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# HOUSING DELIVERY THROUGH PUBLIC- PRIVATE PARTNERSHIP IN NIGERIA AND THE CASE FOR BENEFICIARIES' INVOLVEMENT

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**Abstract**
Over the years successive governments have devised and launched strategies to tackle the huge housing deficit in Nigeria. In the recent past, public-private partnership was embraced and employed in a number of low-income housing schemes across the country. Four such schemes which represented a partnership between the state government and private developer, and between the federal government and private developer, were chosen as case studies. They are Sunshine Gardens and HOB Estate, both in Akure, the Doma Road Estate in Lafia and Shelter-View Estate in Ado Ekiti. The study sought to identify beneficiaries' participation in the schemes. It was established that there was an absence of meaningful community/beneficiaries' participation in these schemes. This absence of participation impinged on the overall performance of these shelter projects. A case was therefore made for beneficiaries' participation in PPP arrangement for low-income housing in Nigerian cities. The advantage of having this third partner needs to be utilised to improve success on the present and future low-income housing schemes.

**Keywords:** public-private partnership, low-income housing, beneficiaries' participation

## INTRODUCTION

There is a high rate of urbanisation in Nigeria. The population explosion and extension in territorial coverage have not been matched by a commensurate increase in social, economic and technological development. Due to the rapidly growing population, the demand for adequate and decent affordable housing units outstrips the supply, among other basic infrastructural facilities. The magnitude of housing shortage in the country – just one aspect of the housing problem – has largely been a guesstimate. The one often quoted document in the recent past is from the Federal Ministry of Housing and Urban Development. In its National Housing Policy Draft, 2004 it puts 'homeless'

persons at 60% of the entire population. It therefore translates to a deficit of about 14 million housing units for the urban and rural areas.

To tackle this deficit, successive governments have devised intervention strategies in terms of policy initiatives and programmes, in order to deliver mass and affordable housing for the various classes of citizens, especially the low-income group. This public sector intervention has been aimed predominantly at the low-income group and has been justified based on a number of reasons identified by Olotuah (2009). First, housing is fundamental right to man's existence and for the development of human potential. Government has a responsibility therefore to ensure its provision as a social service. Second, massive housing intervention stimulates the economy of a nation and is a basis for guided urban development. The third reason is that adequate and affordable housing for low-income earners has the effect of ameliorating the high inequality in income distribution existing in the country and the consequential effect of improving the standard of living. Despite these justifications for public sector intervention and efforts put into it through direct construction of houses, nothing significant has been achieved in terms of meeting the needs of the low-income group - a group which constitutes a large chunk of urban citizenry in the country. Some scholars have presented detailed analyses and arguments on the failure of public housing in Nigeria particularly for the low-income group. The direct provider approach has been criticised in terms of meeting the needs of the target groups, transparency in project implementation, scale of production achieved (Keivani & Werna, 2001), financial constraints, affordability and cost recovery. Performance was also found to be unsatisfactory in terms of cost and time management on the projects using this direct construction approach (Okuwoga, 1998).

However, public-private partnership (PPP), which allows the private sector to participate in the provision of affordable housing, has been a notable feature in the recent past in terms of housing delivery mechanisms. PPP, a form of procurement originally entails the provision of public assets and services through collaboration between the government and the private sector. Grimsey and Lewis (2005) expressed the view that PPP will generally fill the space between traditionally procured

government projects and full privatisation. Akintoye et al. (2006) noted that this joint venture can assist in developing a project more quickly and efficiently than the government (public) would accomplish on its own. The application of PPP in various sectors of the economy is becoming increasingly popular in Nigeria as well as other developing economies. For housing, PPP has been embraced widely and employed in a number of low-income housing schemes by various levels of governance across Nigeria.

As Nigeria has adopted a PPP approach for low-income housing delivery, there is a need to appraise this growing paradigm of partnership. What kind of arrangement is obtainable in the delivery process on these partnership projects? How do these arrangements include the participation of all stakeholders to the end of achieving the goal of delivering affordable mass housing? This paper examines beneficiaries' involvement from a study of low-income housing through public-private partnership. The aim is to identify and possibly measure the level of their involvement in these shelter delivery schemes.

## PRIVATE SECTOR PARTICIPATION IN HOUSING IN NIGERIA

The private sector's participation in housing in Nigeria comprises both the formal and informal segments. Small-scale private landlords in rental housing dominate the informal sector supply of urban housing as noted by Ikejiofor (1997). The greater part of houses produced by this sector is non-conventional, does not comply with established procedures and is frequently contravening existing legislation (Olotuah, 2005). The formal segment of the private sector constitutes corporate institutions who are involved in direct large-scale production and delivery of housing units. The collaborative effort between this sector and the government is generally believed to be beneficial as Li and Akintoye (2003) noted. It enhances government capacity to develop integrated solutions, facilitates creative and innovative approaches thus reducing the cost and time spent to implement the project, transfers certain risk to the private project partner, attracts larger productivity and more sophisticated bidders to projects while providing an avenue to access better skills, expertise and technology.

***As a policy initiative***

Private sector participation has been a highlight in Nigeria's housing policy documents. A shift in policy initiative came partly in response to propositions by various scholars and stakeholders. A New National Housing Policy, dated 2006, evolved from the document produced by a Presidential Committee set up on Housing and Urban Development in 2002. The extant policy had the primary goal of ensuring that all Nigerians own or have access to decent, safe and affordable housing accommodation. The features of the policy influenced the establishment of certain institutional apparatus such as the Federal Ministry of Housing and Urban Development (FMHUD), restructuring of the Federal Mortgage Bank of Nigeria (FMBN), review of critical laws relevant to housing and so on.

A novel policy feature which was in the direction of serious private sector involvement was the formation of the Business Development Department in the Federal Ministry in charge of housing and the establishment of the Real Estate Development Association of Nigeria (REDAN). The former is the division that deals with partnership issues while the latter is the umbrella body of the various individual players (developers) in private-sector housing development. State governments across the country also developed institutional frameworks to facilitate partnership with the private sector for housing delivery. The policy also led to the formation of Building Materials and Pricing Association of Nigeria (BUMPAN).

***Public-Private Partnership Model***

The PPP housing model of PPP in Nigeria is largely similar to what obtains in Malaysia, (Abdul-Aziz & Kassim, 2011), Australia (Thomas, 2009), South Korea (Choe, 2002) and India (Awil & Abdul-Aziz, 2006; Segpunta, 2005). Its emergence can be traced to the broader Nigeria National Privatisation Policy and shift towards structural adjustment in the national economy. Asegiemhe (2007) identified the following operational modes and development process of PPP in housing through his study of Lagos State Development and Property Company (LSDPC):

- Conception or demand for the project
- Site identification
- Preliminary development appraisal- feasibility and liability analysis

- Development programme
- Appointment of professional team
- Contract award
- Actual construction
- Completion and disposal of the project and
- Profit sharing

The private developer is expected to perform all the development tasks, such as design, finance and construction of the housing units. The public sector, that is the government agency, would normally contribute the land, provide counterpart funding, and determine the housing type and selling price. Abdul-Aziz & Kassim (2011) outlined the role of public agencies in this form of partnership. They include that of 'regulator' (Leung and Hiu, 2005), 'enabler' by providing an enabling environment for the private developer (Segpunta, 2005), 'moderator' by balancing market incentives with community interests, 'facilitator' by assisting in project completion and reducing developers' risk (Lynch, Brown and Baker, 1999). These are unlike the erstwhile 'provider' role whereby the government involved itself in direct construction and production of houses (Ogu and Ogbuozobe, 2001). The variety of the roles identified in the former is a function of the level of involvement of the government and other stakeholders, especially the beneficiaries. The touted value of community participation makes any arrangement that involves the community of beneficiaries in part or the entire project process noteworthy.

## COMMUNITY PARTICIPATION IN HOUSING

The idea of community participation has been so widely expressed (Davidson et al., 2007), that it may not seem to mean anything clearly distinct anymore. The term 'community' has been used to refer to a neighbourhood, a slum, a group of local NGOs, a group of militant leaders, the residents of a small town, a workers' union, a group of women, etc. It depicts a group of people that can benefit from any development project and in the context of this paper the terms beneficiaries' participation and community participation are used to generally mean the same thing.

A ‘ladder of community participation’ defines a continuum of approaches for how organizations seek community involvement in housing projects. This ladder was originally proposed by Arnstein (1969) and was later modified by Choguill (1996) to fit the context in developing countries. Davidson et al. (2007) adapted it based on the work of these two authors as shown in Figure 1 below. The ladder depicts that approaches at the top of the ladder empower people in important decision-making roles or offer collaboration with communities, thus promoting community control over the project. On the bottom end of the ladder, beneficiaries may be consulted about their needs and wants (with no assurance that these will be taken into account), merely informed about the shape the housing project will take or even manipulated into taking part in the project. As Choguill (1996) and Arnstein (1969) argue, these cannot actually be classified as ‘participation’ because the users will have little or no control over decision-making (Davidson et al., 2007).

It is, however, a largely accepted fact that stakeholder participation brings important benefits for construction projects (Chinyio and Olomolaiye, 2010; Friedman and Miles, 2006; Walker et al., 2008). As observed in some African cities by Uduku (1994), the support of the urban population is necessary for the development and provision of many aspects of infrastructure services. Studies have also found that housing satisfaction is influenced by variables such as users' characteristics, dwelling unit characteristics, management, as well as environmental and locational factors (Awotona, 1991; Ukoma and Beamish, 1998), which are best decided with meaningful beneficiary participation. It was also opined by Jusan (2010) and Asad Poor and Jusan (2010) that a suitable living environment can be established by proactive individual participation as against passive or non-participation. It yields architectural attributes that are flexible thus facilitating spatial personalisation and then ‘person-environment congruence’ (PEC). One possible way of achieving success in any developmental project therefore is through some form of stakeholder partnership, (Ogu, 2000), and the beneficiaries are just one of the major stakeholders in any housing project.

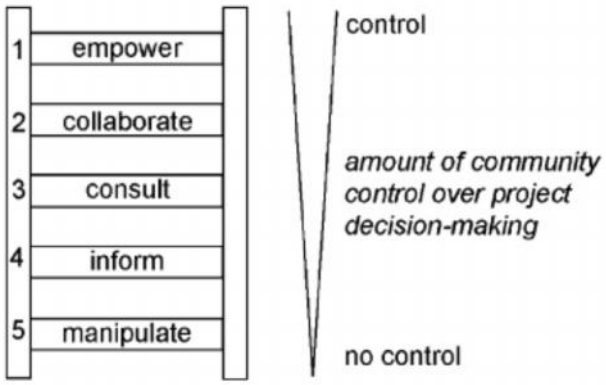


Figure 1: Ladder of community participation (adapted from Arnstein (1969) and Choguill (1996) by Davidson et al. (2007)

## RESEARCH METHODOLOGY

The methodology adopted follows the case-study methodology. This approach involves careful and complete observation of concerning entity(ies) in minute details and then drawing inferences from the case-data generalisations (Kothari, 2004). Four case studies which represented partnership between state government and private developer and federal government and private developer were chosen. They are Sunshine Gardens and HOB Estate, both located in Akure, Ondo State. The third one is Doma Road Estate in Lafia, Nassarawa State while Shelter-View Estate in Ado Ekiti, Ekiti State is the 4th scheme. The four cases are located in medium-sized cities that also serve as state capitals in Nigeria. The research involved a longitudinal collection of data from March 2006 to August 2011. The non-chronological sequences of activities involved are:

1. Visits to the selected low-cost housing projects delivered through PPP. Study and collection of drawings (that indicated the building design and site layout), project report, notes and picture took place. Non-participant observation also took place which allowed the researchers to learn directly from their own experience of the setting.

2. Visits to offices (off site) of the project partners. The offices included those of the Federal Ministry of Housing and Urban Development (FMHUD) in Ado Ekiti and Akure, Ondo State Development and property company (OSDPC) and other representatives of the public and private sector. Information was collected through interviews and taking of notes.

3. Unstructured interviews and informal meetings were held with personnel involved in the project. This cut across public servants who represented government's interest, officers/representative of private developers, contractors and professionals involved in the scheme.

4. Conducting a search for all publications (advertorial, articles, website, and press releases) and unpublished matters that related to any one of the projects studied.

5. Interactions with some individuals who fall within the beneficiaries/target group of the housing units developed. This yielded information that assisted in ascertaining the needs, expectations and involvement during the different phases of the projects

6. Condensation of research results and analytical generalisations as opined by Yin (2003).

Following the case-study research method proposed by Proverbs and Gemeson (2008), the triangulation method was used to ascertain the integrity of the information collected. Information on the project discussed in Case Study 3 was derived from Ahmed et al. (2010) having utilised similar methods to those stated above.

***Case Study 1 - HOB Housing Estate, Akure, Ondo State***

In August 2005, the Federal Government of Nigeria signed a Memorandum of Understanding (MoU) with private developers for the construction of housing units across the country. Development of the above estate was undertaken by the real estate arm of HOB Nigeria Ltd. in partnership with FMHUD under the Partnership and Business development programme. HOB is a private company involved in human and infrastructural development, educational advancement, telecommunication, automobiles and housing development. It is a registered member of the Real Estate Developers Association of Nigeria (REDAN). The official handing-over of the project site by the Federal Minister in charge of Housing took place on 15 December 2005 at Igbatoro Road, Akure. It was learnt that funding for the scheme was secured from institutional lenders with particular reference to the Federal Mortgage Bank of Nigeria.

The housing scheme was aimed at providing permanent housing for the low-income group, especially the public servants in the Akure Metropolis. The estate is located directly behind the Federal Secretariat Complex and adjacent to the Nigeria Police State headquarters; that area therefore accommodates the largest concentration of federal public servants in the state. There are 3 modes of acquiring any of the dwelling units. The first is outright payment, then instalment payment within one year and payment through mortgage finance. Contributors to the National Housing Fund through accredited Primary Mortgage Institution PMI can make payments in instalments that span 25 years.

New Dimension Consultants, an architectural firm undertook the design for the estate in 2005. The 29.9 ha of land was subdivided into 110 blocks to accommodate 314 units of 2-bedroom semi-detached, 3-bedroom detached and 3-bedroom semi-detached dwellings. Other supporting facilities include a school, a religious centre, a petrol station, an administrative building, recreation spaces and so on. The scheme is only on its 1st phase which has to date seen the construction and delivery of only 3-bedroom detached units. Different building contractors were engaged by the developer to handle construction of the units in this phase. Taiwo and Adegun (2011) reported that less than 70 units of this phase have actually been delivered while others are under construction, although no construction work was seen to be ongoing at the time of their study. A few of the units delivered have already been sold, allocated and occupied.

***Case Study 2 - Sunshine Gardens, Oba Ile, Akure, Ondo State***

The State Government through her Ministry in charge of Lands and Housing entered into a partnership with Locke Homes Ltd., a Lagos-based real estate company in 2009 to develop a low-cost housing scheme. The housing estate is located on land earlier earmarked for housing development which also adjoins the existing Oba-Ile housing estate. PMG Nig. Ltd. undertook architectural design and site layout for the estate to a total of 405 dwelling units. Other facilities proposed include a sports centre, a police post, and a shopping mall.

This phase of the scheme was developed in 3 typologies, namely Liberty, Diamond, and Starlet design options. Liberty is 3-bedroom detached dwelling unit with all the bedrooms en-suite.

Diamond is also a 3-bedroom detached dwelling unit with only the master bedroom en-suite. Starlet is a 2-bedroom semi-detached dwelling unit with a bathroom. There are 3 modes of payment for any of the units. The first is outright payment, then instalment payment within one year (10%) initial payment, (30%) for provisional allocation, and the balance (60%) upon completion/occupation of the house. Payment is also possible through mortgage finance that is provided by the National Housing Fund. Other payments include a 5% of the selling price as agency fee and 5% also as value-added tax (VAT).

***Case Study 3 - 500 Unit Estate, Lafia, Nasarawa State***

In October 2007, the Administration of Governor Aliyu Doma signed an MoU with CHIPA Nig. Ltd. for the construction of 500 housing units in Lafia, the Nasarawa State Capital through PPP. CHIPA Nig. Ltd., as learnt, was selected from the list of bidders due to its track record in similar projects and a strong company profile. The housing scheme was developed in 200 blocks of 3-bedroom detached bungalow dwellings and 150 blocks of 2-bedrrom semi-detached units. This makes a total of 500 dwelling units. The scheme was also aimed at providing permanent housing for low-income civil servants in the State capital.

The agreement provides that Government will shoulder the following as its contribution to the joint venture:

- Land with secured tenure
- Access roads, water supply, electricity supply (off and on the site)

The State Government secured a 58 ha piece of land along Doma Road, in Lafia for the development. Having paid compensations to the land owners, the land was cleared and handed over to the developer for the commencement of construction. The Certificate of Occupancy (C of O) was also issued to the developer to facilitate mortgage transactions. The C of O is under lease tenure of 99 years to be sub-divided among beneficiaries on completion of the housing estate. The remuneration to Government and other parties in the joint venture shall be based on pro-rata of contribution to the total project cost. The State also signed a contract with a construction company to provide infrastructural services in the estate.

The mortgage arrangement will involve the sourcing of NHF loan from the Federal Mortgage Bank of Nigeria (FMBN) through a PMI at an interest rate of 6% on behalf of interested civil servants. The loan would be utilised by the allottees to purchase the houses from the developers. The developer, in concert with the Office of the Head of Service and an accredited PMI, would secure the loan facility for interested civil servants. The Ministry of Works, Housing and Transport took into account the developer's design and specifications to arrive at prices for the various units.

***Case Study 4 – Shelter-View Estate, Ado Ekiti, Ekiti State***

FMHUD, on behalf of the Federal Government signed an MoU with Shelter-View & Investment Nigeria Ltd. (a private real estate organisation) towards the development of a housing estate on Afao Road of Ado Ekiti. Ado Ekiti is a major city in Nigeria and capital of Ekiti State. The scheme was proposed to provide 220 dwelling units in typologies of 2-bedroom, 3- bedroom and 4-bedroom detached bungalows. Other facilities for the estate include a police post, a religious centre, a health centre, an educational institution.

Ownership of any of the dwelling unit is open only to Nigerians above the age of 21 who have been contributors to the National Housing Fund for a period of not less than 6 months. Membership and contribution to the NHF scheme is taken as collateral for the loan. Platinum Savings and Loans, a mortgage banking organisation was designated as the PMI and marketer for the scheme. The schedule before acquisition includes 10% of the selling price as initial payment, accessing a loan at 6% annual interest from FMBN, payment of 3.5% on loan as administrative charges, payment of other charges (mortgage deed, facility charge) before handing over of the building to the owner. Repayment of the loan is spread over the number of years between the owner's age at purchase and 60 years. It was observed that some of the dwelling units have been delivered and are occupied while others are in various stages of construction.

***Absence of beneficiaries' input***

The study indicated that the organisational structure in the four schemes excludes the participation of the beneficiary group at the meaningfully decisive stages: management, financing, design, construction and assembly of components. It was only an agreement between the government

ministry/parastatal in charge of housing and the private organisation (developer). The Nigeria Labour Congress (NLC) was to stand in for civil servants in the MoU signed for Case Study 3. This community of government workers was, however, denied participation in the scheme intended for them. These interventions dwelt on supposed needs by the government (public), translated into arbitrary standards by the private developer rather than including benefitting households' needs, peculiar interest, willingness to purchase and ability to pay.

The architectural design and layout of the units did not take adequate cognizance of the 'incremental' characteristic of low-cost housing; a factor which could have been addressed with timely and appropriate beneficiaries' participation. The incremental factor refers to the evolutionary process (horizontal and vertical expansion of the units) in response to the problem of inadequate space, household dynamics and growth, exploration of economic possibilities and change in status. There is no permission for alterations in the building's architectural form before and after purchase; however, changes are allowed in areas such as finishing, fixtures and certain components. Provision for physical redevelopment to accommodate household growth and dynamics is limited to the erection of another structure behind the existing building in the small yard provided at the rear of each building, subject to approval of the presiding authority. This situation is averse to the nature of low-cost housing in a developing economy. It impedes the achievement of self-help initiative and citizen empowerment. It is not a pro-sustainable development. Serious changes were observed in the finishes and certain components of the house already occupied. Since what the developers put in place in the houses do not meet the beneficiary households' varied psychosocial needs, they have to alter various aspects, which naturally has disadvantages. Adegbehingbe and Fadamiro (2007) dwelt on some of these disadvantages.

The housing schemes studied were relatively new and the housing units delivered have not been fully occupied, hence the extent of community participation at the post-occupancy stages was therefore not looked into. As stated, these schemes are devoid of meaningful participation from the beneficiary groups. The same situation can be said applies to the majority of the low-income housing schemes delivered through PPP across the states in the country, although the cases discussed above have not been proved to be truly representative. This finding would provide a footing for Olotuah's argument

that decisions reached in the top-down approach to propose a prototype housing design for the entire Nigerian population have never really succeeded. It also supports the position taken by Adegun and Taiwo (2011) that although there are additions to the existing housing stock, the present arrangement of PPP for low-income housing delivery needs to be fine-tuned to improve project execution, affordability, sustainability and other issues.

***Case for beneficiaries' involvement***

The case for beneficiaries' involvement/community participation adduces towards the 'bottom-up approach' as against the existing 'top-bottom approach' on PPP in low-income housing delivery. Involving the beneficiaries meaningfully smacks of an overlap between the conventional approach of housing provision from an industrial and economic process relying solely on professional knowledge, and a humanistic process relying on cultural roots while responding to the beneficiary's higher level of need. On PPP in housing Segpunta (2005) actually opined that the government will have to pave the way for a constructive expansion of partnership to include community participation without stifling producer productivity and competitiveness. Such programmes should be based on genuine local participation in order to ensure sustainability, (Olotuah, 2009). This will require the balancing of market incentives with community interests. Alongside policies, capacity-building efforts will be needed to increase awareness and change attitudes to the formation of what Jain (2003) called 'Public-Private-Peoples Partnerships' (PPPP). The fact is that successful low-income housing development will require a careful 'articulation of multiple participants' (after Lizarralde, 2011) – private, public and the people.

The South African example was noted by Lizarralde (2011) where in order to respond to the difficulties of integrating beneficiaries in the development of subsidised housing, the programme adopted a participatory approach called People Housing Process (PHP). Contrary to developer-driven approaches, in PHP housing projects community-based organisations, which might take the form of Community Development Co-operatives (McEwan, 2003), lead the process of housing procurement with the support of Community Support Organisations (CSOs). The CSOs are often NGOs involved in development and community empowerment. The PHP approach that maximises beneficiaries' participation, choice and control resulted in construction of better quality houses.

It also resulted in development and skills transfer and employment creation, especially for women (Thwala and Ogunfiditimi, 2007).

The potential of beneficiaries' involvement at circumventing 'corruption' inherent in public sector sole or partnered construction projects in Nigeria must be acknowledged. Corruption is a generic term used in Nigeria to capture sharp practices inherent in governance manifesting especially in procurement processes. Adegun and Taiwo (2011) took note of nepotism, disregard for merit and due process in the selection of contractors and award of contracts in two of the cases above. This resulted in workmanship of poor quality in some situations. Involvement of the beneficiaries will, however, disallow or at least minimise this. The interest of each beneficiary and everyone together will count such as to ensure that a suitable private partner/developer is selected, the projects are priced appropriately, funds are prudently spent, the quality of work specified is done and due process is adhered to. Their involvement is also capable of shielding undue political influence on the schemes.

## CONCLUSION AND RECOMMENDATIONS

It has been shown that PPP, originally a form of procurement, has been employed by various governmental authorities as a means of providing mass housing for the low-income urban population in Nigerian cities. The four cases studied and the discussions that followed indicate that this arrangement has allowed an increase in the affordable housing stock in the cities. It can, however, be seen that these excluded any meaningful participation of the beneficiaries in the entire process of delivering these housing schemes. This exclusion resulted in some negative outcomes on the schemes.

It has also become clear that there is a need to restructure these partnerships to incorporate beneficiaries' input as exemplified in community participation. Community participation in PPP for low-income housing delivery would not be an end in itself but a means to an end. The end is – provision of mass, decent and affordable houses in the cities. There is no single model for participation that would fit into the different kinds of schemes taking place in the country, since there are varying participants and contexts. Establishing a practical and operational framework is suggested. This is to provide a better understanding and consideration of housing-related needs

(possibly after Maslow's Hierarchy of Needs) and their psychological, socio-economic and cultural requirements. This would help to determine what kind of participation, at what stage, what kind of input among other variables that would help to achieve better shelter schemes for the low-income group through PPP in Nigerian cities.

It is not enough for any government (state, federal or local) to envision mass housing schemes for its low-income citizens; for such vision to be successful and sustainable it must include meaningful participation of the beneficiaries; it should be noted that beneficiaries' involvement has policy implications. It is necessary that all Memorandums of Understanding crafted and signed must contain a meaningful place for the beneficiaries. This must also be implemented to the letter. For any project that would involve public servants, the National Labour Congress, Trade Unions/Associations must be consulted during every phase. There is also a need to expand the mode of acquiring these dwelling units to include those operating in the informal sector. These people normally do not contribute to the National Housing Fund or are disposed to taking up other formal means of finance.

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# ASSESSING THE IMPACT OF DELAYS ON THE PRODUCTIVITY OF CONCRETE PLACEMENT BY CRANES IN NIGERIA

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**Abstract**

Infrastructural construction investment in Nigeria is currently estimated at US$5bn annually and of the key trades in the industry, concreting makes up about 15% of the total frequency of operations. One of the most dominant concrete-placement methods in Nigeria is by crane and skip and it has been established that fractional delay (delay time expressed as a fraction of pour duration) is the most significant factor affecting its productivity. This study therefore focused on evaluating the extent of delays on craned concrete placement in Nigeria and determining their effects on concreting productivity. The study involved a close observation of 35 daily concrete pours placed by crane and skip on 25 project sites selected through stratified random sampling procedure in Lagos. Productivity data obtained were analysed by multiple regression to obtain a model relating productivity to fractional delay. The results showed an average delay of above 23% of the pour time while the productivity is reduced by more than 2.5 m3/h for every 10% increase in delay. The latter is over 5 times the productivity reduction obtained in Hong Kong study for the same percentage increase in delay and confirms that delay has a far greater impact on the productivity of concrete placement by cranes in Nigeria than in other countries. It was recommended that serious, and concerted, managerial actions be directed at proper planning and scheduling of material deliveries as well as labour and equipment inputs by adopting the developed model to monitor and eliminate most delays and sustain productivity.

**Keywords:** concrete placement, crane, delays, impact, Nigeria, productivity

## INTRODUCTION

Concreting is one of the most common operations in today's construction industry and concrete operations including batching, transporting and placing are familiar on many construction sites throughout the world.

Concrete work is also an important and fundamental part of modern construction practice common to international construction which can provide a meaningful indication of the comparative performance of contractors since it is essentially a cyclical task which is similar on all construction sites, regardless of international location (Proverbs, Holt and Olomolaiye, 1999). Furthermore, as submitted respectively by Chan and Kumaraswamy (1995), Wang, Ofori and Teo (2001) and Dunlop and Smith (2003), the operational productivity of equipment and labour in concrete placement is an essential, intrinsic parameter influencing the construction industry.

Productivity, however, combines effectiveness with efficiency because while effectiveness relates to performance, efficiency is related to resource utilisation (Mali,1978).Such productivity rates rank amongst the most essential data needed in the study of construction productivity for the reason that planning engineers require them to estimate and schedule concrete pours and resource levels as well as for accounting control. Dunlop and Smith (2003) submit that planning engineers often maintain a large databank of basic productivity rates which they adjust for individual projects taking into account specific site factors and conditions which may influence such rates.

According to Graham, Smith and Tommelein (2005), the problem of inefficiency and high cost of manufacture, transportation and placing of concrete has been continuing for decades. Unfortunately in Nigeria, where the infrastructural construction investment in 2007 was about NGN 350bn (approximately US2.8bn dollars) and is expected to grow annually by about 11% up till 2013, there is a shortage of data and information on the overall demand and production of concrete as well as concreting productivity benchmarks(Nigerian Infrastructure Report Q2, 2009). Meanwhile, it has been estimated that of all the key trades in the Nigerian building industry, concreting represents 15% of the total frequency, after carpentry which represents 19.5% of the overall frequency (Olomolaiye, 1984).

Furthermore, Olaoluwa, Adeyemi and Lawal (2010), in a recent study of the concreting process and the factors influencing the productivity of concrete placement by cranes in Nigeria, submitted that productivity in the Nigerian construction industry has been branded as extremely low by a number of industry researchers and recommended that the three variables of type of pour, pour size and

fractional delay be noted by planning engineers in the future planning of concrete placement by crane. It is against this background that the present study purposes to evaluate the delays associated with craned concreting and assess the extent of their impact on concreting productivity.

## CONCRETING PRODUCTIVITY RATES

Productivity can be defined in different ways depending on the purpose of measurement. In construction, trade productivity is usually defined for conceptual and analytical simplification as the ratio of the output in a particular trade related to the tradesman's inputs and can be expressed in quantitative terms as physical productivity. Wang (1999) and Abd, Abd, Hj, Zain and Ismail (2008), however, submitted that it is important to specify the input and output to be measured when calculating productivity because there are many inputs to the construction system, such as labour, materials, equipment, tools, capital and design. Also, the conversion process from inputs to outputs associated with construction operations is complex, being influenced by the technology used and by many externalities such as government regulations, weather, unions, economic conditions and management and by various environmental components. Even for an operation like concreting, with well-known equipment and work methods, construction productivity estimation can be challenging, owing to the unique work requirements and changeable environment of each construction project, as well as the complexity of the influences of job and management factors on operational productivity (Ok and Sinha, 2006).

Different yardsticks are usually employed for measuring the productivity of concrete placement by giving the placement labour or equipment productivity as the ratio between the quantity of concrete placed to the man-hours (mh) or equipment hours (eh) committed by the placing gang or equipment respectively, the mixer productivity as the ratio between the quantity of concrete placed to the mixer-hours spent on site (Wang, 1995, Anson, Wang and Wang, 1996). Concreting productivity consequently entails relating a single input (worker-hour (wh) or equipment-hour (eh)) to a single output (concrete volume in m3) and the simple productivity ratio of this input and output is calculated by assuming a closed system with all other factors held constant except for the desired input and output (Wang, 1999). Such productivity measures relating output separately to each major class of input proportions reflect changes in these input proportions as well as changes in productive

efficiency and allow organisations to analyse the changing costs of the inputs when combined or when separated in terms of both their prices and quantities (Kendrick, 1977; Mali, 1978).

The overall productivity for an entire concreting operation, which is the placement rate, is thus appropriately measured as the ratio of the quantity of concrete placed to the total time of the operation in m3/h. However, in this study the convention of measuring labour productivity as input divided by output or operative hours per unit of work, (wh/m3 of concrete) has been adopted, since it has been found more appropriate for planning purposes (Proverbs et al., 1999; Dunlop and Smith, 2003).

***Earlier work***

Previous findings have indicated the effects of delay in concrete supply service on concrete placement productivity in the countries of Europe, Hong Kong and Singapore. For example, Anson and Wang (1998) measured the mean interruptions (delays) in concrete supply as percentages of pour duration for pumped, craned and barrowed pours in Hong Kong buildings and plotted the placement speed (productivity) achieved against delay in the supply of concrete. The regression lines computed for each of the three types of placement method in their study showed how productivity dropped with a delay in supply. Similarly, Wang et al. (2001) measured delays caused by the RMC supplier for crane and skipped, tremied and pumped pours in Singapore and compared the average delay due to concrete supply as a percentage of pour duration for crane and skipped pours with those for the United Kingdom, West Germany and Hong Kong.

***Concreting in the Nigerian construction industry***

In the early construction industry in Nigeria, head pans served as the standard concrete handling/placement unit with women using them to haul hand- and site-mixed concrete on building sites. Although the construction industry has come a long way with cranes now in use, many buildings are still constructed using the head pans for in situ concrete placement. The results of a pilot survey conducted by Olaoluwa (2008) on construction sites in Lagos, Nigeria, showed that the most prevalent concrete-placement methods and/or equipment in use are head pans (used in about 71% of the building sites), wheelbarrows (used in about 57% of the building sites), dumpers (used in

about 48% of the building sites) and cranes and skips (used in 44% of the building sites). Concrete placement by crane and skip in Nigeria is the least labour intensive of the placement methods and is the most efficient and effective way, being about twice as fast as when using a wheelbarrow and nearly four times faster than when using a head pan (Olaoluwa and Adeyemi , 2009). Apart from these methods, the two methods of placing concrete that are most applicable to multi-storey frame construction are by pumping and by crane and skip where a site crane hoists a skip from ground level to the required location in the frame.

Most empirical studies have, however, revealed that the output of the construction industry in Nigeria is quite low when compared with that of many developed countries and workers' productivity on construction sites has been shown to be very poor (Fagbenle, Adeyemi and Adesanya, 2004). Concreting and the selection of the concrete-placement method on construction sites is still largely governed by cost and availability of resources without much regard for the economy of location and size of the pour, the rate of progress required, and the productivity levels of the method of concrete placement (Olaoluwa, 2008). Many buildings in Nigeria are also still constructed using the traditional method of in situ concrete placement in which concrete is mostly site-batched and mixed. The use of ready-mixed concrete in concrete truck pumps, truck mixers and conveyor belts is almost non-existent.

This study of the influence of delay on the productivity of in situ concrete placing will therefore provide insight into one major area of the construction industry where productivity can be improved and provide benchmark results for control and monitoring of the productivity of Nigerian contractors. The study will build and expand on previous works in other countries by identifying the effect of delay on concreting productivity by crane, which currently is the fastest of the four prevalent concrete-placement methods in Nigeria.

## RESEARCH METHODOLOGY

The approach was to study several concreting operations on selected building construction sites in the Lagos Metropolis to obtain concreting productivity data which could be analysed to predict the influence of delay in concrete supply service on the concreting productivity rates of cranes.

For the purpose of this study, all the bungalow and single-storey building sites where considerable in situ concreting was being carried out were visited to identify 64 building sites manned by contractors duly registered with the Nigerian Federal Ministry of Works. This was decided on because only such contractors are formally adjudged as being capable of concreting to acceptable standards. Lagos was selected for the study because it is a typical mega-city with the largest concentration of construction sites and workers in Nigeria.

***Sampling size***

Based on the population of 64 construction sites manned by contractors registered with the Federal Ministry of Works where concreting was being undertaken in the Lagos Metropolis, the sample size was calculated from the stratified random sampling formula given by Mendenhall, Ott and Scheaffer (1971) as:

$$n = \frac{\sum^{L} \frac{N_i^2 p_i q_i}{W_i}}{N^2 D + \sum_{i=1}^{L} N_i p_i q_i}$$

where:

n = sample size

L = number of strata = 3 (for sites manned by large-, medium-, and small-sized firms registered in categories A, B & C, and D, respectively, with the Federal Ministry of Works, i.e. large-sized firms being those registered in Category A, medium-sized firms those registered in Categories B & C, while small-sized firms are those registered in Category D)

$N_i$ = size of the $i^{th}$ stratum, with $i$ = 1, 2, 3; and

($N_1$ = 8 sites of large firms; $N_2$ = 34 sites of medium firms; and $N_3$ = 22 sites of small firms)

$N$ = population size = 64 building sites

$p_i$ = population proportion for the $i^{th}$ stratum with required characteristic (assumed to be 0.5)

$q_i$ = denotes the population proportion for the $i^{th}$ stratum without the required characteristic ($q = 1 - p$)

$w_i$ = fraction of observations allocated to the $i^{th}$ stratum = $\frac{N_i}{N}$ ; $w_1 = {}^{8}/_{64} = 0.125$, $w_2 = {}^{34}/_{64} = 0.531$, $w_3 = {}^{22}/_{64} = 0.344$

$D = B^2/4 = (0.1)^2/4 = 0.0025$

in which $B$ is the error bound on the estimate (= 0.1), and $1 - B$ is the confidence level. Substituting values into the above equation

$$n = \frac{\sum_{i=1}^{3} \frac{N_i^2 p_i q_i}{w_i}}{N^2 D + \sum_{i=1}^{3} N_i p_i q_i}$$

$$\sum_{i=1}^{3} N_i^2 p_i q_i = \frac{8^2(0.5)^2}{0.125} + \frac{34^2(0.5)^2}{0.531} + \frac{22^2(0.5)^2}{0.344}$$

$$= 128 + 544 + 352 = 1024$$

$$\sum_{i=1}^{3} N_i^2 p_i q_i = 8^2(0.5)^2 + 34^2(0.5)^2 + 22^2(0.5)^2$$

$$= 2 + 8.5 + 5.5 = 16$$

$$N^2 D = (64)^2\ 0.0025 = 10.24$$

$$n = \frac{1024}{10.24 + 16} = \frac{1024}{26.24} = 39$$

Therefore, $n_i$, the number of samples or observations allocated to the $i^{th}$ stratum shall be obtained from:

$n_i = nw_i$, $i = 1, 2, 3$

where:

$n_1 = 0.125\ (39) = 4.88 \approx 5$ sites manned by large-sized construction firms

$n_2 = 0.531\ (39) = 20.701 \approx 21$ sites manned by medium-sized construction firms

$n_3 = 0.344\ (39) = 13.416 \approx 14$ sites manned by small-sized construction firms

From the pilot survey, it was observed that while all the sites manned by large-sized construction companies were supervised and managed by qualified professionals, only 10 of each of the sites manned by medium- and small-sized construction firms were supervised by qualified professionals. Based on the stratified random sampling formula adopted, the outcome of the pilot survey conducted, and the need to achieve a common quality evaluation system for the construction projects selected for the productivity studies, only 25 projects were selected for a detailed study as follows:

5 sites manned by large-sized construction firms

10 sites manned by medium-sized construction firms and

10 sites manned by small-sized construction firms

To select sites in the first stratum on a simple random basis, the balloting system was adopted whereby the sites in this stratum are numbered from 1 to 8. Each number was squeezed into a ball-like shape and gathered in a container, which was properly shaken to mix the 'paper balls' well. Five of the balls are drawn one after the other from the container and the sites corresponding to each of the drawn numbers were included in the sample.

On these 25 project sites, a total of 167 separate concrete-placement operations were observed comprising 35 pours placed by crane and skip, 26 pours placed by dumper, 58 pours placed by wheelbarrow, 37 pours placed by head pan and 11 pours placed jointly by pump, wheelbarrow and head pan.

***Methods of data collection and field work***

The method of data collection in this study was through field survey where survey sheets were duly completed during personal site visits, backed up with face-to-face discussions with site personnel and concrete-placement operatives in order to eliminate the problem of no response. The structured survey sheet was developed to gather primary data on the concreting operations and to ensure consistency of approach while making allowances for general discussions and peripheral comments which were noted and added to support contextual evidence. The data appropriate for the productivity study of the concreting operations, i.e., the activities of mixing, transporting and placing, were obtained through site survey and direct observation of the concrete pours on the 25 building construction sites. Direct measurements were made over the cycles of concreting operations to obtain operational data on each of the concrete pours.

Table 1 summarises the data and productivity characteristics that were observed and calculated for the 35-craned concreting operations. The observed data included the types of pour, the pour size or the quantity of concrete placed, the total duration of the pour or overall pour-time from the beginning of each operation to the end, and the total time of delay. The total time of delay comprised the idle

times encountered during the concreting operation due to poor weather, plant breakdowns, fuel or material shortages and other problems relating to difficulties in mixing and placing the concrete, including inadequate planning or scheduling and poor management which adversely affected the timely supply of concrete to and from the placing equipment. The calculated quantities are the fractional delay (delay time expressed as a decimal fraction of the pour duration) as well as the productivity (overall and labour) values indicated in the table.

Table 1: Summary of data and calculated productivity characteristics for each type of pour

| Type of pour | | Pour size ($m^3$) | Delay (min) | Total duration (h) | Fractional delay | No of operatives | Distance to pour location (m) | Overall productivity ($m^3$/h) | Worker-hour per $m^3$ |
|---|---|---|---|---|---|---|---|---|---|
| **Beam & slab** | Sum | 1319.2 | 1222.88 | 92.72 | 4.31 | 443 | 278.00 | 333.24 | 55.21 |
| | Mean | 59.96 | 55.58 | 4.21 | .19 | 20.14 | 12.63 | 15.14 | 2.51 |
| | N | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| **Column & wall** | Sum | 136.45 | 523.29 | 34.08 | 2.35 | 168 | 10.00 | 60.19 | 88.02 |
| | Mean | 10.50 | 40.2531 | 2.62 | .18 | 12.92 | .77 | 4.63 | 6.77 |
| | N | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| **Total** | Sum | 1455.65 | 1746.17 | 126.80 | 6.65 | 611 | 288.00 | 393.43 | 143.23 |
| | Mean | 41.59 | 49.89 | 3.63 | .19 | 17.46 | 8.23 | 11.24 | 4.09 |
| | N | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |

The definitions of all the variables used in Table 1 and in the analysis which follow are:

i. Type of pour-either slab & beam or column and slab

ii. Pour size-volume of concrete poured (in cubic metres)

iii. Delay or waiting time in minutes

iv. Total duration in hours

v. Fractional delay-ratio of delay to duration

vi. Number of operatives – placing crew

vii. Distance to pour location(dpl)-distance between concrete mixing point and placing location in metres

viii. Overall productivity or output or quantity of concrete poured in unit time (m3/h)

ix. Labour productivity or how many operatives are required to pour 1 m3 of concrete in wh/m3

## DATA ANALYSIS AND DISCUSSION OF RESULTS

The mean pour size for all the 35 pours in the sample was 41.59 m3. The bigger mean pour size was about 60 m3 for beam and slab pours while about 10.5 m3 was the mean pour size for column and wall pours. This shows that the size of column and wall pours is generally less than 20% (actually 17.5%) of beam and slab pours. This is to be expected because column and wall volumes are usually much less than beams and slabs.

The mean duration of all pours was found to be approximately 3.6 h, the longer mean duration of about 4.2 h being for the 22 beam and slab pours while the mean duration for the 13 column and wall pours was about 2.6 h or about 60% of the mean duration for beams and slabs. This is also reasonable because concreting of columns and walls is much slower than concreting of beams and slabs and shows that while 60 m3 of beam and slab concrete took 4.2 h to pour, 10.5 m3 of column and wall concrete took 2.6 h to pour, i.e. about 3½ times slower.

The mean number of concrete-placement operatives for all the 35 concrete operations was about 17, i.e., approximately 20 for the 22 beam and slab pours and about 13 for the 13 column and wall pours. Considering that the average concrete volume of beam and slab pours is 60 m3 while that of column and wall pours is 10.5 m3,the number of operatives employed per m3 for the column and wall pours is about 4½ times higher than for beam and slab pours. On the other hand, since the concreting of beams and slabs is only 3½ times faster than the concreting of columns and walls, the number of operatives employed for the column and wall pours is comparatively on the high side. This confirms earlier observations made by Olaoluwa and Adeyemi (2009) that there is no proper, adequate planning or work scheduling effort to ensure optimal utilisation of labour by streamlining the number

of concrete-placement operatives engaged with the type and method of pour.

It has been stated that the delays recorded include idle times encountered during the concreting operations, due jointly or severally to poor weather, poor site conditions, plant breakdowns, fuel or material shortages and problems relating to difficulties in mixing and placing the concrete, including inadequate planning or poor management which adversely affect the timely supply of concrete to and from the placing equipment. These were within the range of 56 min to 40 min for all the craned pours or an average of 50 min out of a mean duration of 3.6 h, implying that the average delay is above 23% of the pour time. This is excessively high when compared with the figure of 8.1% obtained by Wang et al. (2001) for other delays encountered on craned concrete-placement sites in Singapore (i.e. outside those caused by truck mixers being idle and waiting times for truck mixer).

For all pours, the mean distance between the mixing/batching point and the pour location was about 12.6 m for beam and slab pours but less than 1 m (0.77m) for column and wall pours. Although the latter is on a practically very low side, it is not unreasonable because most column and wall concrete have to be poured in a controlled manner (Dunlop and Smith, 2003) while cranes are used mainly for their advantage in slewing over vertical distances and not usually for horizontal distances.

***Actual productivities achieved***

The overall productivities were monitored and calculated in m3/h for each type of pour and for all the pours as shown in Table 1.The productivity achieved overall is the ratio of pour size to the total duration including all delays. For labour productivity, it is the ratio between the times committed by the concrete-placement operatives to the pour size.

From Table 1, it can be observed that the mean productivity of craned pours is 11.24 m3/h for the 35 pours of 41.6m3 mean pour size. The mean productivity of beam and slab pours (15.15 m3/h) is, however, more than 3 times the mean productivity of column and wall pours (4.63 m3/h), as previously indicated. The mean productivity of 11.24 m3/h for craned pours observed in this study compares very well with those of 12.2 m3/h for 43 craned pours obtained in Hong Kong with a mean pour size of 89 m3 (Anson and Wang, 1998) and 11.3 m3/h for 10 craned pours obtained in Hong

Kong with a mean pour size of 49 m3 (Chan and Kumaraswamy, 1995).

The mean labour productivity was 4.09 wh/m3 for all pours, 2.51 wh/m3 for beam and slab pours and 6.77 wh/m3 for column and wall pours. The labour productivity of 4.09 wh/m3 for crane and skip observed in this study is, however, nearly 5 times lower than that of 0.81 wh/m3 obtained in Anson and Wang's (1998) study of craned pours in Hong Kong buildings corroborating earlier submissions by Ameh and Odusami (2003) and Fagbenle et al. (2004) that workers' productivity on Nigerian construction sites is very poor and much lower than that achieved in the developed world. It also confirms the observation made by Olaoluwa and Adeyemi (2009) that there is poor site management, including the improper planning and scheduling of site labour, in the concreting operations carried out in Nigeria.

***Regression analyses on observed productivity data***

Regression analysis was carried out on the observed data to determine the statistical relationship between productivity and the significant explanatory variables and to obtain probable models to estimate productivity rates for the concreting operations. In this regard, the explanatory variables originally identified for serious variability in craned concreting productivity were:

- Type of pour, – coded '1' for slab and beam and '2' for column and walls Pour size, (m3)
- Total duration (h)
- Delay (min)
- Number of operatives
- Fractional delay
- Distance to pour location (m)
- Weather, – coded '1' for fine weather, '2' for cloudy weather, '3' for sunny and '4' for rainy weather

For the regression analysis, the in-built functions of SPSS 16.0 for windows was used because it allows one to store the data, perform transformations and analyse and produce charts and graphs of results. In this instance, a stepwise regression of productivity was run on the 8 identified variables and the regression results were examined in turn so as to determine the functional relationship among

the variables and obtain a model that will predict productivity rates for the craned concreting operations.

The regression analysis used is multiple linear regression which begins with all the explanatory variables (type of pour, pour size, fractional delay, weather and distance to pour location) in the model, and eliminates the 'non-significant' variables for the craned method of concrete placement (Dunlop and Smith, 2003; Tabatchnick and Fidell, 1996). The output of the regression analysis, according to Oluwadiya (2004) includes the following:

- ANOVA table which signifies the acceptability or otherwise of the regression results.
- Model summary table, which indicates the strength of the relationship between the model and the variations in the dependent variable.
- 'Coefficients' table which displays the values for predicting the dependent variable given the scores of the independent variables and using the 'Unstandardised Coefficients' as the values for the constant and the coefficients of the variables.
- Table of correlation coefficients between all pairs of the explanatory variables, including productivity, which indicates the relationships between the variables and confirms the appropriateness or otherwise of the regression coefficients above.

A set of the regression analysis and correlation coefficients matrix was computed for the set of multiple regression analysis performed to explain the effectiveness of the eight responsive parameters on productivity. The regression is of the form:

Productivity, $P = y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8$ where

$x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8$ are the variables explained previously and $a, b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8$ are constants.

For concrete placement with cranes, the ANOVA results are shown in Table 2 where the last column of the table titled ‘Sig’ shows that the ‘Goodness of Fit’ is less than 0.05, implying that the model fits the data and the variations explained by the model are not due to chance. The summary of the ANOVA table indicates that the model is significant at the 0.000 level. This is less than the chosen confidence level of 0.05 and is therefore acceptable.

Table 3 is the coefficients table of the first run regression on actual productivity for the craned pours and displays the statistics of each explanatory variable and the significance of the ‘t’ statistics. From Table 3, all the variables, type of pour 2 (column and wall), pour size, delay, total duration, fractional delay and number of operatives were significant because their ‘Sig’ values were less than 0.05 or 5% error of estimation.

Table 2: ANOVA statistics for regression on actual productivity for craned pours – first run

| | Sum of squares | df | Mean square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 2409.37 | 5 | 481.87 | 6.541 | .000 |
| Residual | 2136.27 | 29 | 73.66 | | |
| Total | 4545.63 | 34 | | | |

Table 3: Coefficients of regression on actual productivity for craned pours – first run

| | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | t | Sig. |
| (Constant) | 25.505 | 3.417 | | 7.463 | .000 |
| Typour2 | -8.292 | 2.875 | -.352 | -2.884 | .008 |
| Pour Size ( m3) | .166 | .037 | 1.001 | 4.473 | .000 |
| Delay (min) | .138 | .057 | .812 | 2.401 | .024 |
| Total duration (h) | -3.524 | .940 | -.1.109 | -3.750 | .001 |
| Fract delay | -40.038 | 10.472 | -.682 | -3.823 | .010 |
| Number of operatives | -.263 | .121 | -.419 | -2.171 | .039 |
| Distance of pour location (m) | -.014 | .068 | -.025 | -.209 | .836 |
| Weather | 2.191 | 5.556 | .045 | .394 | .697 |

**Table 4: Correlation coefficients between all pairs of variables for craned pours – first run**

| | Productivity ($m^3$/h) | Pour type 1 | Pour type 2 | Pour size ($m^3$) | Delay (min) | Total duration (h) | Fract. delay | No. of operatives | Dist. to pour location (m) | weath 1 | weath 2 | weath 3 | weath 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Productivity ($m^3$/h) | 1.000 | .446 | -.446 | .433 | -.109 | .021 | -.452 | .190 | .081 | -.238 | . | . | .238 |
| Pour type 1 | .446 | 1.000 | -1.000 | .348 | .110 | .215 | .038 | .192 | .286 | -.189 | . | . | .189 |
| Pour type 2 | -.446 | -1.000 | 1.000 | -.348 | -.110 | -.215 | -.038 | -.192 | -.286 | .189 | . | . | -.189 |
| Pour size ($m^3$) | .433 | .348 | -.348 | 1.000 | .625 | .790 | .004 | .764 | .058 | -.039 | . | . | .039 |
| Delay (min) | -.109 | .110 | -.110 | .625 | 1.000 | .847 | .547 | .635 | -.069 | .183 | . | . | -.183 |
| Total duration (h) | .021 | .215 | -.215 | .790 | .847 | 1.000 | .205 | .667 | .086 | .066 | . | . | -.066 |
| Fract. delay | -.452 | .038 | -.038 | .004 | .547 | .205 | 1.000 | -.004 | -.199 | .241 | . | . | -.241 |
| No. of operatives | .190 | .192 | -.192 | .764 | .635 | .667 | -.004 | 1.000 | .117 | .013 | . | . | -.013 |
| Distance to pour location (m) | .081 | .286 | -.286 | .058 | -.069 | .086 | -.199 | .117 | 1.000 | -.280 | . | . | .280 |
| weath1 | -.238 | -.189 | .189 | -.039 | .183 | .066 | .241 | .013 | -.280 | 1.000 | . | . | -1.000 |
| weath2 | . | . | . | . | . | . | . | . | . | . | 1.000 | . | . |
| weath3 | . | . | . | . | . | . | . | . | . | . | . | 1.000 | . |
| weath4 | .238 | .189 | -.189 | .039 | -.183 | -.066 | -.241 | -.013 | .280 | -1.000 | . | . | 1.000 |

Table 4 displays the correlation coefficients between the pairs of variables for the first-run stepwise regression on productivity for craned pours and shows how their separate effects on the response variable can be determined. Since the objective is to determine the factors influencing productivity significantly, emphasis was placed on identifying the variables that are highly correlated with productivity. A glance at Table 4 shows that only the correlation coefficients (positive or negative) of each of type of pour (1 and 2), pour size, and fractional delay were high enough (i.e. above 0.250) to be considered to have significant relationships with productivity. It was therefore necessary to carry out further runs of regression, while eliminating the insignificant variables, i.e. delay, total duration, number of operatives ,weather and distance to pour location in a stepwise analysis until a final run in which all the variables that were left have 'Sig' values less than 0.05 and were thus significantly correlated with productivity. The resulting ANOVA statistics, coefficients of regression and correlation tables are shown, respectively, in Tables 5, 6 and 7.

The F-ratio for the final-run regression on productivity for craned pours shown in Table 5 is 10.516, which is higher than the critical F-ratio of 2.92 at a significance level of 0.5%, F (0.05, 3, 31).

Table 6 shows the coefficients and t-statistics for the final run and indicates that the final run regression equation model is:

**Productivity = 17.43 - 8.39(pour type 2) + 0.05(pour size) - 27.41(fractional delay)** -----Equation (1)

This equation shows the key determinants of productivity, y, for craned pours as type of pour 2 (column and wall) at the 0.013 level of significance, pour size at the 0.028 level of significance, and fractional delay at 0.001 level of significance, indicating that the fractional delay at the 0.001 level of significance is the most significant of these factors.

The 'Beta' column of Table 6 which contains the standardised coefficients confirms that fractional delay with a Beta value of -0.467 is the most powerful predictor of productivity, followed by column and wall type of pour with a score of -0.356 and lastly by pour size with a score of +0.311.

Table 5: ANOVA statistics for regression on actual productivity for craned pours - final run

| | Sum of squares | df | Mean square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 2292.72 | 3 | 764.241 | 10.516 | 0.000 |
| Residual | 2252.91 | 31 | 72.675 | | |
| Total | 4545.63 | 34 | | | |

Table 6: Coefficients of regression on actual productivity for craned pours - final run

| | Unstandardised coefficients | | Standardised Coefficients | | |
|---|---|---|---|---|---|
| | B | Std. error | Beta | t | Sig. |
| (Constant) | 17.425 | 2.694 | | 6.468 | .000 |
| Fract. Delay | -27.410 | 7.426 | -.467 | -3.691 | .001 |
| Pour type 2 | -8.391 | 3.183 | -.356 | -2.636 | .013 |
| Pour size ($m^3$) | .052 | .022 | .311 | 2.304 | .028 |

Table 7: Correlation coefficients between all pairs of variables for craned pours - final run

| | Overall productivity ($m^3$/h) | Pour type 1 | Pour type 2 | Pour size($m^3$) | Fract. delay |
|---|---|---|---|---|---|
| Overall Productivity ($m^3$/h) | 1.000 | | | | |
| Pour type 1 | .446 | 1.000 | | | |
| Pour type 2 | -.446 | -1.000 | 1.000 | | |
| Pour size($m^3$) | .433 | .348 | -.348 | 1.000 | |
| Fract. delay | -.452 | .038 | -.038 | .004 | 1.000 |

**Effect of delay on productivity of craned pours**

From the coefficients in Equation (1) and Tables 5, 6 and 7, it is thus obvious that although fractional delay is not the only independent variable that is statistically significant in predicting concreting productivity for craned pours, it is the most significant determinant. Consequently, the relationship between concreting productivity and fractional delay is examined for further regression analyses to generate a scatter diagram from which a model relating productivity to fractional delay can be developed assuming a closed system with pour size and type of pour held constant (Wang,1999).

Figure 1 is a scatter plot of concrete-placement speed or concreting productivity achieved against delay in the concreting operations expressed as a decimal fraction of the concrete pour duration for the 35 pours placed by crane and skip. Although there is a lot of scatter, the regression line averaged a linear relationship as shown by the plots that are equally clustered close to either side of the straight line except for cases 24 and 25 that are clear outliers.

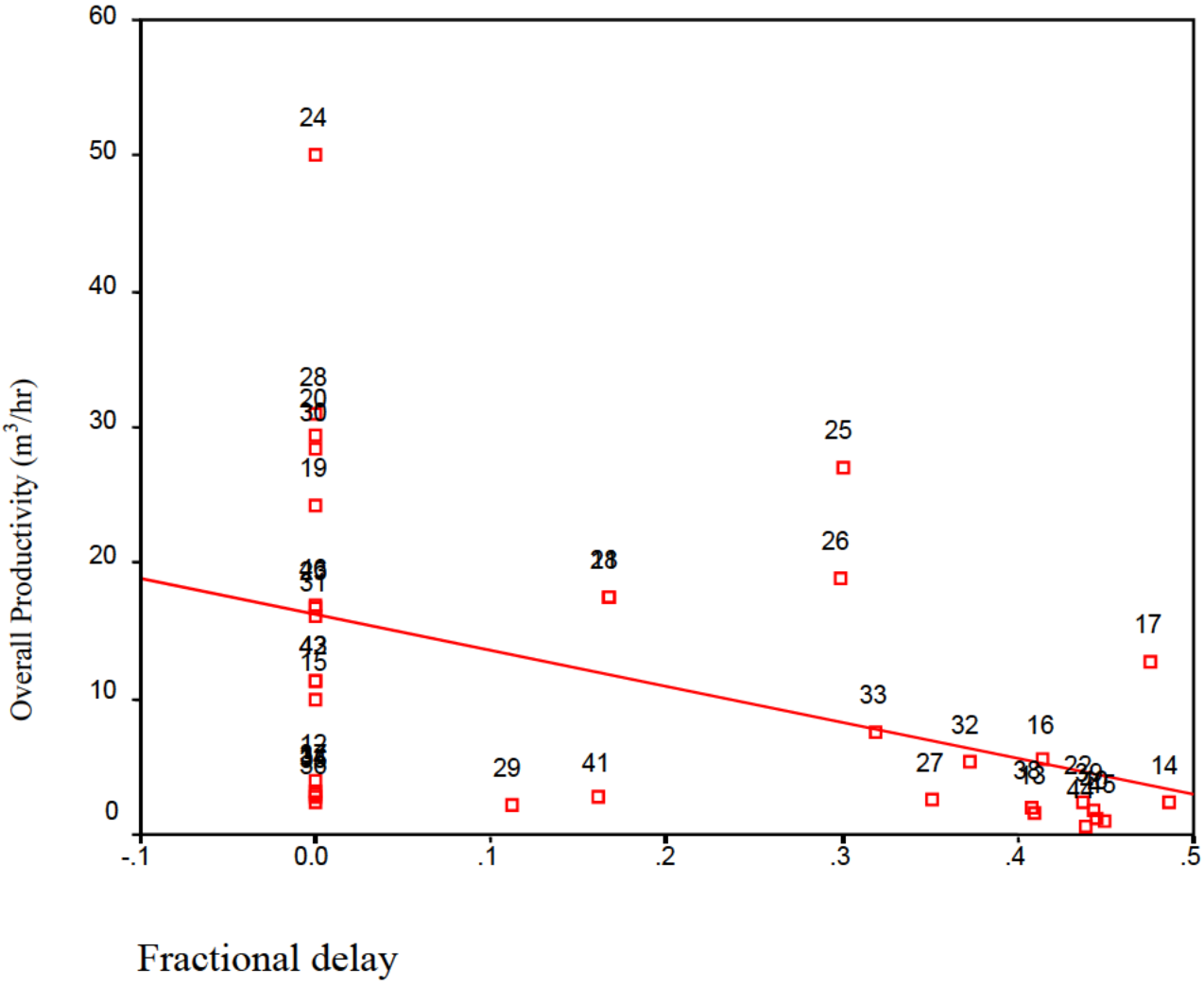


Figure 1: Plot of productivity against delay as a fraction of poor duration for craned pours

Table 8 shows the Pearson correlation coefficient between fractional delay and productivity, to be – 0.452 as in Table 7 when all the pairs of significant variables were correlated together. The linear regression modelled by the line can also be viewed from the regression coefficients in Table 9 based on Figure 1 where the model becomes:

***Productivity = 16.3 –26.5 fractional delay*** ---------- Equation (2)

A look at Table 9 shows that although the constants differ, both the unstandardised and standardised coefficients as well as the‘t’ and ‘Sig.’ values for fractional delay are practically the same confirming that the removal of the other variables type of pour and pour size from the regression analysis has not significantly affected the statistical relationship between fractional delay and productivity. The significance from Table 9 is also 0.006, proving again that the correlation is significant at the 0.01 level or 99% degree of confidence. This derived model represented by Equation (2) implies that the productivity drops significantly with a delay in the supply, delivery, and mixing of materials for in situ concrete placement by cranes. Specifically, for every 10% increase in fractional delay, the concreting productivity reduces by 2.65 m3 /h for craned concreting based on the results obtained from the 35 pours observed.

This model is practically comparable to the model R = 12.8 – 4.9T obtained by Anson and Wang (1998) for craned pours in Hong Kong buildings where R = placing speed, (m3/h) and T = delay time spent waiting for truck mixer arrival, as percentage of pour time

The reduction in the productivity of pours placed by cranes per 10% of increased delay observed in this study is, however, greater than 5 times the reduction obtained in the Hong Kong study, and shows that delay has a greater effect on the productivity of concrete placed by crane in Nigeria.

On the other hand, the models indicate that the productivity or placing speed when there are no delays is 16.3 m3/h in Nigeria as compared to 12.8 m3/h in Hong Kong implying that there is greater prospect for higher craned concreting productivity in Nigeria if delays can be eliminated.

Table 8: Correlation coefficients between productivity and fractional delay for craned pours

| | Overall productivity | Fract. delay |
|---|---|---|
| Overall productivity | 1.000 | |
| Fract. delay | -.452 | 1.000 |

Table 9: Regression coefficients of productivity on fractional delay for craned pours

| | Unstandardised coefficients | | Standardised coefficients | | |
|---|---|---|---|---|---|
| | B | Std. error | Beta | t | Sig. |
| (Constant) | 16.287 | 2.476 | | 6.578 | .000 |
| Fract. delay | -26.541 | 9.111 | -.452 | -2.913 | .006 |

## CONCLUSION

A key factor that was found to influence the concreting productivity of cranes significantly is the timely supply and delivery of concrete for placement (i.e. supply with little or no delay). The results of the multiple linear regression analysis undertaken to obtain a model for predicting productivity, *P*, from values of fractional delay, *FD* (which is the delay time expressed as a fraction of the pour duration),shows statistically significant results for craned pours as represented by:

$$\boldsymbol{P = 16.3 - 26.5FD} \quad \text{-Equation (3)}$$

This model is comparable to the model $R = 12.8 - 4.9T$ obtained by Anson and Wang (1998) for craned pours in Hong Kong buildings, where:

$R$ = placement speed, ($m^3$/h)

$T$ = delay time spent waiting for truck mixer arrival, as % of pour time, and

indicates, mathematically, how productivity falls with increased delay times.

From the model, the productivity for pours placed by cranes reduces by over 2.5 $m^3$/h for every 10% increase in time delay, which is over 5 times the reduction obtained in Anson and Wang's (1998) study of Hong Kong buildings for the same percentage increase in delay. This shows that, although

the mean productivity of craned pours observed in this study compares very well with that obtained in the Hong Kong study, time delay has a far greater impact on the productivity of concrete placed by cranes in Nigeria than in Hong Kong.

From Table 1, an average delay of over 23% of the total pour duration was observed in all craned, *in situ*, site-mixed pours in this study as compared to 8.1% obtained by Wang et al. (2001) for site delays, i.e. for delays outside those caused by truck mixers being idle as well as delays encountered while waiting for the truck mixer to supply ready-mix concrete to craned concrete-placement sites in Singapore. A comparison of the two models above also indicates that the maximum productivity for craned concreting in Nigeria (when there are no delays) is 16 $m^3$/h or almost 30% higher than the maximum productivity for craned concreting in Hong Kong (12.8 $m^3$/h), confirming that there is an excellent prospect for high concreting productivity by cranes in Nigeria if delays can be mitigated.

The variance between the maximum and mean productivities in this study (5.06 $m^3$/h) is, however, nearly 850% of that in the Hong Kong study (0.6 $m^3$/h) indicating that there is a much higher, marked non-uniformity in the productivities observed on Nigerian sites due to excessive delays on these sites.

This study has demonstrated that delay is a most significant factor that needs to be greatly reduced before Nigeria can enjoy the benefits of high productivity attributable to concrete placement by cranes. The study has also shown that special, concerted efforts need to be made to forestall or reduce delay in craned concrete pours in Nigeria to sustain productivity. Particular strategies and appropriate measures which may be adopted to avoid or mitigate delays must be focused on the significant factors and contributors to delays such as poor site management, plant breakdowns and idleness of plant and labour.

## RECOMMENDATIONS

Since most of the observed delays are materials, labour and equipment-related, as well as the interactions between these factors due to poor co-ordination, improper planning and lack of control of site activities, professionals in the Nigerian construction industry, especially contractors'

management staff members are advised to focus attention on these site-management conditions in their concreting operations. Furthermore, to make the research relevant to the construction practitioners and researchers, the model relating productivity to fractional delay may be standardised for use in improving productivity on Nigerian construction sites and for advice by professional bodies to site managers and practitioners.

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# MANAGING RISK IN TOURISM DEVELOPMENT PROJECTS: A CASE STUDY OF NIGERIA

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**Abstract**
Tourism is the fourth largest industry in the global economy. In 2009 the industry was described by the United States Institute of Peace (USIP) as an industry that helps promote peace and stability in developing countries through its jobs provision, income generation, economy diversification, environment protection and promotion of cross-cultural awareness. However, due to inherent risks in terms of some key issues, in tourism development projects, all efforts made by successive governments in Nigeria to develop this important sector of the economy have yielded few positive results. Although there had been several studies on tourism in developing countries, little is known to exist on managing risk in tourism development projects in Nigeria. The main objective of the paper therefore is to provide better understanding of risk and its management in tourism development in Nigeria. Through a sequential mixed-method approach involving a qualitative/quantitative sequence, this paper reveals that a shortage of infrastructure; poor market demand; immature financial markets; and lack of competent manpower were among the significant risk factors affecting successful development of tourism in Nigeria. The paper also identified effective mitigation measures for these risk factors. It is recommended that every stakeholder involved in tourism development projects must be involved in risk management (i.e. in identifying, analysing, developing responses, and controlling risk). Moreover, risk management should also be integrated with the decision-making processes in managing tourism development projects, as risk management reveals the rationales for making appropriate decisions.

**Keywords:** developing countries, Nigeria, risk management, tourism industry

## INTRODUCTION

The rapid growth of the modern tourism industry which, in 2005 registered approximately 800 million international tourist arrivals worldwide has made the tourism industry one of the most important industries of the world, particularly in economic terms (Frangialli, 2006). The industry is a

vital part of the global economy generating roughly $1 trillion in global receipts in 2008 (up by 1.8% from 2007). Tourism accounts for 3.6% of the gross domestic product (GDP) and 9.5% of capital investment. The number of jobs directly linked to tourism and recreation is 74.5 million, and this number increases to 225 million when counting its association with other sectors. It has been estimated that in the next 10 years, the tourism industry worldwide is expected to grow by 4% to 5% per year (UNWTO, 2007). The growth in international travel has not been limited to the developed countries only but has greatly expanded in recent years to encompass the developing world, making tourism a key foreign exchange earner for 83% of developing countries and the leading export earner for one-third of the world's poorest countries (Mastny, 2001).

Nigeria is a developing country located in West Africa on the Gulf of Guinea between Benin and Cameroon. Nigeria, with its rich cultural heritage has 36 states and six geopolitical zones that group people largely by ethnic background: North-West, North-East, South-West, South-South, South-East and Central Nigeria (see Figure 1). The country has one of the world's highest urbanisation rates, the estimated rate being 5.3% per year, and the estimated net migration rate in 2008 being 0.25 migrants per 1 000 people (LOC, 2008). The country is also blessed with tropical rain forests, savannah grasslands, mangrove swamps, and the Sahel savannah near the Sahara Desert. With these great features Nigeria has colossal potential for development of various types of domestic tourism. However, in spite of all these vast human and natural resources, and proclaimed government support, the tourism industry in Nigeria can be said to be inadequately developed, for all the ever-increasing demand for its services.

Honey and Gilpin (2009) presented a report to the United States Institute of Peace (USIP) on the performance of the tourism industry in three developing countries, viz. Kenya, Nigeria, and India. The study reveals that international tourism is a lucrative source of income for Kenya, accounting for 2.24% of the nation's gross domestic product (GDP) in 2006. However, by contrast, Nigeria barely has a tourist industry at all, reflected by tourism's paltry contribution to national wealth, just 0.02% of GDP in 2006. Moreover, the Secretary-General of the United Nations World Tourism Organization (UNWTO) Francesco Frangialli wrote in the foreword of the Nigeria Tourism Master Plan (2006) that an immediate benefit of the tourism industry is its ability to create employment

(Tourism Development International, 2006). Frangialli (2006) states: 'As a labour-intensive industry, tourism has potential to create more jobs per unit of investment than any other industry and tourism can be a useful source of employment for women and ethnic minority groups.'

However, the fact that about 60% of Nigerians still live on less than US$1 per day (LOC, 2008) provides compelling evidence that all is not well in the industry. In addition, in terms of the human development index (HDI) of the country (i.e. HDI of 0.511 for Nigeria), the country is given a ranking of 158th out of 182 countries (Human Development Report, 2009). This index (HDI) provides a composite measure of three dimensions of human development: (i) living a long and healthy life (measured by life expectancy); (ii) being educated (measured by adult literacy and gross enrolment in education); and (iii) having a decent standard of living (measured by purchasing power parity, PPP, income). It is evident that the tourism industry is not performing to the expected standard.

Risks are part and parcel of projects (Dey and Ogunlana, 2004). Tourism development projects are not different, as project planning is done with minimum information. However, the degree of risk varies with complexity, size (both in terms of schedule and budget), and location. Lack of understanding of problems, ambiguous requirements, lack of resources, and security issues are some of the common risk elements in tourism development projects. Therefore, there is a need to manage risk in tourism development. Adeleke (2008) argues that, while tourism may well promote peace, peaceful conditions have to be in place before tourism can thrive. The lack of peace and security, she argues, is the main reason why Nigeria has been unable to persuade foreigners to visit its many cultural and natural attractions. In addition, she identifies a string of other societal problems – poverty, corruption, a lack of infrastructure – that contribute to Nigeria's failure to establish a tourist industry. It is imperative to evaluate these risk factors or challenges facing successful development of tourism in Nigeria and also proffer possible mitigation measures in order to derive the benefits that come with a vibrant and functional tourism industry.

The aim of the study therefore is to provide better understanding of risk and its management in tourism development projects in Nigeria. This is to be achieved through the following objectives.

First, the paper assessed the benefits of risk management in tourism development projects. It went further to identify and assess critical risk factors in tourism development projects and finally it examined possible mitigation measures to the identified critical risk factors in tourism projects.

Tourism attractions are found virtually in all the 36 states of Nigeria and are dispersed over large areas. Due to the huge population size, this study was limited to tourist attractions found within the South-West geopolitical zone comprising of six states, namely Ekiti, Lagos, Ogun, Ondo, Oyo and Osun. In all a total of 39 tourist attractions were identified within the region. See Table 1 for the list of tourist attractions in the South-West geopolitical zone of Nigeria and nature of occurrence.


Figure 1: Map showing the 36 states of the Federation of Nigeria

Source: http://www.nigerianmuse.com/20090804062112zg/nigeria-watch/archival-info-on-the-matter-of-maps-of-ethnic-groups-in-nigeria-for-the-record/

Table 1: List of Tourist Attractions in the South-West Zone of Nigeria

| Geopolitical zones | States | Major tourist attractions* | Nature of occurrence | Classification of attractions |
|---|---|---|---|---|
| **South-West Zone** | Ekiti | Olosunta hills, Ikere | Natural | Natural |
| | | Ikogosi Warm Spring | Natural | Natural |
| | | Erita Waterfall, Ipole Iloro | Natural | Natural |
| | | Fajuyi Memorial Park, Ado | Man-made | Historical monument |
| | | Ero Dam, Ikun | Man-made | Resort |
| | Lagos | Takwa Bay, Eleko, Bar, Lekki , Badagry Beaches | Natural | Beach |
| | | National Theatre | Man-made | Historical monument |
| | | First storey Building, Badagry | Man-made | Historical monument |
| | | National Museum | Man-made | Historical monument |
| | | Slave Relics, Badagry | Man-made | Historical monument |
| | | Holy cross Cathedral | Man-made | Religion |
| | | Eyo Festival | Man-made | Cultural/festival |
| | | Apapa Amusement Park | Man-made | Leisure |
| | | Oba's palace, Lagos | Natural/ Man-made | Historical monument |
| | Ogun | Olumo Rock | Natural | Natural |
| | | Adire Market, Abeokuta | Man-made | Cultural |
| | | Birikisu Sungbo Shrine | Man-made | Religion |
| | | Ancient Palace of Alake of Egbaland | Man-made | Culture/historical Monument |
| | | Ogunde Theatre | Man-made | Cultural/festival |
| | | Ojude Oba Festival | Natural | Cultural/festival |

| | | | | |
|---|---|---|---|---|
| | Ondo | Idanre Hills, Idanre | Natural | Natural |
| | | Ebomi Lake | Natural | Natural |
| | | Owo Museum | Man-made | Historical monument |
| | | Deji's Palace, Akure | Man-made | Cultural/historical monument |
| | | Oke Maria, Akoko | Natural | Religion |
| | | Cave of Isarun | Natural | Natural |
| | Oyo | Igbeti Hills | Natural | Natural |
| | | Amusement Park, Ibadan | Man-made | Leisure |
| | | Calabash Carving | Man-made | Art and crafts |
| | | University of Ibadan Zoological Garden | Natural/ man-made | Zoological |
| | | Aso-Oke Weaving, Iseyin | Man-made | Cultural/art and crafts |
| | | Alaafin of Oyo's Palace | Man-made | Cultural/historical monument |
| | | Old Oyo National Park | Man-made | Historical monument |
| | Osun | Erin-Ijesha Waterfall | Natural | Natural |
| | | Osun Osogbo Festival | Man-made | Religion |
| | | Ife Museum | Man-made | Historical monument |
| | | Ooni's Palace, Ile-Ife | Man-made | Historical monument |
| | | Oranmiyan Staff | Man-made | Historical monument |
| | | Ife Bronze | Man-made | Historical monument |

*Compiled from the States' websites, the Federal Ministry of Tourism, Culture and National Orientation (2008); Okpolo et al. (2008); Adora (2010); Akeredolu and Simeon (2010); Jiboku and Jiboku (2010).

## TOURISM INDUSTRY AND NIGERIAN ECONOMY

Nigeria gained independence from Britain in 1960, but it wasn't until 1976 when the government established the Nigeria Tourism Board (NTB) that tourism was officially recognised as a potential economic activity. However, ongoing political instability and a string of military dictatorships have meant that developing the tourism industry has largely been neglected. According to Adeleke (2008),

the story of Nigeria's tourism industry is one of unfulfilled potential. She argues that with the country's 370 ethnic groups, rich cultural heritage and natural wonders, unique wildlife, and a very favourable climate, Nigeria is tailor-made for tourism. Yet very little effort has been undertaken at the national level to develop tourism. This is evident from the fact that Nigeria did not establish an official tourism board until 1976 and only in the 1990s did it formulate a national tourism policy.

The main thrust of the policy is to make Nigeria a prominent tourism destination in Africa, generate foreign exchange, encourage even development, promote tourism-based rural enterprises, generate employment, accelerate rural-urban integration and foster socio-cultural unity among the various regions of the country through the promotion of domestic and international tourism. It also aims at encouraging active private sector participation in tourism development. Fakiyesi (2008) summarises the current state of tourism in Nigeria as follows:

i. Nigeria has a unique, untapped tourism goldmine that offers potential opportunities for investors;
ii. Nigeria's tourism industry operates well below international standards;
iii. Nigeria's tourism industry lags behind that of many other African countries;
iv. The interdependence between tourism, culture and the environment has become an important consideration in the formulation of tourism policies;
v. Successive governments have failed to establish comprehensive and well-coordinated agendas for tourism development, either among departments at the national level or between national and local governments;
vi. The Ministry of Tourism is often seen as a junior player in government

In terms of tourism contribution to the country's economy, it was reported in the Nigeria Tourism Master Plan (2006) that spending by international tourists has a direct impact on the national economy estimated at US$280m/N36b. Moreover, downstream economic impacts from the 'export' revenues of international tourist spending are estimated to generate additional gross revenue of US$224m/N29b.

**BENEFITS OF TOURISM TO A NATIONAL ECONOMY**

Gatchalian and Reiman (2005) argue that tourism has the potential to bring profound benefits to the federal government, local authorities, and the private sector through generation of revenue, financial returns on investment, and tax revenue. They suggest that, 'Tourism, as an instrument that fosters open and friendly communication between nations and cultures, creates a global language of peace that can help people understand one another and accept their differences. It can bring about unity in diversity – where people eventually realize that, although they may differ in customs, traditions and value systems, they share the same hopes and dreams for the future.' Moreover, according to these experts, the poverty challenges facing the majority of Nigerians could be mitigated through the development of a robust and sustainable tourism industry. When properly developed and managed, tourism can serve as a tool for protecting natural environments, preserving historical, archaeological, and religious monuments, and stimulating local cultures, folklore, traditions, arts and crafts, and cuisine.

In the 2006 Nigeria Tourism Development Master Plan, the Secretary-General of the UNWTO, Francesco Frangialli, wrote in the foreword that an immediate benefit of the tourism industry is its ability to create employment. Frangialli states: 'As a labour-intensive industry, tourism has potential to create more jobs per unit of investment than any other industry and tourism can be a useful source of employment for women and ethnic minority groups.' Honey and Gilpin (2009) highlight the benefits of tourism over other industries to include the following:

- It is consumed at the point of production so that it directly benefits the communities that provide the goods;
- It enables communities that are poor in material wealth but rich in culture, history, and heritage to use their unique characteristics as an income-generating comparative advantage;
- It creates networks of different operations, from hotels and restaurants to adventure sports providers and food suppliers. This enables tourist centres to form complex and varied supply chains of goods and services, supporting a versatile labour market with a variety of jobs for tour guides, translators, cooks, cleaners, drivers, hotel managers, and other service sector

workers. Many tourism jobs are flexible or seasonal and can be taken on in parallel with existing occupations, such as farming;

- It tends to encourage the development of multiple-use infrastructure that benefits the host community, including roads, health-care facilities, and sports centres, in addition to the hotels and high-end restaurants that cater to foreign visitors.

As stated by Chanchani (2008), the United Nations identified tourism development as one of the methods poorer countries might use to meet the Millennium Development Goals (MDGs). However, many challenges have been affecting its successful development in Nigeria or making it near impossible. The nature of these risk events are considered in the next section.

## TOURISM RISKS IN NIGERIA

Risk refers to future conditions or circumstances that exist outside of the control of the project team that will have an adverse impact on the project if they occur. In other words, whereas an issue is a current problem that must be dealt with, a risk is a potential future problem that has not yet occurred. Chapman and Cooper (1983), define risk as ‘exposure to the possibility of economic or financial loss or gains, physical damage or injury or delay as a consequence of the uncertainty associated with pursuing a course of action.' Risk is inherent in every human endeavour and difficult to deal with; therefore, it requires a proper management approach both at project and market level.

Risk has been fairly well studied in the economic literature for manufacturing, financial, insurance, and other institutions, but methods of risk assessment and management for tourism have received much less attention. Risks specific to the entire construction scenario have been classified into three broad levels by Hastak and Shaked (2000), i.e. country, market and project levels. However, Ovcharov (2008) opines that tourist risks can be divided into two groups: potential risks for tourists in planning and taking tours (tourist risks proper); and economic or business risks stemming from the activities of tourism firms. The first group of risks includes factors associated either with material and financial losses (loss or damage of property during trips, financial losses, theft, fines) or with threats to the tourist’s life and health. The second group includes a large number of various types of risk inherent in the operations of the tourism and recreation industry that occur due to the sector’s

complexity and diversity. Many efforts have been directed toward planning, preventing and controlling the first type of risk, while little has been done in respect of the second type. This study looks at both classes of risks as they are interlinked in a number of ways. For instance, if tourists feel unsafe in a particular tourism attraction, they may not visit such attraction again and that will affect the objective of the tourist attraction. In other words, the risk exposure of the tourist has an adverse effect on the economic or business aspects of the tourist attraction. As in any other project, there are infrastructure aspects to be considered in tourism development projects. For example, the actual development or upgrading of a particular tourist attraction to modern-day standards requires the construction of some infrastructures such as a good road network to link the tourist attraction to the larger community, water supply, telecommunication, power, hotel accommodation for tourists, security in and around the tourist area and the subsequent maintenance of these developments. Moreover, the operational phase of the tourist attraction as well as the running of other facilities which are complementary to the tourist attraction has inherent risks of not achieving its objectives.

The types of risk an organisation is exposed to are wide-ranging and vary from one organisation to another. It is desirable to understand and identify the risks as early as possible, so that suitable strategies can be implemented to retain particular risks or to transfer them to minimise any likely negative aspect they may have. Notable among risk events that can impact negatively on tourism development projects are: political risk, legal risk, economic risk, environmental risk, technological risk, security risk, design risk, cultural risk, demand risk, and availability of resources. Therefore, identifying and management of these risk events are very necessary in order to achieve the time, cost and quality objectives of the project. Risk management is a formal and orderly process of systematically identifying, analysing, and responding to risks throughout the life-cycle of a project to obtain the optimum degree of risk elimination, mitigation and /or control (Wang, Dulaimi and Aguria, 2004). The task of risk management can be approached systematically by breaking it down to the following three stages: (1) Risk identification - this involves identifying risk events that when they occur could have adverse effects on the objective of the project; (2) Risk analysis - here probability and severity of the risk events are analysed using qualitative and quantitative tools with the active involvement of the stakeholders; and (3) Risk responses - possible responses that have potential to reduced project risk

substantially are identified and implemented in response to adverse risk events before they occur. Adopting the process of risk management will definitely bring significant improvement to construction project management performance (Flanagan and Norman, 1993). Effective risk management in tourism development ensures successful accomplishment of projects with customers' satisfaction, functional achievement, and overall better financial performance of the industry. Managing risk dynamically throughout the project phase will ensure user/customer/client involvement, management commitment, clear specification and design, appropriate planning, realistic expectations, competent and committed staff, and clear vision and objectives.

## RESEARCH METHODOLOGY

A sequential mixed method involving firstly qualitative research approach followed by separate quantitative research was adopted for this study. The qualitative research in this study was carried out through in-depth interviews with key stakeholders in tourism development, notably State government officials in the Ministry of Youth, Culture and Tourism, local government officials and some heads of the communities where the tourist attractions are situated. This helps to probe deeply, uncover new risk factors and to secure vivid, accurate, inclusive accounts that are based on personal experience. During the interviews, the respondents were asked to identified some of the risk events they feel could affects the development of tourism in their locality and to suggest what they feel should be done to mitigate them. About 20 interviews were conducted with 80% of respondents being from the public sector, 20% of respondents are from the private sector, like the local chiefs and some enlightened individuals within the community. The reason for this is because government still remains the largest investor in tourism attraction in the country because of the huge capital involved in developing the tourism destinations.

Analysis of data from these interviews were carried out using a nine-step process suggested by Ibrahim and McGoldrick (2003) which involves reading and re-reading of transcribed data, categorisation, abstraction, comparison, dimensionalisation, integration, iteration, refutation and relating to literature. Results from these were then used as the basis for the preparation of a questionnaire survey which was used for the quantitative data collection. The questionnaire was structured in three main parts. The first being the demographic information about the respondents,

the second is the identification of risk events that can affect the actualisation of the objectives of tourism development projects, while the last parts elicits information on possible mitigation measures to these risk events. The respondents are required to rank the identified risk events from the previous interviews based on their perceptions of the likelihood of occurrence as well as their impact when they occur. Moreover, they are to rank the effectiveness of the identified mitigation measures in militating against these risk factors. In selecting the respondents for this study, a purposeful sampling technique was employed. The reason for this was that there is no database from where to source the list of construction professionals or list of government officials who have been involved in a tourist attraction development project.

Moreover, due to poor record keeping, there is not a single tourist attraction within the study area, i.e. south-western part of the country, which has any record of the number of tourists that have visited in the past few months; therefore, random sampling techniques could not be employed as the population is not defined. Using purposeful sampling techniques, a total of 240 questionnaires were distributed within the six states; 40 questionnaires in each state out of which 127 were returned and 112 were found to be suitable for analysis. This represents a 47% rate of return which can be said to be adequate and appropriate for analysis as it is far above the typical norm of 20% to 30% response rate in questionnaire surveys of the construction industry (Akintoye and Fitzgerald, 2000; Fellow and Liu, 1997). These questionnaires were administered to the state ministry officials as well as local government staff that are in charge of the management of tourist attractions and a few tourists who agreed to participate in the study during visits to these tourist attractions. Data collected were analysed: first, the background information about the respondents as well as the demographic information were analysed using percentiles. Secondly, respondent's opinion about risk and possible mitigation measures were analysed using mean score. The Statistical Package for Social Sciences (SPSS V 17.0) was used for the data analysis.

## FINDINGS

In line with the structure of the questionnaire, the findings from the data collected for the research are divided into three parts: demographic characteristics of the respondents and background of the

respondents; tourists' and developers' opinion about risk; and lastly possible prevention or mitigation measures.

***Demographic characteristics and background of the respondents***

Table 2 shows the number of questionnaires received from each State within the study area. Out of 112 respondents, 28% came from Ondo State, 14% came from Oyo State, and 12% came from Osun State, while 27% came from Lagos State, and 9% and 10% came from Ogun and Ekiti State, respectively. In the same vein, Table 3 shows the summary of the background information about the respondents. It is observable from the table that 55.3% of the respondents have postgraduate qualifications while about 44.6% have a minimum qualification of a Higher National Diploma in their various fields of study. Furthermore, about 52.7% of the respondents are Fellow Members of their respective professional bodies while 47.3% of them are Corporate Members of their professional bodies. In terms of respondent's years of experience, it is evident from Table 3 that the respondents have an average of about 16 years' experience in the construction industry and have also been visiting at least one tourist attraction or have been involved with one tourist attraction or the other for about 11years. In view of these, it can be concluded that the data were sourced from appropriate respondents, thus they can be relied upon for the purposes of analysis.

Table 2: Number of questionnaires from each state

| **Respondents** | **Ondo** | **Oyo** | **Osun** | **Lagos** | **Ogun** | **Ekiti** | **Total** |
|---|---|---|---|---|---|---|---|
| Architects | 8 | 4 | 3 | 10 | 2 | 3 | 30 |
| Structural engineers | 2 | 2 | 1 | 3 | 1 | 2 | 11 |
| Quantity surveyors | 5 | 2 | 2 | 7 | 2 | 2 | 20 |
| Professional builders | 1 | 2 | 1 | 4 | 2 | - | 10 |
| Estate surveyors | 2 | 1 | 1 | 3 | 1 | 1 | 9 |
| Services engineers | 3 | 1 | 2 | 1 | 1 | 1 | 9 |
| Tourists | 10 | 4 | 4 | 2 | 1 | 2 | 23 |
| Total | 31 | 16 | 14 | 30 | 10 | 11 | 112 |
| Percentage | 28 | 14 | 12 | 27 | 9 | 10 | 100 |

Table 3: Background information about respondents

| **Category** | **Classification** | **No.** | **%** |
|---|---|---|---|
| Academic qualification | HND | 11 | 9.8 |
| | B.Tech./B.Sc. | 39 | 34.8 |
| | M.Tech. | 51 | 45.5 |
| | Ph.D. | 11 | 9.8 |
| Professional qualification | Corporate Member | 53 | 47.3 |
| | Fellow Member | 59 | 52.7 |
| Years of experience | 1-5 years | 11 | 9.8 |
| | 6-10 years | 10 | 8.9 |
| | 11-20 years | 51 | 45.5 |
| | 21-30 years | 29 | 25.9 |
| | >30 years | 11 | 9.8 |
| | Mean | 16yrs | |
| Frequency of visits to tourist attraction | 1-5 years | 19 | 17.0 |
| | 6-10 years | 64 | 57.1 |
| | 11-20 years | 11 | 9.8 |
| | 21-30 years | 18 | 16.1 |
| | Mean | 11yrs | |

***Benefits of risk-management exercise in tourism development project***

Table 4 presents the opinion of the respondents on the benefits of the risk-management exercise in tourism development project. The results show that respondents agree with the fact that risk-management practices should be incorporated in any tourism development project, it is capable of delivering all the benefits identified although in varying degree. From the table, it is evident that establishing a risk profile for the project is ranked 1st with a mean score MS of 4.23 and standard deviation of 0.870, while delivering to budget was ranked 9th with an MS of 3.54. However, with these potential benefits of risk management to the development of tourism, it is shocking to know

that a large percentage of the respondents with their years of experience have not been involved in a risk-management exercise. This is observable in Figure 2 where 74% of respondents indicated that they have not partaken in a risk-management exercise before and only 26% of them have partaken in an RM exercise before.

Table 4: Assessing benefits of risk-management exercises

| ID | Perceived benefits of risk management | MS | Std.Dev. | Rank |
|---|---|---|---|---|
| BE1 | It establishes the risk profile of the project | 4.23 | .870 | 1 |
| BE5 | It allows the team to manage risk effectively | 4.08 | .796 | 2 |
| BE7 | It provides a mechanism for reporting risk on a regular basis to the appropriate levels of management | 4.06 | .675 | 3 |
| BE9 | It helps to improve customer satisfaction | 3.92 | .773 | 4 |
| BE3 | Value for money | 3.88 | .515 | 5 |
| BE6 | It improves confidence that the project will be delivered to the owners' and end users' expectations | 3.79 | .572 | 6 |
| BE2 | Delivering to time | 3.70 | .613 | 7 |
| BE8 | Assists management in the task of raising the necessary funds and, later, controlling the project by judicious application and draw down of the risk allowances | 3.63 | .486 | 8 |
| BE4 | Delivering to budget | 3.54 | .500 | 9 |

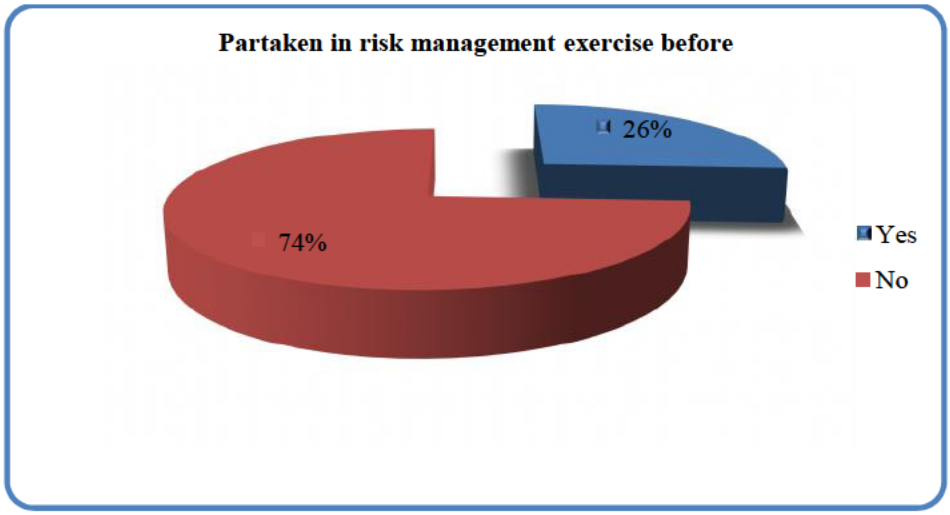


Figure 2: Experience of respondents in risk-management practices

***Identification and assessment of risk events in tourism development project***

Having established the importance of risk management in the development of tourism in Nigeria, it is important therefore to identify those risk factors that are significant to tourism development projects. In order to achieve this, the probability of occurrence and possible impact of these risk factors in case of their occurrence were assessed. The results are as presented in Table 5. It is evident from Table 5 that some risk factors were rated the same in terms of probability of occurrence and impact. For example, from the table, poor infrastructure, demand risk, weather conditions and cultural risk were ranked 7th, 8th, 12th and 13th respectively. However, some risk factors have different ratings in terms of probability and impact. For instance, security risk was ranked 1st in terms of likelihood of its occurrence but was ranked 2nd in terms of its impact on the project. In the same vein, political risk that was ranked 2nd in the area of probability of occurrence was ranked 4th under impact.

Table 5: Analysis of probability and impact of risk factors

| ID | Risk factors | Probability | | Impact | |
|---|---|---|---|---|---|
| | | MS | Rank | MS | Rank |
| RE6 | Security risk | 4.21 | 1 | 4.54 | 2 |
| RE2 | Political risk | 4.02 | 2 | 4.46 | 4 |
| RE11 | Corruption | 3.99 | 3 | 4.66 | 1 |
| RE9 | Environmental risk | 3.86 | 4 | 4.10 | 6 |
| RE7 | Lack of resources | 3.82 | 5 | 4.50 | 3 |
| RE1 | Unstable government | 3.80 | 6 | 4.20 | 5 |
| RE8 | Poor infrastructure | 3.54 | 7 | 4.08 | 7 |
| RE5 | Demand risk | 3.53 | 8 | 3.82 | 8 |
| RE12 | Non-involvement of host community | 3.38 | 9 | 3.54 | 11 |
| RE3 | Poor public decision making process | 3.31 | 10 | 3.73 | 9 |
| RE4 | Legal risk | 3.17 | 11 | 3.67 | 10 |
| RE13 | Weather conditions | 3.08 | 12 | 3.21 | 12 |
| RE10 | Cultural risk | 3.00 | 13 | 3.19 | 13 |

Due to these differences in ratings, a Criticality Index (CI) was computed for each risk factor using t heir score in the areas of probability and impact; to determine the significance of each risk factor. Th e reason is to identify critical risk event. This will help developers or investors in tourism developme nt to understand which risk to accord special attention. As it will be uneconomical to waste much res ource mitigating a risk with little chance of occurrence and one which, even when it occurs does not have significant impact on the project.

Table 6 shows the Mean Criticality Index (MCI) for each risk factor. CI is the sum of the mean score for both the probability and impact for each risk as given by the respondents while the MCI is the av erage obtained by dividing CI by 2. The ranking of risks is then done using the MCI.

Table 6: Assessing criticality of risk factors

| ID | Risk factors | CI | MCI | Ranking |
|---|---|---|---|---|
| | | P+I | CI/2 | |
| RE6 | Security risk | 8.75 | 4.38 | 1 |
| RE11 | Corruption | 8.65 | 4.33 | 2 |
| RE2 | Political risk | 8.47 | 4.24 | 3 |
| RE7 | Lack of resources | 8.32 | 4.16 | 4 |
| RE1 | Unstable government | 8.00 | 4.00 | 5 |
| RE9 | Environmental risk | 7.96 | 3.98 | 6 |
| RE8 | Poor infrastructure | 7.63 | 3.81 | 7 |
| RE5 | Demand risk | 7.35 | 3.67 | 8 |
| RE3 | Poor public decision-making process | 7.04 | 3.52 | 9 |
| RE12 | Non-involvement of host community | 6.93 | 3.46 | 10 |
| RE4 | Legal risk | 6.84 | 3.42 | 11 |
| RE13 | Weather conditions | 6.29 | 3.15 | 12 |
| RE10 | Cultural risk | 6.19 | 3.09 | 13 |

From Table 6, the top 10 risk factors identified for sustainable tourism development are security risk, corruption, political risk, lack of resources, unstable government, environmental risk, poor infrastruct ure, demand risk, poor public decision making process and non-involvement of host community. Leg al risks, weather conditions and cultural risks were rated 11th, 12th and 13th, respectively.

Table 7: Effective risk-mitigation measures in tourism development

| ID | Mitigation measures | MS | Ranking |
|---|---|---|---|
| MM4 | Improve data collection | 4.92 | 1 |
| MM13 | Conduct market study and obtain exact information of competition | 4.92 | 1 |
| MM5 | Secure standby cash flow in advance for infrastructure development | 4.64 | 3 |

| | | | |
|---|---|---|---|
| MM2 | Obtain insurance for political risks | 4.56 | 4 |
| MM12 | Ensure transparency and accountability | 4.54 | 5 |
| MM11 | Insure all of the insurable force majeure risks | 4.46 | 6 |
| MM10 | Ensure customer satisfaction is measured | 4.36 | 7 |
| MM9 | Ensure local residents are employed including in skilled and management positions and receive a fair wage | 4.34 | 8 |
| MM1 | Ensure the project complies with local development plan | 4.28 | 9 |
| MM3 | Improve basic infrastructure | 4.28 | 9 |
| MM8 | Promote 'a sense of place' through the use of local art, architecture, and cultural heritage | 4.26 | 11 |
| MM7 | Give local communities special training to work in the international hospitality industry | 4.08 | 12 |
| MM6 | Presence of strong and effective institutions, at national and local levels | 3.83 | 13 |

***Effective risk-mitigation measures in tourism development***

Table 7 presents the rating of various risk mitigation measures. It can be observed from the table that all the 13 mitigation measures identified from the qualitative research approach were rated as being effective, as they all have a mean score ranging between 3.83 and 4.92 on a scale of 5.00. The top ten mitigation measure as evident from the table are:

- Improve data collection, i.e. taking good record about the number of people that are using a particular tourist attraction;
- Conduct a market study to obtain exact information of competition;
- Secure standby cash flow in advance for infrastructure development;
- Obtain insurance for political risks;

- Ensure transparency and accountability;
- Insure all of the insurable *force majeure* risks;
- Ensure that customer satisfaction is measured;
- Ensure that local residents are employed, including in skilled and management positions and receive a fair wage;
- Ensure that the project complies with the local development plan;
- Improve basic infrastructure.

**DISCUSSION OF FINDINGS**

Emanating from the findings above is the fact that risk management is an important concept if objectives of tourism development are to be achieved. It is evident from the findings in Table 4 that risk management can help investors or developers to understand the nature of risks in a particular development project which in turn will inform their decision as to what to do to eliminate the risk, transfer it to other party or mitigate it ab initio. These findings are in agreement with those of Dallas (2006) and Wang et al. (2004) that effective risk management ensures successful accomplishment of projects with customers' satisfaction. This invariably will enhance the performance of the particular industry, in this case the tourism industry.

Moreover, with all these benefits of risk management, it was revealed from the study that little or no effort has been geared towards risk management within the study area especially with respect to tourism development project. This is evident in Figure 2 where it was presented that about 74% of the respondents with their years of experience in the tourism industry have never been involved in any risk-management exercise. The study went further to assess risk events in tourism. The results reveal a number of risks that are critical to the successful implementation of tourism development projects. This finding corroborates the findings of Adeleke (2008) and Fakiyesi (2008) that lack of infrastructure and absence of peace and security across the length and breath of the country are among the major challenges of tourism development in Nigeria. It is not surprising to see the lack of resources as among the critical risk factors. These resources could be in the form of capital, human and technology required for the development of tourism. For instance, governments at all levels are

complaining of a shortage of funds to cope with huge demand placed on infrastructure as a result of the increasing population of the country. Moreover, the recent embrace of public private partnership (PPP) arrangements in the development of housing, road networks and markets are a good testimony to this.

It is evident also from the study that, although corruption was rated 3rd in terms of probability of occurrence, it was rated 1st in terms of impact and so was ranked 2nd after security. These findings can be said to corroborate the assertion in the HDI (2009) report that corruption is one of the main problems that is retarding the growth and development of the country, i.e. Nigeria. This also agrees with the LOC (2008) report where it was argued that due to corruption, 95% of the wealth of the country is in the hands of just 5% of the population while 95% of the population are left to struggle with the remaining 5% of the country's wealth. Moreover, the finding of the study on the criticality of political risk and unstable government can be said to be true in the sense that periodical change in the government within the study area confirms this. The resultant effect has been lack of continuity in government policies and implementation. These are noticeable in one of the tourist attractions visited where the new government in the state abandoned the development project embarked on by his predecessor in office claiming that he is not in the office to complete abandoned projects but decided to start a new one which was never completed before leaving office. This lack of continuity has affected the development of tourism drastically within the study area.

Furthermore, the findings of this paper in the area indicate a poor public decision-making process and non-involvement of the host community. Legal risks, weather conditions and cultural risks which were rated 11th, 12th and 13th, respectively, show that although these factors can be said to have some impact on the project, they are very critical to tourism development within the study area. These findings can be said to be true in the sense that in the South-West Zone of the country, there had not been cases of militancy as experienced in the Niger Delta region where this is a major concern. In other words, host communities are involved to some extent in tourism development efforts.

In the same vein, effective mitigation measures which invariably will help militate against these risk events before they occur were identified. The study revealed that in order to militate against poor infrastructure in tourism development in the face of shortage of funds from the public sector, involvement of private sector partners in the infrastructure development was identified in this regard. This finding can be said to be in line with the findings of Awodele et al. (2008) that private participation in infrastructure development can assist developing countries to overcome the dearth of infrastructure that is hindering their development. Moreover, the issue of improved customer satisfaction is another effective mitigation measure identified in the paper; this can be said to be true in the sense that tourism is a service-producing industry thus customers need to be kept satisfied or else visitors will not return and will tell friends and family not to visit. Therefore, for development of tourism, the needs of the end user must be met in a way that makes them ask for more.

## LESSONS LEARNT

It is obvious from the study that risk management remains a useful concept in tourism development as the concept helps all would-be investors in the development (i.e. both public and private) to know what the risks are and how to manage them so as to avoid any pitfalls in the development effort. Moreover, with these numerous benefits of risk management, the paper has revealed that the current level of risk-management application in tourism development in Nigeria is still very low. Many risk factors were identified as being critical to tourism development; these risk factors are: security risks, corruption, political risk, lack of resources, unstable government, and poor infrastructure, to mention a few of them. To militate against all these critical risk factors, the study has identified a good number of mitigating factors.

## RECOMMENDATIONS

It is therefore recommended that every stakeholder involved in tourism development projects must be involved in risk management (i.e. in identifying, analysing, developing responses, and controlling risk). Moreover, risk management should also be integrated with the decision-making processes in managing tourism development projects, as risk management reveals the rationales for making appropriate decisions (e.g. decision to invest in tourism development either by public or private sector). In addition, since it is difficult to give what you don’t have to others, it is also recommended

that professionals in the industry, i.e. in the tourism industry, should also widen their knowledge spectrum by taking some specific courses in the area of risk management. Moreover, the host community should be adequately involved so as to have sense of belonging which goes a long way to guaranteeing adequate support for the development project. Finally, communities where there are tourist attractions should equally come together to help in the development of the centre as this will assist in the development of their area and help improve the standard of living of the people in the area.

## CONCLUSION

The overall conclusion based on our analysis boils down to the following: Positive development or growth in Nigeria's tourism industry is associated with the influence of risk factors whose effects vary over time, and are manifested at both the macro- and micro-levels. Therefore, the identification of risk factors and development of risk-management methods are among the most important tasks for economic analysis of the tourism industry. In this study, risk factors that are critical to the tourism industry have been identified and possible effective mitigation measures suggested.

It is our hope that if risk management were to be integrated into every tourism development project, the industry could be transformed to achieve international status with its associated benefits coming into the country. We equally suggest that similar studies be conducted in other sectors as well as projects across various types of industries in Nigeria because the risk-management concept is still evolving in the country.

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# STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS FOR PUBLIC-PRIVATE PARTNERS IN INFRASTRUCTURE DELIVERY IN NIGERIA

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**Abstract**
Public-private partnership (PPP) is basically the collaboration between a public and a private organisation in order to achieve a specific goal. This paper examines the capabilities of partners and the environment in which they operate in Nigeria using a case-study approach. Data for the study were collected from written documents, inter alia company's business brochures, official reports, unpublished performance data on resources and operations; interviews were also conducted with 8 professionals from public and private parties. Data analysis was done using analytical induction, content and logical analysis. The study revealed that diversity and multidisciplinary attributes, and ready access to consultants are among the major strengths of the public partners, while its weakness is insufficiency of arm. The passing of relevant laws was seen as an opportunity by both parties, while lack of understanding of roles by ministries, and an unfavourable banking climate were identified as threats by the public partner. The private partner identified creativity and innovativeness, high knowledge of business and superb negotiation ability among its strengths and saw poor federal influence as a major weakness with poor local understanding of PPP as a threat. The study concluded that the success of partnerships depends much on cordial relationships between partners.

**Keywords:** strengths, weaknesses, opportunities, threats, partners, public-private partnership

## INTRODUCTION

The strength of a nation's economy lies in its level of social and economic infrastructure as infrastructure contributes immensely to all economic activities, improves human welfare and has considerable potential for directly reducing poverty (Department for International Development, 2007; Omana, 2007). The initiative of bringing in the private sector to assist in infrastructure provision by several governments was basically because of the sector's access to finance, knowledge

of technologies, managerial proficiency and good entrepreneurial spirit (DFID, 2007). In Nigeria and some other countries of the world, several methods of financing have been employed for infrastructure development, yet many of these nations are still short of infrastructure. According to Mansur (2011) a sum of US$15bn is needed annually by Nigeria to bridge the infrastructure gap. Also in India, about US$475bn was estimated to be needed between 2007 and 2012 for roads, railways, seaports, airports, electricity transmission lines and other infrastructure according to Omana (2007). These huge amounts cannot be raised by the government without intervention from private partners.

In Nigeria, a number of projects have been completed under this delivery system; among these projects are the Murtala Mohammed Airport Terminal 2 - Ikeja, Lagos State; Garki Market - Abuja; part of Lekki - Epe expressway - Lagos State; Gani Fawehinmi Diagnostic centre – Ondo State; and an independent power project in Lagos State. Some other public-private partnership (PPP) projects are at the procurement stage while some are at the construction stage in Nigeria and also in other countries of the world. As the attention had shifted towards the private sector for assistance, a number of issues are relevant to be considered; among these is to establish how capable the private partners are in ensuring successful collaborations.

The motivation to undertake this study was based on the fact that there are outstanding issues in a number of projects executed under this delivery system , despite the series of documentations usually described as painstakingly drafted framework, clearly defined agreement structure and high cost of procurement (Blaiklock, 2005; Adeniyi, 2008). Therefore, examining the strengths, weaknesses, opportunities and threats of partners could assist in identifying some underlying matters that need to be addressed. SWOT is an alphabetisation of strengths, weaknesses, opportunities and threats, and the concept of laying out the SWOT of an organisation, a person or an entity is referred to as SWOT analysis. SWOT analysis is a strategic planning approach that reveals the condition of the environment (both internal and external) in which an organisation or an individual operates. It is being employed in this study to analyse partners in collaborative infrastructure delivery with the aim of providing a clear picture of the important factors that influence survival and success, with the goal

of providing information necessary for planning and ensuring improved performance in collaborative infrastructure delivery in Nigeria.

## PROBLEM STATEMENT

As a result of infrastructure shortage in Nigeria and the government's inability to bridge the gap, the business community that would rather invest in activities that are profit oriented according to Olashore (1991) was called upon for support. A number of problems have been identified in projects on which private partners have been engaged; among these problems are unsettled controversies and delays. However, the presence of these problems is seemingly sweeping away the glory of public-private partnerships. Therefore, it is necessary to examine the attributes of the participating partners and the environment in which the partners operate. This study revealed the positive and negative influences on the operations of partners and issues affecting partnerships.

Harris (2003) categorised the framework for effective implementation into 5 broad groups, namely government guarantee, effective procurement, favourable economic condition, project implementability and available financial market. Pongsiri (2002) emphasised the importance of the establishment of a transparent and sound regulatory framework as a necessary precursor to private sector participation in a PPP. The private partner is expected to be assured of a sound regulatory system that includes respect for contract agreements, protection from expropriation, quick and satisfactory dispute settlement and legitimate recovery of costs and profit proportional to the risks undertaken. Samii, Van-Wassenhove and Bhattacharya (2002) identified resource dependency, commitment symmetry, common goal symmetry, intensive communication, alignment of cooperation working capability, and converging working cultures as key success factors. It is expected that the existence of the listed success factors in a partnership will ensure a seamless collaboration. The existence of disapproval marked by public protests as observed in the reports by Osiyemi (2010) and Concession: 2 Days of Rage (2010) signifies breach from either party, incompetence of one or both parties or faulty implementation framework. This study revealed the status of partners in respect of the aforementioned success factors.

## OBJECTIVES OF THE STUDY

The aim of this research was to examine the strengths, weaknesses, opportunities, and threats for partners in infrastructure provision in Nigeria, with the intention of providing information that will be helpful in matching their capabilities with the environment in which they operate. In clear terms, this study attempts to:

- examine the strengths and weaknesses of public and private partners in collaborative infrastructure provision;
- examine the opportunities for public and private partners in collaborative infrastructure provision; and
- identify the threats facing public and private partners in collaborative infrastructure provision.

## LITERATURE REVIEW

A public-private partnership (PPP) is simply a contractual agreement formed between a government agency and a private sector entity that allows for greater private sector participation in the delivery of public infrastructure projects (Deloitte, 2005). In some countries, involvement of private financing is what makes a project a PPP project. According to Wikipedia (2008) Public-private partnership (PPP) describes a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. The expression public-private partnerships ('PPPs') is widely used but is often not clearly defined. This can be confusing, as some PPPs may include only a narrow range of project types while for others it may encompass the whole spectrum of approaches from privatisation, through the contracting out of services and revenue-sharing partnership arrangements to pure non-recourse project finance (Harris, 2003). Governments stretching the definition for political reasons can cause further confusion. The UK Labour Government, for example, includes projects in its definition of PPP that are, essentially, part-privatisations. According to HM Treasury (2000), a PPP is an arrangement that brings public and private sectors together in a long-term partnership for mutual benefit – this definition in its simplicity leaves much to be desired in terms of interpretation. In this context the term 'partnership' is ambiguous and the wording 'mutual benefit' is highly debatable. It could, for example, be argued that the public and private sector cannot have mutual goals as their planning horizons differ; thus,

what could be considered beneficial for one party in the long-term may not be beneficial for the other. The following definition was adopted and was used thereafter in Leiringer (2006;): a public-private partnership is an arrangement between public sector and private sector investors and businesses whereby the private sector on a non-recourse or limited recourse financial basis provides a service under a concession for a defined period that would otherwise be provided by the public sector.

However, the exact definition of PPPs is not as important as ensuring that both sides of the dialogue understand what they are both talking about. In Nigeria, Build Operate Transfer (BOT) and Joint Venture (JV) are the popular PPP models being employed in the provision of infrastructure projects ranging from road, airport, to housing units. In a study conducted by Dada et al. (2006) cited in Ibrahim (2006), 18 out of 21 PPP projects surveyed in Lagos State, Nigeria used either JV or BOT models with two thirds of the projects being in the housing sector. In another study conducted by Jagafa (2008), 9 out of 10 projects referenced in the work were based on the BOT model.
The BOT PPP model is the granting of a concession by the government to a private promoter, known as a concessionaire, who is responsible for financing, construction, operation, and maintenance of a facility over a concession period before finally transferring the functional facility to the government. The JV approach is the system of partnership in which the private and the public sector partners pool their assets, finance, and expertise under joint management, so as to deliver long growth in value for both partners.

Weihrich (1982) presented a typical list of attributes affecting business enterprises, being classified as economic factors, social and political factors, management and finance abilities, markets and competition. Shen, Li, Drew and Shen (2006) classified contractors' strengths and weaknesses factors into management ability, technological ability, financial ability, and organisational structure and operational procedures. This classification is also suitable for other private enterprises in the infrastructure world. They further examined the factors contributing to contractors' opportunities and threats, including social and political environment, economic environment, market opportunities and competition mechanisms. Based on these existing studies, the following typical attributes can then be used for examining SWOT of private partners: management ability; financial ability;

technological ability; cost differences; resource differences; social and political environment; economic environment; and markets and competition.

Kuprenas, Chinowsky, and Haran (2000) conducted a study on strategic planning in public sector engineering organisations; the SWOT analysis was the second task carried out after the drafting and publicising of bureaus' vision. It was noticed from the outcome of the analysis that the outlined SWOT attributes were similar to the aforementioned 8 categories but differs as the list includes no emphasis on direct monetary profit, and less emphasis on the development of a niche market.

Weihrich (1982) and Shen et al. (2006) have identified the basic attributes through which a company's SWOT can be established if they are just to be used in line with the responsibilities or functions of a concerned enterprise. The attributes are: management ability; financial ability (financial ratios and others); technological ability; cost differences; resource differences; social and political environment; economic environment; and markets and competition. Not all the 8 classifications are relevant in all cases.

***SWOT analysis***

According to QuickMBA (2010), a scan of the internal and external environment is an important part of the strategic planning process. Environmental factors internal to the firm usually can be classified as strengths or weaknesses (S or W) and those external to the organisation can be classified as opportunities or threats (O or T). A SWOT analysis framework is used for identifying strengths, weaknesses, opportunities and threats. Enterprises' strengths and weaknesses are usually considered as business internal factors which are controllable, while opportunities and threats are external factors over which enterprises have no direct control, but to which they can react to their own advantage (Pearce, 1992). This type of strategic analysis of the environment is referred to as a SWOT analysis. This strategic analysis provides information that is helpful in matching an organisation's resources and capabilities to the environment in which it operates.

A number of researchers have employed SWOT analyses in the examination of construction-related organisations; in a study conducted by Zhao and Shen (2008), SWOT analysis was used to examine the competitiveness of Chinese construction companies in the international market. The study

reported that Chinese contractors find difficulties and barriers in developing their overseas businesses largely because of the differences in operating their businesses in the domestic market compared with the international market. Shen et al. (2004) identified the typical differences between the Chinese construction market and the overseas markets. For example, the Chinese construction market is regulated through a set of complicated policy systems, including quality monitoring system, tendering procedures, contract administration system, owner responsible system, business licence and qualification system. These differences suggest that Chinese contractors need to adjust their business strategy cultivated in the domestic market to be adaptable to the international market when they operate in overseas markets. Zhao and Shen (2008) stated that a number of researchers have actually suggested methodologies meant to assist the international business of Chinese construction companies, but they only provided valuable references for their own study which actually presented the state of Chinese construction companies operating abroad through the identification of their strengths, weaknesses, opportunities and threats. The identification was then followed by proposing a framework for assisting the Chinese international contractors in selecting suitable strategies for developing overseas business.

The attributes of the environment in which an organisation operates dictate the success or failure of such organisation. The identification of the surrounding conditions can be done via a number of methods, among which are PEST analysis – political, economic, social, and technological; Porter's Five Forces analysis; PRIMO-F analysis, i.e. people, resources, innovation and ideas, marketing, operations and finance; and SWOT analysis which was employed in this study.

## RESEARCH METHOD

This study employed the case-study research design approach. Two private partners/concessionaires were targeted to be used as case studies alongside the public partner which was represented by a State Public Private Partnership Office; the private partners/concessionaires were selected because of their involvement in prominent capital-intensive BOT projects in the same State. The targeted private organisations are perhaps among the few private partners to have been involved in prominent core infrastructure PPP projects in Nigeria.

The research commenced by doing an adequate review of relevant literature to gain an understanding of general factors affecting the operation of public and private partners in a partnership. This was also done in order to understand the basic principles of the SWOT analysis.
Data were collected using the following approaches:

***Interview survey:*** A semi-structured interview was conducted with top-ranking officials of the selected concession companies and the public party. The interview was in two parts; the essence of the first part was to collect demographic information about the respondents, while the second part was meant to extract information about the SWOT attributes of the respondents' organisation. Open-ended questions were used for the interview in order to avoid the influence of pre-conceived opinions. A minimum of four top-ranking officials of the concession/private companies and at least four high-calibre professionals in the PPP office in the state were targeted for the interview. Presented below are the questions raised:

1) At present, what do you see as your strengths (the qualities possessed by your company that must be maintained and also gives you an edge over competitors) and weaknesses (things your organisation must improve on, things you know are supposed to be improved on) in respect of infrastructure delivery through partnership with the private parties? (strengths and weaknesses are internal to your organisation).

2) At present, what are the opportunities for you and threats to your involvement in infrastructure delivery through PPP? (opportunities and threats are external to your organisation)

The Nigerian National Policy on Public Private Partnership and its supplementary notes were used as guidelines for the interview. It was used alongside the knowledge of the potential attributes of an infrastructure development organisation already identified from the literature.
Several other questions came up during the interview; the results are analysed in the results section using content analysis.

***Literature/written documents*:** Information related to SWOT attributes was collected from company's business brochures, unpublished performance data on resources and operations, official reports and other operation documents. Data analysis was done using content analysis and logical analysis.

## RESULTS

Out of the targeted interviewing of a minimum of four (4) professionals in each concession company and the State Public Private Partnership Office, making 16 interviews overall, two (2) professionals responded to the interview in each of 2 concession companies and four (4) from the public-private partnership office.

Table 1: Distribution of interviewees

| Groups | Interviewees | Number of interviewees |
|---|---|---|
| Government | Legal and risk unit | 1 |
| | Director-General's office | 1 |
| | Procurement unit | 1 |
| | Engineering and construction | 1 |
| Concessionaire | Line manager | 2 |
| | Project engineer | 2 |

***Presented below is the case analysis of one concessionaire and the public partner***

### *Public partner*

The Lagos State Public Private Partnership Office was established in 2008 to accelerate the development of infrastructure. This is in line with the vision of transforming Lagos State into Africa's model megacity. The office collaborates with the Ministries, Departments and Agencies (MDA) involved in infrastructure delivery and reports to the Office of the Executive Governor who is the approving authority for all procurement projects. Prior to giving reports to the Executive Governor, the office acts totally in the capacity of the state government.

The PPP office was described as a 'one-stop shop' as it gives prompt assistance to prospective investors to ensure efficient project implementation in accordance with the legal and regulatory frameworks. The office acts as a liaison between the private sector and ministries and development authorities to ensure that the state government enters into meaningful partnerships with private investors and developers across a range of sectors. The head of the office is the Director-General who leads a team of ten (10) professionals with expertise in the areas of finance, procurement, engineering/construction, legal analysis and project management.

The office organised its team of professionals around two broad infrastructure clusters, namely core infrastructure – power, public transport, water resources, roads; and social infrastructure – healthcare, education and social housing, among others. The two project teams are supported by a team of professionals specialising in administration, risk management, information technology, communications and project management to ensure the smooth running of processes.

## PUBLIC PARTNER: STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS

### *Strengths*

All those interviewed identified the multidisciplinary and diversity attribute of the organisation as a great strength that will definitely support the achievement of the organisation's vision. The areas of expertise are finance, procurement, engineering/construction, legal analysis and project management. This attribute is very untypical of a public organisation and it gives a noticeable advantage of quick decision-making and easier task allocation as each party takes care of its own aspects of the work and use its knowledge with the support of others to make necessary consultations and manipulations. Also, the unit has direct access to consultants from different fields which they usually contact whenever the need arises. Due to the specific interest of the state government in public-private partnerships, the unit has been given the mandate to consult with various consultants as might be needed, and this usually results in approvals being given more rapidly; it was revealed that sufficient consultations are usually made with consultants, among which are risk managers, debt managers, and finance consultants before recommendations are made by the office to the governor. The in-house expertise is great as all members of staff have served in one ministry or the other with an appreciable

number of years of experience before being drafted into the office thereby ensuring an assemblage of highly skilled professionals with sufficient commitment and high level of collaboration with other public sector offices and teams.

***Weaknesses***

Despite the high level of diversity in discipline which is seen as a great strength, the office still requires more divisions with staff members who can handle varieties of PPP projects beyond infrastructure, and even more on infrastructure. Probably to prevent spreading wrong notions, the specific desired divisions where shortages are noticed were not mentioned by the interviewees, despite some probing questions. It is worthy of note that the government has a focus on health; power; transportation – roads, highway, bridges, ferry service, airport; housing; water; tourism; commercial real estate infrastructure; industry; and waste management. This is evident in the brochure of projects that has been technically scrutinised and is now presented as showcasing investment opportunities. It is envisaged that the respective projects will be undertaken through different forms of partnership with the private sector and ranging from construction to service and maintenance only. Despite the non-readiness to disclose some specific insufficiencies it is evident that the organisation needs to look inward and make necessary improvements.

***Opportunities***

The Lagos State Government was said to have a specific interest in PPP, because it is seen as the only way through which the states' infrastructure deficit can be addressed. The interviewees stated that this is evident through the state government's activity on a number of key challenges on PPP projects, e.g. the state government's role on the Lekki - Epe Toll Road, ranging from dispute resolution and the provision of a mezzanine loan. The holding of workshops and summits on different occasions for potential investors was referred to as a clear indicator of the interest in PPP. This is seen as a great lift for the PPP office.

The strengthening of existing laws and enactment of others were seen as an opportunity for the achievement of the objectives of the office; about 8 laws are in existence to control the operation of the office and partnerships as a whole. All these laws are seen as needed legal frameworks for the

success of the office and partnerships.

***Threats***

The interviewees mentioned the lack of understanding of the roles of the office as a major threat to its operation; this was said to be as a result of lack of enlightenment and personal development among the staff of MDAs with whom they are supposed to be collaborating; this was said to have caused a lot of shortcomings and some disagreements on a number of occasions. Some ministries are not seeing the office as an arm to complement their own activities and vice versa but as a contender, i.e. just a duplicate office. The other ministries were said to see the PPP office as interfering in their duties.

As a result of a lack of knowledge and understanding of the concept of PPP among ministries, interviewees stated that there is always the fear of the PPP office taking over the responsibilities of the ministries it is meant to be assisting on partnership issues. A quick recap was made about the project origination procedure, whereby ministries can identify a project that is suitable for the PPP and then for the Public Private Partnership Office to take over and conduct a technical appraisal and call for expression of interest; instead, some ministries see it as a pure take-over that will eventually demean their own effort and give the glory to the PPP office. The interviewees stated that as a result of the diversity of the office, some of the activities performed are also being done in similar ministries but people tend to forget the distinguishing factor, i.e. it is concerned only with public-private partnership issues.

All those interviewed agreed that for systematic appraisal of technical solutions, preparation of economic, social and environmental cost/benefit analysis, environmental impact assessment, and financial analysis, among others, the PPP office requires the support of the ministries and even individuals. However, obtaining the requisite information for relevant analysis is always difficult even within the government offices. They stated that people are always reluctant because of the fear of possible prosecution, i.e. the information might be used against them no matter how trivial it looks.

Interviewees were a bit reluctant to talk at length on this issue of insufficient consultations and engagement with stakeholders when they were asked whether they see the protest experienced on one of the PPP projects initiated by the state as a threat to their operation, but the respondent from the legal and risk unit admitted that this is definitely a threat but it is being managed. Other respondents opined that once a major project like the road project is experiencing such protests, other host communities for PPP projects might also stage an uproar which will definitely affect the delivery system. They all pointed out that whatever threatens the project threatens the partnership, and whatever threatens the partnership threatens the public partner which they are representing. The uproar was simply said to be the result of insufficient consultations and engagement with stakeholders by the private partner.

Nigerian banks have been playing significant roles in the finance of PPP infrastructure development in Nigeria; they have been supporting development in different ways ranging from direct investment finance to technical assistance, provision of loans and overdrafts, among others. One of the interviewees made reference to how five indigenous banks spearheaded the fund-raising for over ₦20bn for the Murtala Mohammed Airport Project, in agreement with the Federal Government in Lagos State. The unpleasant present climate of the Nigerian banking sector is visible through the sacking of five Managing Directors/Chief Executive Officers (MD/CEOs) not so long ago and mass retrenchment of staff by many others even up till now. Sanusi (2009) opined that the banking sector's problem was a result of lack of corporate governance and poor risk-management system, but according to the information gathered from the unit, whatever the case was, banks are presently being more cautious when it comes to granting loans and rendering financial support. Therefore, since the interaction between the infrastructure development private partners and the banks is very significant, the private partners might have problems with financial guarantees; this was classified as a critical success factor for PPPs by Harris (2003). This is a serious potential threat to the vision of the office as difficulties in finance will definitely affect the delivery system.

***Private partner: Strengths, weaknesses, opportunities and threats***

An asset management company floated a special purpose vehicle (Concession Company) in 2008 in line with the company's ambition to develop infrastructure projects throughout Nigeria and West Africa. The company as at the time of floating the company had ₦130bn under management.

The floated special purpose vehicle received the concession of the expansion and upgrade of 49.4 km Ozumba Mbadiwe Avenue/Lekki-Epe Expressway plus a ramp at Falomo Bridge (Phase 1 of the project) and the construction of a coastal road (20 km) plus an option to do the southern by-pass as Phase 2. The agreement was signed in August 2008 with a construction period of 30 months and an operation and maintenance concession term of 30 years. The investment on the project is to be recovered through toll charges, advertising fees and duct leases. The project is being financed by the concessionaire on a limited-recourse basis. The estimated cost of construction is US$300 million (₦50bn). Macquarie Bank of Australia and Old Mutual of South Africa through the African Infrastructure Investment Fund are major shareholders in the company. The mission of this concessionaire is to provide high-quality road infrastructure and related services along the peninsula, and to be recognised as the pioneer for change in road infrastructure delivery throughout Nigeria.

The outcome of the interview conducted and written documents consulted in respect of the SWOT analysis of the above identified private partner is as presented below:

***Strengths***

Creativity and innovativeness of the company can be viewed through the three-option tolling system being installed for road users, which is the first in Nigeria; unorthodox financing approach through mutual agreement with the state government to provide a 20-year ₦5bn mezzanine loan for the abridge work. The mezzanine loan was needed to show visible progress of the work ahead of the financial close for main works. Apart from constructing the road, a number of projects are being executed in the host community; this is meant to support the development of the host community and also to ensure the community's support for the partnership. Among these projects are Donation of 4 x 500 KVA electricity relief substations to generate a total of 2 000 KVA power for communities in Ajah, Ilaje, Sangotedo, Badore and Ajah McCarious; landscaping; upgrading of a football pitch; and

beautification of Ikota Primary School at Ikota, among others. This was mentioned as a creative means of receiving support from the community.

The company is backed by a highly skilled management team and credible lenders, the managing director has 16 years' experience with a privatised water company in the UK, and experience in privatised development across Europe, Latin America and Africa, holds a degree in financial accounting and management, with professional certifications and affiliations, and also had a spell at American Water before coming to Nigeria. The head of construction and project management holds 2 first degrees and was the project manager for the N3 Toll Project, a 400 km highway from Johannesburg to Durban in South Africa. All other management staff members also hold overwhelming records. Also, the financing of the project is being assisted by respected lenders, namely African Development Bank Group, Standard Bank, First Bank, United Bank for Africa, Diamond bank, Zenith Bank, Fidelity Bank (the last 5 banks are of Nigerian origin) and even mezzanine loan assistance from the state government.

The record of the management team members suggests a high level of knowledge of the business, but this was displayed alongside superb negotiation ability, considering the pattern of finance and some specific terms secured for the project. A N46.4bn long-term financing package was secured on ground-breaking terms.

Table 2: Financing package and support terms

| **Criteria** | **Terms at financial close** |
|---|---|
| Sources of finance | On- and off-shore |
| State financing | ₦5bn mezzanine finance |
| Senior debt tenor | 12-15 years |
| Change in senior debt margins | Over 300 bps lower |
| Interest rate | Fixed and floating |
| Federal support | Sovereign guarantee |
| Foreign currency hedging | US$85m (₦7.5bn) senior loan hedged in Naira by ADB |

The exemplary business skills were again displayed when a 'tied in equity' and a fixed-price lump sum contract was arranged with the engineering, procurement and construction management (EPCM) contractor so as to align long-term interest of the concessionaire and the contractor. The sovereign guarantee by the federal government is to cover termination scenario; ₦33.5bn senior debt of between 10 years and 15 years is the longest commercial tenor currently achieved in the Nigerian market according to the interviewee. The N11.5bn 15-year senior debt tenor at fixed rates is a first for Nigeria. The foreign exchange (FX) hedge in place covering the $85m African Development Bank (ADB) senior loan ensures that the concessionaire's assets and liability are matched in local currency; the first time ADB is able to disburse in local currency.

***Weaknesses***

Insufficient federal influence was noticed when the company was trying to secure Federal Support Security (Irrevocable Standing Payment Order); it took very long, but the intervention of the State Governor ensured the securing of the sovereign guarantee which is meant to cover termination scenario.

The company does not want to accept that there was insufficient consultation, but ideally under SWOT analysis, weaknesses are not just what the organisation sees as weaknesses but what people outside also see as their weaknesses. In an interview conducted by a media house with the MD/CEO of the organisation (Ayara, 2010) he stated that there were town hall meetings with several chiefs and various Obas before the agreement was signed, but the host community is refuting to have ever consented at any time, and the public partner representatives interviewed agreed with the insufficiency in consultation and stakeholders' engagement of the particular partner.

***Opportunities***

The state government's specific interest in PPP and the project can be seen through its various forms of support to the project; among these are mezzanine loan provision, assistance in securing sovereign guarantee, and roles in settling concessionaire and host community's disputes. The holding of workshops and summits on different occasions for potential investors was referred to as a needed support structure to ensure the achievement of objectives. The office shared the same view with the

PPP office on existence of enabling laws and regulations; it is believed that the strengthening of existing laws and the enactment of others are opportunities for the achievement of the mission of the company; about 8 laws are in existence to control operations and partnerships as a whole (the laws are as listed under the analysis of SWOT of the public partner).

Although it takes rather long to obtain federal support, once the guarantee has been obtained, it becomes a great advantage for the pursuance of the company's mission. Also, the shortage in infrastructure supply in the country was identified as a great opportunity, as all potential private partners can therefore explore the infrastructure market; it is definitely favouring the demand for private sector participation in infrastructure provision.

The interviewees also believed that the present-day respect for the abilities of the private sector that they always refer to as possessing great management ability, high technological knowhow, and access to funds is another great opportunity to be explored.

***Threats***

In the year 2010, there was a public protest by the host community about the project being executed by this concessionaire; the host community denied ever consenting to the execution of the road project while the concessionaire is insisting on the adequate engagement of stakeholders. However, the state government set up a committee to look into the issue and a resolution has been reached for now. This scenario was identified as a threat to the success of the project and even infrastructure partnerships as a whole, especially if it persists. Also, the view about the high-risk nature of Nigeria was a serious threat initially, especially when attempting to attract capital and on reasonable terms. The risks identified by those approached are: lack of continuity; unstable foreign exchange (FX) rate; inflation; unpredictable judiciary; uncertainty over volume; and unfamiliar experience. As the concession agreement does not end until 30 years from now, these identified threats are still valid, although there are mitigation measures on the ground for some.

In addition, there are still doubts by many Nigerians about the dream of PPP infrastructure delivery coming to pass; some are still doubting the ability of concessionaires to deliver, and thereby not giving the necessary embrace to projects, whereas in such projects the support of all parties to the contract, the potential users and others is necessary.

The local understanding of the PPP model is insufficient; so many people and especially the other stakeholders see the close working relationship between the concessionaire and the state government as connivance, simply because they do not understand what PPP (BOT) entails. It is supposed to be a close and healthy relationship between the public sector, private sector and the civil society at large. Also, there is a lack of skills and experience in key areas, for example, in deal development/packaging, project structuring/financing, and major project management/execution. All these need to be addressed.

Government bureaucracy is sometimes a necessary evil, but it caused some months of delay for the project and every second lost especially on this type of project is simply a loss of funds. In addition, a few other issues need to be addressed, such as the fledgling institutional capacity of some regulatory institutions and the ambiguity on some legal issues, for example, the Fiscal Responsibility Act.

Table 3: Summary of SWOT analysis of public and private partners

| PUBLIC PARTNER | PRIVATE PARTNER |
|---|---|
| **STRENGTHS** | |
| Diversity and multidisciplinary attribute | Creativity and innovativeness |
| High technical and organisational capability | Credible and experienced players' involvement |
| Ready access to consultants | High knowledge of business and superb negotiation ability |
| **WEAKNESSES** | |
| Insufficient units | Insufficient federal influence |
| | Insufficient consultation |
| **OPPORTUNITIES** | |
| Government's interest in PPP | Unflinching state government's support |
| Passage of relevant laws | Existence of enabling laws and regulations |
| | Federal support |
| | Enormous demand for public infrastructure |

| | |
|---|---|
| | Recent respect for private enterprises |
| **THREATS** | |
| Lack of understanding of roles by ministries | Host community's uproar |
| Fear of taking over | Nigeria being viewed as high risk |
| Holding on to information | 'Nigerian factor' |
| Insufficient stakeholders' consultation | Insufficient local understanding of PPP model |
| Unfavourable banking climate | Government bureaucracy |

## DISCUSSION OF RESULTS

The outcome of the SWOT analysis which is a strategic planning tool as well as a tool for situational analysis reveals that the private partner is strong in the areas of creativity and innovativeness, involvement of credible and experienced players, high knowledge of business and superb negotiation ability. All these have given the company a high competitive advantage unlike domestic private investors in China whose great marketing competition ability was based on the ability to explore new markets, independence of new operation, organisational structure and management ability as reported by Ke, Zhao, Wang, and Wang, (2009). The major weaknesses as identified by the study are internal structure management; poor negotiation ability; financing and investment problems; lack of management capability in infrastructure projects; and unsustainable development. This is almost the opposite of what was obtained from the SWOT analysis of the private party assessed in this work, especially in terms of negotiation ability. In a SWOT study conducted on foreign invested companies in China by Shen, Zhao and Drew (2006), it was realised that good project management skills, better information management facilities, and good finance-raising ability were among their major strengths. Ke et al. (2009) identified finance-raising ability as a weakness among domestic private enterprises (DPEs) in China, but this is not true of the private party engaged in this study. The partner successfully secured financial backing of five indigenous banks and two foreign banks alongside the financial buoyancy of the mother asset management company. Shen et al. (2006) also identified the limited number of professionals and lack of knowledge on regulations among the threats for foreign invested companies in China; this is in agreement with the finding in this study that identified insufficient understanding of PPP models among professionals and even stakeholders as one of the major threats.

The public and private partners assessed in this work shared similar opinions in some areas; they both believed that government's interest in PPP and the existence of enabling laws are opportunities to explore. Also, the existence of high technical and organisational capability in the public sector and the backing of the private partner by credible and experienced players should ensure successful collaboration; these qualities can be related with the work of Iyar and Jhar (2006) which identified the competence of project managers as a factor needed for project success. The technical and organisational capability, the credibility and experience of both the public and private partners cannot be separated from their ability to manage resources and relationships in line with the objectives of collaboration. Therefore, since the competence of project managers is important for project success, competence of parties involved in partnerships is equally important to success, and the existence of these qualities in the partners assessed gives a hope of success in the collaboration.

Zhang (2005) discussed the importance of technical and financial capability of concessionaires; he stated that a reliable concessionaire consortium with strong technical and financial strength is important to the success of collaborations. While the government is in a better position to create a favourable environment for private sector participation in public infrastructure development in general, private sector participants play a paramount role in the successful implementation of particular PPP projects. Technical and financial strengths are the most important success factors in competitive tendering for a PPP project (Tiong, 1996) and since they are important to win bids, they are important to the success of the partnership as a whole.

Zhang (2005) listed some expected strengths of a suitable concessionaire as follows: strengths in formulating advantageous financial and technical packages; managerial capabilities, including a leading role by a key enterprise or entrepreneur; workable project organisational structure; good relationship with host government authorities; partnering skills; rich experience in international PPP project management; multidisciplinary participants; and a strong project team. It can be observed that the majority of the listed attributes are possessed by the examined partners.

The World Bank also provided the following reasons why many partnered infrastructure projects could be held up:

- Wide gaps between public and private sector expectations
- Lack of clear government objectives and commitment
- Complex decision-making
- Poorly defined sector policies
- Inadequate legal/regulatory frameworks
- Poor risk management
- Low credibility of government policies
- Inadequate domestic capital markets
- Lack of mechanisms to attract long-term finance from private sources at affordable rates
- Poor transparency
- Lack of competition (Asian Business, 1996)

All the listed factors are the conditions needed for partnership success, usually referred to as critical success factors. In particular, partners in PPP can measure themselves in relation to the expected attributes already identified by a number of authors.

Economic viability, appropriate risk allocation via reliable contractual arrangements, sound financial package, a reliable concessionaire consortium with strong technical strength, and a favourable investment environment are the five major classifications of factors needed for success of partnerships (Zhang, 2005). Comparing the outlined SWOT attributes with these factors, diversity and multidisciplinary attributes, creativity and innovativeness, high technical and organisational capability, credible and experienced players' involvement, ready access to consultants, high knowledge of business and superb negotiation ability have a strong relationship with the 2nd, 3rd and 4th factors for success. All the identified opportunities among which are government's interest in PPP, unflinching state government's support, existence of enabling laws and regulations, and enormous demand for public infrastructure, have strong links with economic viability and favourable investment environment. A project that is not viable is not likely to receive support from the state, federal government and financiers as they all have to do an analysis before granting their support. A favourable investment environment is also guaranteed by the available support and laws.

Although opportunities are available for partners to explore, a lack of understanding of the roles played by ministries, the host community's uproar, fear of being taking over, Nigeria being viewed as

high risk, holding on to information, the 'Nigerian factor', insufficient stakeholders' consultation, insufficient local understanding of PPP model, unfavourable banking climate, and government bureaucracy can frustrate the opportunities. The partners are therefore expected to utilise the opportunities to overcome the threats. The principle of SWOT analysis is that strengths should be used to overcome the effects of weaknesses while opportunities should be used to overcome the danger posed by threats, but beyond that, an organisation can use its strengths to overcome some threats. A good example is the creativity displayed by the private party to win the support of the host community, although the state government's interest did much in settling the uproar. As PPP is a relationship between many parties, but mainly between two prominent parties, and the need for the parties to complement each other cannot be overemphasised.

## LESSONS LEARNT

In addition to revealing the factors around the operation of public-private partners, some specific lessons can be learnt from this study. The lessons learnt are summarised below:

- Better terms of agreement between a borrower and a creditor can be reached; it all depends on the business knowledge and negotiation ability of a potential borrower.

- Concessionaires on any social infrastructure project should stick with the rule 'No sovereign guarantee, no concession' even if it is a state government project. This will ensure adequate cover in case of termination or delays caused by forces outside the concessionaire's jurisdiction. This is very important in places where public-private partnership is relatively new. In the case above, the state government is paying the concessionaire for the delay in charging tolls.

- Lack of knowledge is costly to both the public and the private partner. It can destroy a potential partnership even before the project gets to the table for consideration. The concessionaire will have a problem with deal packaging and appraisal, while the public partner will have problem with project origination, project appraisal and deal assessment.

## CONCLUSIONS

Public and private partners are striving hard to improve the infrastructure climate, going by their capabilities assessed through SWOT analysis. However, one of the major weaknesses of case-study research is that it does not support generalisation of outcomes, so a statement cannot be made of other partners in several other parts of the country. Also, this study revealed that PPP partners do not carry out situational analysis of their company for documentation. In addition, they do not engage in official strategic planning but rather face their day-to-day activities. This was discovered during the interviews. With the effective use of identified strengths by partners, impacts of weaknesses identified can be overcome or reduced, while also using the interest of the state government to overcome possible threats at the state level. From the revelations of this study, it can be clearly stated that a very cordial relationship needs to be maintained between the government and the private partner, as without this, partnerships in infrastructure may not thrive in Nigeria.

## RECOMMENDATIONS

Based on the revelations of this research, the following recommendations are made:

Government should come up with policies that will change the banking climate; it is a fact that the banking sector is very important to any partnership. The sector provides funds and other support structures to private partners like it does for all other investors. Also, governments, concessionaires, and contractors should be made to have financial commitment or equivalent in infrastructure partnerships, as financial commitment tends to guarantee greater dedication from parties. The state government's interest, its ₦5bn mezzanine investment and its financial obligation to the concessionaire if the partnership is terminated could be seen as the cause of its unflinching support. Also, the contractor had a 'tied in equity' which ensured a long-term interest. A standard benchmark should be set for the amount of concessions (cost of projects) that can be shouldered by concession companies based on assessed capabilities, similar to the prequalification system; a company's score must tell the magnitude of the project it can handle. Not all concession companies will be lucky to break the grounds achieved by the private partner assessed in this study. Adequate enlightenment programmes should be done for potential users, key members of staff of ministries, and all stakeholders by the government and the concessionaire before embarking on any partnership in infrastructure development. This will ensure necessary cooperation; prevent misinformation; and

avoidable disputes or uproar which can harm partnerships. Federal government should always be ready to support concession projects and bureaucracy should be considerably reduced.

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# BUILDING MAINTENANCE SYSTEMS OF PUBLIC HEALTH INSTITUTIONS IN GHANA: A CASE STUDY OF LA GENERAL HOSPITAL – ACCRA

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**Abstract**
It is highly desirable but hardly feasible to produce buildings that are maintenance free although much can be done at the design stage to reduce the amount of subsequent maintenance works. The research aim was to examine the various maintenance systems in use at La General Hospital in Accra. Field surveys and administration of questionnaires were used to collect the data. Most of the building structures in the institution have outlived their service period. Corrective maintenance was found to be in use and was ineffective in ensuring prompt remedial works. The level of manpower required (skilled) was also lacking. In view of these findings and by way of recommendations, it was suggested that management should adopt a maintenance policy for effective use in the institution and the entire scheme of corrective maintenance be re-structured. Furthermore, training, seminars and workshops should be organised for estate/maintenance officers to update their knowledge with regard to effective maintenance practices.

**Keywords:** public health institutions, building maintenance systems, La General Hospital

## INTRODUCTION

The mere sustenance of human life points to the fact that maintenance is of importance if there should be continued existence. Building maintenance has recently been a neglected field of technology, being regarded by many as a 'Cinderella' activity. There is little glamour in building maintenance; it is unlikely to attract very much attention and is frequently regarded as unproductive although many of the managerial and technical problems are more demanding of ingenuity and skill than those of new works, as declared by Seeley (1976), in his explanation of building maintenance.

Once there are structures, it will remain impossible to run or utilise them if maintenance is not practised. Maintenance on public buildings such as hospitals must be systematic and scheduled in order to save costs, lives and at the same time provide safety and comfort to occupants in the buildings. The level of maintenance of buildings in any country is invariable directly related to the strength of its economy. This is the only way by which meaning can be given to building construction and for that matter maintenance (Miles, 1978).

Many maintenance systems have evolved with time and user needs, which are abundantly clear in the survey undertaken at the La General Hospital in the Accra Metropolis The financial forecast and funding on the various maintenance systems available were determined to ascertain the level of manpower required for the maintenance systems already in place. This study focused on the relevance of the maintenance systems available vis-à-vis new systems that could be integrated into existing ones to provide a basis for the maintenance of buildings for the aforementioned purpose.

## STATEMENT OF THE PROBLEM

Many building owners and institutions have neglected the desire and need for a comprehensive maintenance culture on their buildings. This may be through ignorance of the maintenance systems available or lack of appreciation of the need for maintenance. As a result of this, many institutions have placed a very low premium on the need to have consistent maintenance systems in place. This attitude has created a cause for concern. Most public health institutions have lost their architectural and aesthetic appearances and are fast deteriorating, leading to high cost of renovations thus making the occupants uncomfortable. At La General Hospital, the various systems in place were not effectively practised. Thus, it was imperative to ensure that the various maintenance systems put in place especially, in the institutions were very effective as far as cost and quality were concerned.

## PURPOSE OF THE STUDY

This study examined the various maintenance systems in use at La General Hospital. The following specific objectives were used to achieve the aim of the study:

- To establish the various types of maintenance systems in use, their effectiveness;

- To establish the level of manpower required for maintenance systems and their sources of funding;
- To identify the types of institutional structures;
- To make recommendations on the appropriate maintenance system to use.

## LITERATURE REVIEW

Building maintenance authorities, including professionals have sought to define maintenance within the scope of their work. This has given rise to many diverse definitions, all pointing to the fact that maintenance as it was brings about value, restoration and beauty. Lee (1987) defined maintenance as 'a combination of any action(s) carried out to retain an item in or restore it to an acceptance condition'. On the other hand, R.I.C.S. (1990) defines building maintenance in the context of work which is undertaken in order to keep, restore or improve every facility, that is, every part of a building, its services and surrounds to a currently acceptable standard, and to sustain the utility and value of the facility. A more refined definition from BS3811 states categorically that maintenance is 'work undertaken in order to keep or restore every facility, that is, every part of a site, building and its contents, to an acceptable standard' as indicated by Seeley, 1985.

## THE CONCEPT OF BUILDING MAINTENANCE IN GHANA

Building maintenance as pertaining in Ghana is nothing so conspicuous to write home about, yet evidence has shown that it is imperative to the sustainability of socio-economic life of the country. Hitherto, most companies that owned estates took ad hoc measures in trying to maintain their properties. The attitude portrayed was held to be negligent in that buildings were usually allowed to deteriorate before maintenance was done. In this way, the costs of maintaining the buildings became unbearable as the repairs required exceeded the cost of putting up the buildings. According to Seeley (1985) leaving buildings to dilapidate is a general phenomenon as property owners frequently endeavour to keep maintenance expenditure to a minimum, ignoring or misunderstanding the adverse long-term effects of such a policy.

**IMPORTANCE OF MAINTENANCE**

The built environment expresses in the physical form, the complex social and economic factors which give structure and life to the society. The condition of a building is a reflection of public pride and the level of prosperity in the areas. It is also a reflection of social values and all the many influences (both past and present) which combine to give a community its unique character. A committee on Building Maintenance asserted that building maintenance was of great significance to the economy, not only because of the scale of expenditure involved, but also because of its importance to ensure that the nation's stock of buildings, as a factor of production and accommodation, was used as effectively as possible as indicated by Lee (1987) and Seeley (1985). Dilapidated building structures generally depict a decaying environment and mostly depress quality of life in the society. Maintenance decisions are mostly based on convenience and for a period, represent a series of ad hoc compromises between the immediate physical needs of the building and the availability of financial resources. The benefit to be derived from systematic maintenance is taken for granted and quite often, very little effort is done to rectify these problems. The element of the built environment accounts for about two-thirds of the capital stock of the nation. This does not only represent the wealth accumulated over the decades but is also a crucial factor in the production of new wealth. This production of the value and utility of the stock of buildings is thus essential to the total well-being of a nation.

In statistics released in the report entitled: State of Ghana's Economy and published by ISSER (1996), it is pointed out, for instance, that the Public Works Department has a programme to rehabilitate more than 21 963 Government buildings nationwide over a period of 20 years. In 1993, however, only 39 out of the 120 earmarked buildings could be rehabilitated, representing about 32.5% of the target. Out of 110 buildings earmarked on in 1994, only 50, representing 54.5%, could be rehabilitated. Thus, the level of maintenance of building structures does not at all appear to be desirable. The standard of maintenance achieved has an important influence on the quality of the built environment and there seems little doubt that society will continue to expect higher standards in new and existing buildings. Consequently, for many years to come, maintenance will remain a significant and important part of the work of the construction industry.

## MAINTENANCE POLICY

Before an effective economic maintenance programme is prepared, the surveyor in consultation with the client and designer should agree and write down clearly a policy to govern the maintenance of the building by which the manager can operate.BS 3811 defines maintenance policy as 'a strategy within which decisions on maintenance are taken'. Alternatively, it may be defined as the ground rules for the allocation of resources (men, materials and money) between the alternative types of action that are available to management (Lee, 1987).

## RESEARCH METHODOLOGY

### *Research instruments*

A field survey was conducted in addition to the administering of questionnaires to the staff, namely management, doctors, nurses and paramedics. This was carried out between March 2011 and May 2011.The field-survey method was adopted because it was regarded as being the best way to obtain first-hand information on the type of maintenance systems/ systems in use, level of defects and remedies.

### *Study population*

The study population was made up of 15 management staff of La General Hospital, 43 doctors, 123 nurses and 157 paramedics, and came to a total study population of 338.

### *Sample size*

The sample size of 70 staff members, representing 20% out of a total study population of 338, was used by the researcher, as applied by Stoker (1998). Based on this, 8 management staff, 18 doctors, 20 nurses and 24 paramedics were employed in the research. Of the sample size, 28 were males, representing 40%, and 42 were females, representing 60%. The intention was to have a balance, but most male personnel were not available during the administration of the questionnaires.

***Sampling technique***

Purposive sampling technique was used to select 8 out of the 15 management staff. A similar technique was employed in the selection of the remaining category of staff members based on the views of various experts in the field.

***Data presentation***

Descriptive statistics was used to analyse the data collected. Results obtained were presented in the form of tables and bar charts to create a pictorial or graphical representation of data obtained from the study for easy understanding.

## RESULTS AND DISCUSSIONS

The study identified four categories of personnel who responded to the questionnaires (Tables 1 and 2).

Table 1: Categories of personnel

| **Category of personnel** | **Frequency** | **Per cent (%)** |
|---|---|---|
| Management | 8 | 11.4 |
| Doctors | 18 | 25.7 |
| Nurses | 20 | 28.6 |
| Paramedics | 24 | 34.3 |
| Total | 70 | 100 |

Table 2: Status of personnel

| **Status** | **Frequency** | **Per cent (%)** |
|---|---|---|
| Senior officers | 52 | 74.3 |
| Junior officers | 18 | 25.7 |
| Total | 70 | 100 |

The majority of the respondents were paramedics, followed by nurses, doctors and management, respectively, and senior staff formed the majority of the personnel.

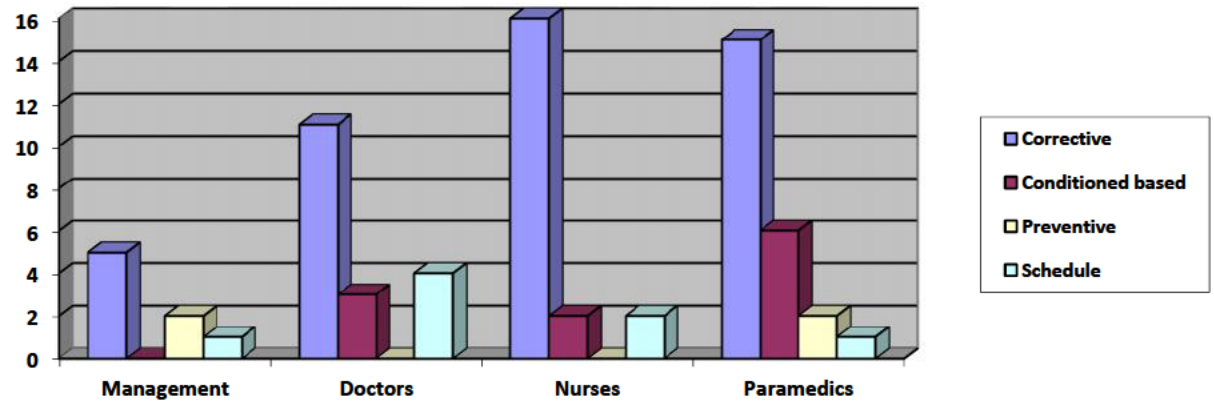


Figure 1: Form of building maintenance system

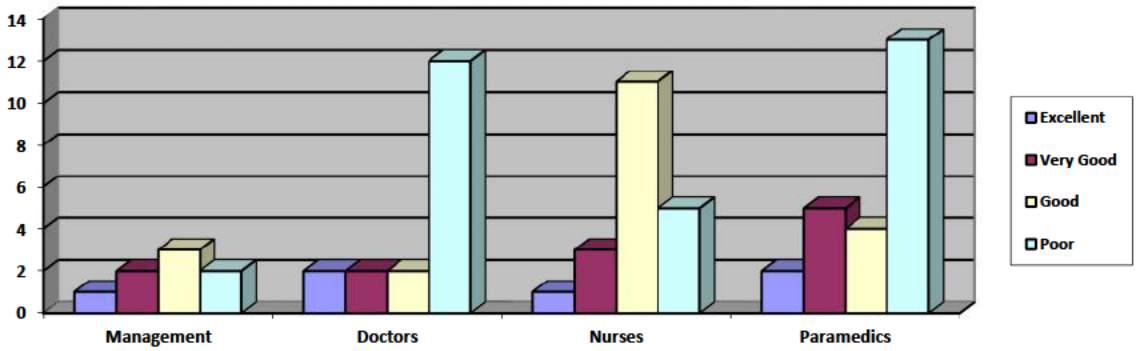


Figure 2: Current state of maintenance practice

Most of respondents were of the view that the hospital practised the corrective form of maintenance (Figure 1) and it was the only maintenance system practised at the hospital. Most of the respondents were management and nurses who rated the state of maintenance practice in the hospital as 'good'. Doctors and paramedics on the other hand rated the maintenance practice as 'poor'. The overall state of maintenance practised at the hospital was poor (Figure 2). The hospital buildings were used as offices, wards, laboratories, pharmacies, morgue and warehouses/stores. The purpose for which these buildings had been put up determined how frequently maintenance works were carried out on the buildings.

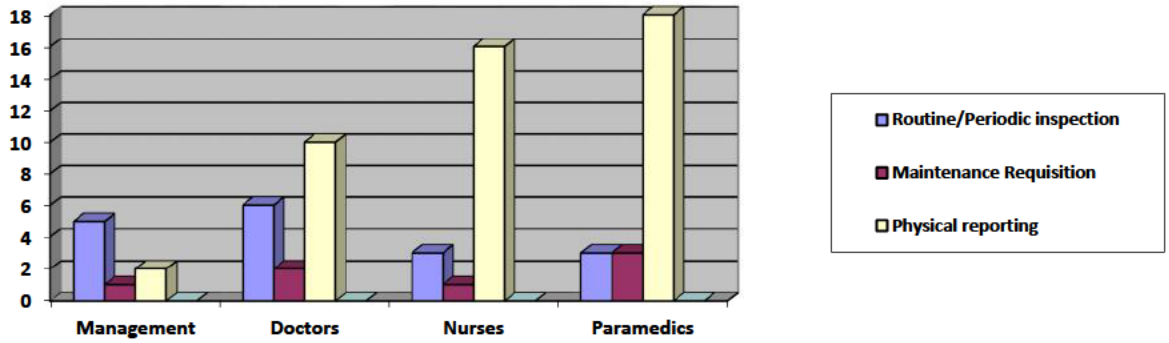


Figure 3: How faults are detected on buildings

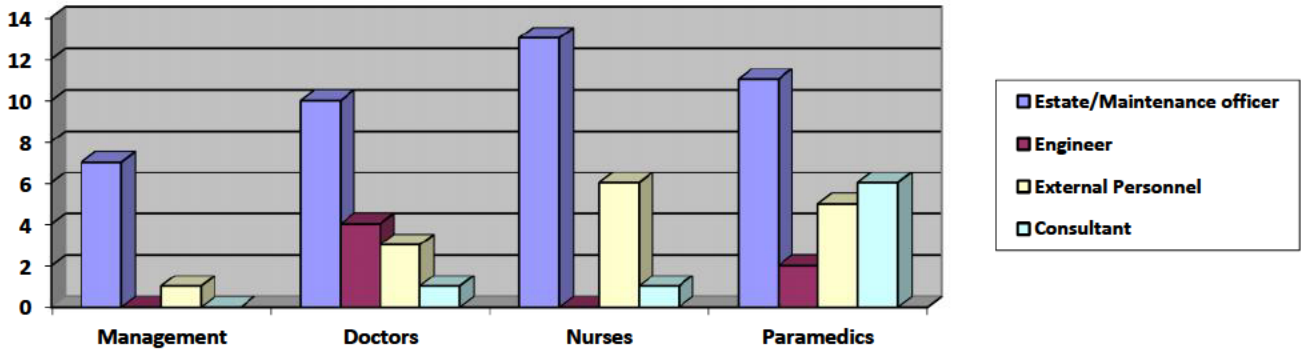


Figure 4: Supervision of maintenance works

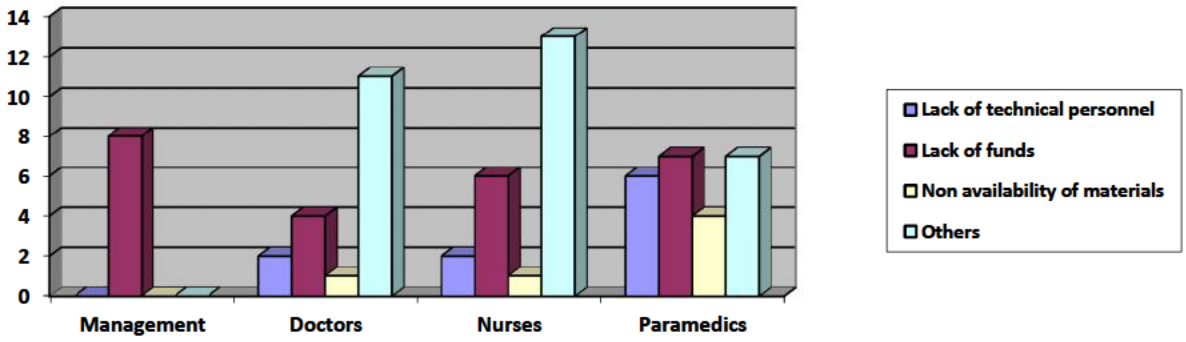


Figure 5: Causes of delays in maintenance works

Faults on buildings (physical problems) were mostly detected by visual inspection and by periodic inspections designed to detect damage, and faults are reported to the Estate Department of the hospital (Figure 3). The repairs were undertaken mostly within a period of one month. Supervision of maintenance works was mostly done by the officers at the Estate/Maintenance Department (Figure

4). Delays in carrying out maintenance works was largely due to lack of funds and commitment on the part of management to include it in their annual budget and provision for maintenance works to be carried out. Others also noted that management were unable to solicit funds for maintenance works as the hospital had to run on a low budget as shown in Figure 5.

The hospital relied mostly on internally generated funds through services rendered by National Health Insurance Scheme (NHIS) operators or beneficiaries. The challenge here was the difficulty and delay in receiving the remittances from NHIS secretariat to run the hospital effectively.

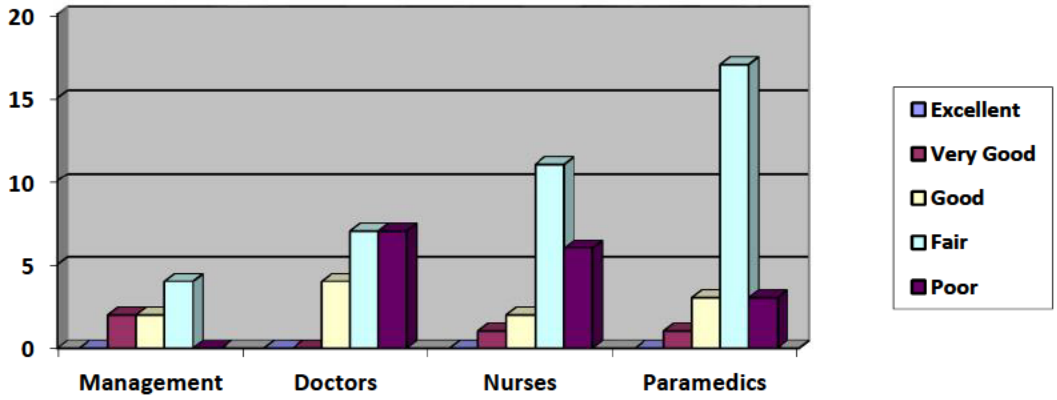


Figure 6: Overall performance of maintenance activities carried out in the hospital

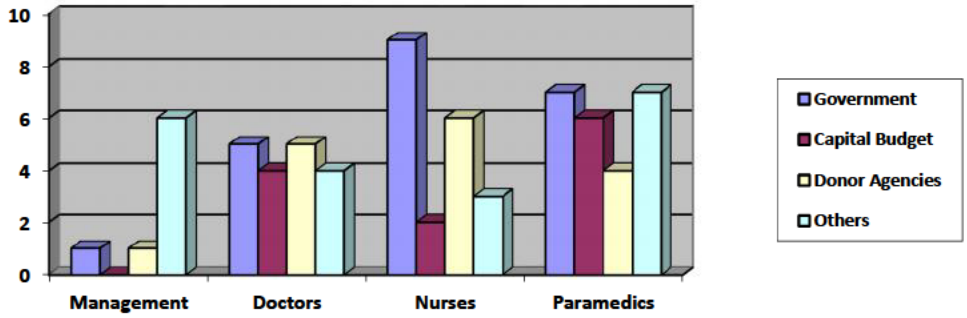


Figure 7: Sources of funds for various maintenance activities

The overall performance of maintenance activities was rated 'fair' (Figure 6). Internally generated funds were used to carry out maintenance works, while other sources of funds for maintenance activities came from government and donor agencies (Figure 7).

The level of funding for maintenance activities was insufficient and the manpower required for maintenance systems was also inadequate. Most of the respondents were of the view that the maintenance systems practised at the hospital should be changed to ensure effective maintenance practice.

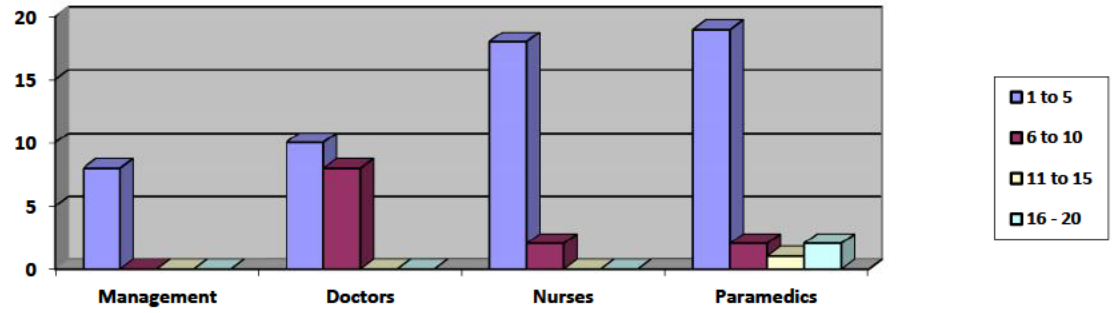


Figure 8: Number of people engaged in maintenance works

The total number of personnel engaged in maintenance works ranged from 1 – 5 which was inadequate for the Maintenance Department tasked with implementing preventative and corrective maintenance programmes (Figure 8). This development has led to their inability to meet the maintenance demands of the hospital.

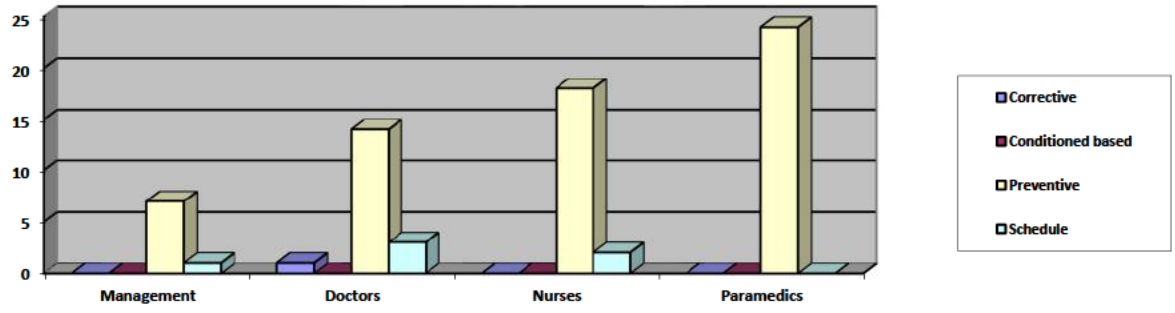


Figure 9: Recommended maintenance system for the hospital

Based on the information shown in Figure 9, preventative maintenance was recommended by a majority of respondents as being the best maintenance policy/systems for the hospital, despite the corrective maintenance being practised.

## CONCLUSIONS

Four types of maintenance systems, namely corrective, adaptive, perfective and preventative, are being practised at the hospital, and it was established that corrective maintenance has dominated the other three types of maintenance systems in use. Contracts on maintenance works were awarded to people outside the department due to the limited number of personnel at the Estate/Maintenance Department of the hospital. The nature of buildings and their usage to a large extent determined the period and pace at which maintenance works were carried out. Attention was given to structures used as theatres, mortuary, outpatient department (OPD) because of the importance that is attached to these functions by management. Funds also posed a great challenge to the hospital and an internally generated fund (IGF) was the only source of funding available to run the hospital. Although the government of Ghana renders support, the money is inadequate, and this reality compelled management to rely on donor agencies for support.

## RECOMMENDATIONS

- Management should place much importance on effective maintenance practices regardless of the purpose for which buildings or structures are being used. Maintenance should not be limited to sections of structures.
- It is appropriate for a hospital, like La General Hospital to a adopt preventative maintenance system as a policy because it makes planning of maintenance works much easier; saves costs; and allows for flexibility in the adjustment of maintenance periodicity.
- Management should also make budgetary allocation for maintenance works that may arise, whilst managing the little financial support they receive from government and donor agencies.
- Training, seminars and workshops should be organised for officers employed in the Estate/Maintenance Department to update their knowledge and skills with regard to effective maintenance practices.
- Recruitment of personnel with requisite knowledge and skills is required to fill the gaps created in the Estate/Maintenance Department and to meet the demands of hospital repairs and maintenance and more investigations should be carried out with a larger scope than was used in this study to confirm some of the findings.

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