AN ASSESSMENT OF EXPATRIATE CONTRACTORS' SITE MANAGEMENT PRACTICES IN THE NIGERIAN CONSTRUCTION INDUSTRY

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DEPARTMENT OF BUILDING,
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JULY, 2016

DECLARATION

I declare that the work in this Dissertation entitled **"AN ASSESSMENT OF EXPATRIATE CONTRACTORS' SITE MANAGEMENT PRACTICES IN THE NIGERIAN CONSTRUCTION INDUSTRY"** has been carried out by me in the Department of Building.
The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was presently presented for another degree or diploma at this or any other institution.

Kenneth I. Okeoma _____ _____

Signature Date

CERTIFICATION

This dissertation entitled **AN ASSESSMENT OF EXPATRIATE CONTRACTORS' SITE MANAGEMENT PRACTICESIN THE NIGERIAN CONSTRUCTION INDUSTRY** by **Kenneth I. Okeoma,** meets the regulations governing the award of the degree of Master in Construction management of the Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This project Dissertation is dedicated to my immediate family, the family of Abraham Okeoma.

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My sincere gratitude goes to God Almighty, in whom I live, move and have my being. I remain eternally grateful to Him.

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Abstract

The concept of site management is not new in the construction industry as it forms an integral part of the construction management process, however its level of practices vary from expatriate contractors to indigenous contractors. The research assessed site management practices of expatriate contractors in Nigeria with a view to improving the performance of indigenous contractors in the country. In conducting the research sample size of seventy (70) expatriate contractors was determined from FIRS (Federal Inland Revenue Service) and the respondents were construction professionals at management level. A research questionnaire was prepared from literature reviews and administered to the respondents. The results were analysed using statistical tools such as relative importance index, mean, percentages while the findings were presented in tables and charts. From the research Effective procedures for issuing of material on site ranked first with a RII of 0.81 which is a very significant factor of site management practice of expatriate contractors, and Electronic exchange of CAD files ranked first with RII of 0.94 which is very significant Technological Application. The research concludes that effective procedures for issuing of material on site is a very important factor to be considered in site management practice so as to deal with issues of material wastage, indiscriminate dumping of materials, demand and supply of materials and in the long run proper delivery of the project. The research therefore recommends that Indigenous firms should put in place Proper material management strategy on construction sites, to check the movement of materials and to avoid wastage. This should also include documentation and recording of materials request forms, and using them for decision on material management. Indigenous firms should encourage the use of information technology as a high priority in management and should also ensure the use of electronic exchange of information to expedite action on site.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

In construction, efficient site management practice is fundamental in meeting project time, cost and scope. However Nigerian contractors are criticised for poor planning and site management practices which results in poor performance (Oladimeji & Ojo, 2012; Aniekwu & Audu, 2010; Muazu & Bustani, 2004; Saleh, 2004; Achuenu, et al., 2000).According to Aniekwu, (2012)Nigerian construction industry is bedevilled by inefficient site practices and an unfriendly socio-cultural business environment, which hampers performance of indigenous contractors and lowers productivity than that of their foreign counterpart. Mbachu and Olaoye(1989) opined that construction projects in Nigeria almost always suffer from time and cost overruns. Leading to a state where major contracts are awarded to expatriate contractors (Ogunsemi, 2005).

In construction, contractors are one of the major parties concerned with the site management practices; this is because they are responsible for executing the works that form the contract. In Nigeria, research studies classify construction contractors into several categories, however for the purpose of this research indigenous and expatriate contractors are the focus, and this is based on their involvement in a large portion of work as identified by Idoro (2007). In separate studies, Edmonds (1979), Ogunpola (1984), Olateju (1991), Samuel (1999), Mayaki (2003) and Idoro (2007) classified construction contractors operating in Nigeria into indigenous and expatriate contractors. The authors describe indigenous contractors as private firms that engage in the production or delivery of construction projects that are fully owned and managed by Nigerians, while expatriate contractors are described as private firms that also engage in the production or delivery of construction projects thatare jointly

owned by Nigerians and foreigners but the management of which is fully controlled by expatriates. Ogunpola (1984), Olateju (1991), Samuel (1999) and Idoro (2004) discovered that expatriate contractors are few in number, operate on a large scale and execute the majority of contracts in Nigeria; in contrast, indigenous contractors considerably outnumber their expatriate counterparts and operate on small and medium scales, but they are responsible for a very small proportion of the value of contracts executed in Nigeria.

Mohammed and Anumba (2006) defined site management practices as a mixture of activities which turns essential resources into finished products. These site management practices are divided into processes which when managed can result in defined functional output by conversion of unprocessed resources (Obiegbu, 2012). Bamisile (2004) opined that creating an environment that will encourage self motivation open mindedness and team spirit, will result in efficient project execution and spur up effective management process as this cannot be achieved by force.

Previous study by Njoku (2007), identified that some problems of site practices as; poor quality of job by indigenous firms, presence of knowledge gap and monetary incapability of firms. Poor site management practice results in undesirable project outcome. Ogunlana (1996) stated that incomplete drawings, materials management problems, deficiency in organisation and inefficient site workers were among the main reasons for project delays and cost overruns. This was acknowledged by Inuwa (2014) who stated that Nigerian Indigenous Contractors' who are involved by both public and private clients experience high rates of time and cost overruns. Obiegbu (2012) opined that excellent site management practices are important in maintaining efficiency, cost effectiveness and control on project of which the research attempt to assess those

This study therefore attempts to carry out an assessment of expatriate contractors' site management practices to identify their key practices relevant to improving the performance of indigenous contractors which will consequently encourage greater patronage in Nigeria.

1.2 Statement of Research Problem

Jimoh, (2012) carried out a study of site management practice in construction firms in Nigeria and identified poor site management practice to be responsible for the backwardness of indigenous firms in Nigeria. This was further strengthened by Idoro (2007) who attributed the success of expatriate contractors to good site management practices. He also opined that it formed their competitive advantage in terms of project delivery.Olateju, (1991) also stated that Expatriate contractors which are fewer than indigenous contractors in number execute over 90% of the construction works in Nigeria regardless of their higher charges than their indigenous counterpart.

Inuwa (2014) stated that Nigerian Indigenous Contractors' who are involved by both public and private clients experience high rates of time and cost overruns. This was supported by Azhar and Farouqui (2008) who stated the time and cost overruns are more severe in developing countries and put huge financial stress on the clients or owner. Apolot*et al.,* (2012) Added that it has become common for projects not to be completed on time and attributed them to poor site management practices.

However, these works have majorly emphasized the importance of good site management practice, but have not clearly identified those key practices that keep the expatriate contractors afloat, while the indigenous firms drown in obscurity.

1.3 Justification of the Study

The success of any project is judged by meeting the criteria of cost, time, safety, resource allocation, and quality as determined by the owner (Muir, 2005). Thus, the purpose of construction site management is to achieve goals and objectives through the planned activities that meet the project's quality, cost, time, scope, and safety requirements. Hence, the major tasks in construction site management include planning, organizing, scheduling, implementing, managing, monitoring, controlling, and tracking construction site activities (Farooqui, *et, al*, 2010). It is essential therefore, for construction site activities to be accomplished successfully in an effective and efficient way. This requires various strategies and management involvement (Alnasseri, *et, al*, 2013). Therefore, it is also critical for site management to focus on the demanding realities in the planning and controlling of construction operations of which expatriate contractors have maximized. Idoro (2007) had stated that these constituted the competitive advantages of the expatriate contractors. Therefore it is expedient that indigenous contractors identify these key practices and implement them, to boost their efficiency and competitive advantage.

Therefore the purpose of this research assess the site management practices by these expatriate contractor with a view of identifying their site key management practices which has enhanced project delivery and consequently better patronage.

1.4 Aim and Objectives

1.4.1 Aim

The aim of this study is to assess site management practices of expatriate contractors' in Nigeria with a view to improving the performance of indigenous contractors in the country.

1.4.2 Objectives

1. To assess the factors that enhances site management practice of expatriate contractors.
2. To evaluate the methods of monitoring Site management practices by the expatriate contractors
3. To ascertain the level of Technology Application in the site management practice of expatriate contractors.

1.5 Scope and Limitation

1.5.1 Scope

The scope is of this research is identifying key site management practices as executed by expatriate contractors with the view to improving indigenous contractors, and its focuses on professionals operating at management level.

1.5.2 Limitation

The result of the findings is limited by the following factors:

1. The respondents' knowledge on the site management practiced on the site.
2. The sample size of the population cannot adequately provide a generalized conclusion.
3. Redundancy of some expatriate firms in Abuja over the research period of time.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Nigerian Indigenous Contractors and Project Management

Indigenous contractors are contracting firms whose ownership and management is manned by Nigerians (Idoro and Akande-Subar, 2008); studies have shown that Nigerian Indigenous Contractors (NICs') experience project management failures emanating from abandonment, cost and time overruns, poor workmanship, poor management capability, financial difficulties, poor planning, poor mechanization and high rate of litigation (Oladimeji and Ojo, 2012; Muazu and Bustani, 2004; Achuenu, Izam and Bustani, 2000). Ibrahim (2012) and Uduak (2006),are of a different opinion, stating that Nigerian Indigenous Contractors (NICs') can handle large and highly technical projects.

There are several studies which have linked Indigenous contractors poor site management practice to incompetence, inexperience, poor planning and the adoption of traditional management approaches; which have proven to be ineffective in the management of construction projects (Ekundayo, Jewell and Awodele, 2013; Adams, 1997). According to (Engineering Network, 2012), the volume of construction projects executed by indigenous contractors is still too low compared to that handled by foreign and multinational companies.

The traditional management approach limits the capacity and overall responsibility of the project coordinator who is usually are engineers, and transfers such powers to the client (Ekundayo, et al., 2013). This arrangement according to Ekundayo, et al, (2013) affords the project coordinator little authority in decision making. In this management

approach, workflow is arranged vertically, hence proves difficult for an extensive planning and coordination, and gives little room for workers to work with other functional areas (Kerzner, 2000). This is unlike the project management approach where the project workflows and project coordination are arranged in a horizontal and vertical manner, thus resulting in an proper planning and coordination (Kerzner, 2000).

Proper management practice results in improved coordination and communication among employees and managers as well as, generates productivity, efficiency, and effectiveness (Kerzner; 2000). However, the use of traditional management methods by indigenous contractors have resulted in poor project planning and low output in management performance (Ekundayo, Jewell and Awodele, 2013).

The resultant effect is generation and distribution of low income, as these expatriates send back their profits abroad, hence no significant value is added to the local construction industry which supply materials (Aniekwu and Audu, 2010; Idrus and Sodangi, 2010). This has prevented the country from enjoying the benefit construction industry contributes to economic growth (Aniekwu and Audu, 2010; Bala, Bello, Kolo and Bustani, 2009; Adams, 1997). Most of Indigenous contractors' project management performance problems can be tackled through training, pre-construction planning and the application of modern construction techniques (Aniekwu and Audu, 2010) and, these can be generally limited through the application of project management techniques (Gollenbeck, 2008).

2.2 Expatriate Contractors

An expatriate is someone who relocates abroad for a specific period of time. It also refers to people who have relocated the country in which they were born and are

living in another country (Chambers Dictionary, 1993). In most cases expatriates do not plan to live in their country permanently and normally maintains their citizenship. The term expatriate has been used by many to mean skilled workers from developed countries who are temporarily working abroad (Financial Times, 2013).

Multinational firms in the construction industry are those firms who are in the business of planning, consulting, design, construction or any combination of these activities on an international base or foreign base. According to Nwankwo (1988) a multinational is a company which has its parent headquarters located in a developed country and has functional subsidiary in a number of other countries. Generally this business enterprise is regarded as the vehicle that drives capital and technology transfer from major economic powers to the developing countries (Erunke, 2009). Multinationals generally engage in projects and activities that are beyond the ability of the local industry, they are also known to execute projects which are in need of professionals and managerial skills often lacking in developing countries, such projects involve capital that are often not locally available hence multinationals must be used.

2.3 Site Management Practices

Management of construction site involves a collaboration of activities, which converts basic resources into a refined output. This can range from materials and labour management, and other resources on the site activities which harness proper information and financial flow (Construction IT, 1996). The construction site which is a vital point where money can be made or lost has great capacity for improving productivity efficiency and quality. According to Illingworth (2000) construction process is a collaboration of two fundamental activities:

1. Handling of materials and equipment, and

2. The skill of the workforce in the positioning of the materials and equipment (assembly) to produce the desired completed whole.

2.3.1 Site Management on Construction Sites

Bamisile (2004) opined that creating an environment that will encourage self motivation open mindedness and team spirit, will result in efficient project execution and spur up effective management process as this cannot be attained by force. Mohammed and Anumba (2006) defined site management practices as a combination of activities which turns basic resources into finished products. These site management practices are divided into processes which when managed can result in defined functional output by conversion of raw resources. Obiegbu (2012). Best site management practice is imperative, leads to fewer problems and disruption as it ensures the most efficient and effective use of resource, helps maintain high standard of quality of workmanship, while building trust with stakeholders (Obiegbu, 2012)

Obiegbu (2012) highlighted the following reasons why practising of good site management is imperative:

1. Ensuring the most resourceful and valuable use of construction resources;
2. Maintaining excellent quality, quality control and workmanship;
3. Display excellent health and safety requirements on building sites; and
4. Developing trust and good relations with stakeholders involved in the project which leads to fewer problems, delays and disruptions. In attaining excellent management on construction sites, Obiegbu (2012) opined that attention be given to:
5. Project drawings, specification and contract documents must be interpreted correctly;
6. Good understanding of all the projects requirements.

7. Proper determination and allocation of resources for the project,
8. Provision of a Functional site layout,
9. Compliance to statutory regulations,
10. Planning and programming the execution of work,
11. Monitoring and control of construction process while ensuring that corrective action is taken when errors occur.
12. Engaging the right calibre of professionals with clearly defined roles.

2.3.2 Features of construction site management practices

Construction IT (cited by Mohammed &Anumba, 2006) divided site management practices into six sub-processes:

2.3.2.1 Management, Supervision, and Administration of sites:

Including correspondence, minutes, labour allocations, payroll, progress reporting, notices/claims, instruction, drawing register, and technical information.

2.3.2.2 Commercial management:

This covers estimating, valuations, sub-contracting, payment, variations, day works, cost-value reconciliation, final accounts, and cash flow management.

2.3.2.3 Legal, health and safety:

Management of legal, health and safety requirements on sites. This considers safety policy, insurance and building regulations.

2.3.2.4Planning, monitoring and control:

This covers all activities associated with project planning and scheduling, typically the production of Gantt charts, network analyses, method statements, resource levelling, progress reports and exception reports.

2.3.2.5 Delivery and Materials' handling:

The activities associated with the management of deliveries and the subsequent handlings of materials on site are covered including requisitions, purchase orders, material call off, and plant returns.

2.3.2.6 Production on-site and off-site:

This considers activities supporting production such as testing, setting out, dimensional checks, and plant maintenance.

2.4 Management, Supervision, and Administration of Sites

Bamisile (2004) indicated that effective site management requires striking a balancing in the following areas by the contractor's team:

First, Right persons: ensuring the right set off professionals and workers are engaged is very important in achieving success of a construction project

Secondly, Communication: all the stakeholders must be well aware of the lines and means of communication from the onset so as to avoid misleading information.

Third is Progressing system**:** This entails comparing checking, measuring and recording of progress with planned requirements, while exploring other item that could cause delay or be delayed so as to meet up with plan

The term supervision which has been used in the recent past in connection with field inspection is largely a risky term and as such is largely discouraged by professionals in the construction industry. Construction administration and construction quality control should include continuous onsite inspection by one or more competent technical qualified experienced inspectors during all structural construction of a building.

Construction Administration and contract administration are terms that can be easily confused. The contract administration entails the management or handling of business

between the parties to a contract which is popularly thought of as being limited to the administration paper work or electronic project management application. Administration of site on the other hand refers to a more broader responsibility of relating to all project related function between parties to a contract, not only the traditional contract duties but also the conduct and responsibilities of the parties, relation with the contractor, communication, authority, documentation requirement, construction activities, planning and scheduling processes, payment administration and change order and extra work, dispute and claim handling, final clean up and administrative closeout.

2.4.1 Notices

Wideman (2001) stated that the construction contracts, often requires parties involved in a project to issue notices to each other under certain circumstances. This is often intended to serve as a warning mechanism, enabling the parties to prepare for, or react to, particular situations on site. Site management practice and administration requires the contract to specify the circumstances under which a notice is to be served, the form of the notice, the information it should contain, the recipient, at what address and the notice period. Failure to follow the correct modus operandi can result in the ensuing claim being defeated (Uff, 2005)

Notices (or in some cases statements) might comprise:

1. Default payment notice.
2. Notification of failure to proceed regularly and diligently.
3. Notice of a delay, or the likelihood of a delay that could merit an extension of time.
4. Notice of intention to refer a dispute to an adjudicator.
5. Notice to proceed or continue work.

6. Notification of an extension of time.
7. Payment notice.
8. Statement of partial possession.
9. Statement of retention.
10. Suspension notice.
11. Termination notice

2.4.2 Claims

More formally, a contractor's claim may be defined as, a genuine request for additional compensation in terms of cost and/or time regarding a change in the terms of the contract.

According to wideman (2001),

1. A claim is a disguised form of blackmail
2. A claim is the last chance to bail out a losing job
3. A claim is an statement to a contractual right

The Canadian construction industry is the single largest industry accounting for over 30% of all economic activity. The industry is yet the most fragmented due to many thousands of smallish contractors and sub-contractors, mostly family owned enter the industry and for one reason or the other leave. Just a few are large in size, and the average lifetime of a typical company may range from 2 to 20 years, rarely more.

Considering the large size nature of the industry and consequently large size disputes, proper site management practice has to a large extent reduced disputes which would have led to project delay and disruption. (Wideman, 2001)

2.5 Commercial Management

2.5.1 Variation

A construction contract is a business agreement that is subject to variability.

Parties in a contract are allowed to call for variation orders within the ambit of the scope of the work without alteration of original contract; this is made possible by the contractual clause

Variation orders involve additions, omissions, alterations and substitutions in terms of quality, quantity and schedule of works. Without contractual clauses, any minor change that the client or his/her architect wished to make later, would mean that the contract has to be cancelled and a new one drawn up (Wainwright & Wood, 1983). There are variations that are permitted and which fall within contractual terms, those are the ones that can be changed once the contract is concluded (Willis & Willis, 1980). According to Uff (2005) a clause permitting variation of works is an essential feature of any construction contract because without it the contractor is not legally bound to carry out additional work or to make omissions or changes. This is in line with Wainwright & Wood, (1983) who opined that under contractual provisions, the client has the right to vary the extent and the nature of the performance to be rendered by the contractor

Variation orders occur because construction projects involve complex operations which cannot be accurately determined in advance. Arguably, variation orders are to a large extent inevitable (Mohamed, 2001). This was acknowledged by Ssegawa et al. (2002) who opined that the presence of variation clauses in contracts means accepting the fact that no project can be completed without changes. Even if carefully planned, there is likelihood that there will be changes to the scope of the contract as the work.

2.5.1.1 Nature of variation orders

The nature of variation orders can be determined in terms of their rate and effects. (Arain&Pheng, 2005) distinguished two types of variation orders, namely: beneficial and detrimental variation orders.

2.5.1.2 Beneficial variation orders

A beneficial variation order is aimed at improving the quality of work, reduce cost, schedule, or extent of difficulty in a project (Arain&Pheng, 2005). It is a variation order initiated for client satisfaction for value analysis purposes to realise a balance between the cost, functionality and durability aspects of a project.

According to Zimmerman & Hart, (1982), Value analysis describes a value study of a project that is already built or designed and analyses the product to see if it can be improved. This was acknowledge by Kelly &Duerk, (2002) who stated that value analysis is an organised approach to identify and eliminate unnecessary cost which neither add value or quality or customer features

Clients' value includes items such as time, capital cost, operating cost and fitness for the purpose, and it is for these reasons that the beneficial variation order is initiated (Kelly &Duerk, 2002).

A beneficial variation eliminates unnecessary costs from a project. According to Zimmerman & Hart (1982) regardless of how excellent the design team may be, all designs have unnecessary cost. A beneficial variation order eliminates unnecessary cost while enhancing the clients benefit against resources inputted into the project. These benefits are understood to be the satisfaction of perceived needs for the development project that include social, economic and commercial aspects. Impliedly, a beneficial variation is initiated in the spirit of adding value to the project. However,

non-value-adding costs are likely to accrue as a result of variation order, regardless of how it might be.

2.5.1.3 Detrimental variation orders

A variation that negatively impacts the clients' project performance is termed a detrimental variation order (Arain&Pheng, 2005). Arguably, it also compromises the client's value system. Substitution of good quality products for lower standard ones may be requested by a client who is experiencing financial problems. For example, using steel window frames in salty regions which result in oxidation and rusting instead of timber or aluminium frames (Arain&Pheng, 2005).

2.5.2 Cost Value Reconciliation

An accurate estimate of a construction project's costs is vital. But it is only of use up until your company wins the contract. It only reflects the amount your company will get paid if nothing changes throughout the life of the project and that is virtually impossible

The risks to a project are many, materials prices may change, work may be delayed due to weather conditions, changes may be required to an architect's plans or the client changes its requirements. Companies need to have a system in place to keep tabs on the changing costs and likely value of the final work, even before the first digger moves on site, The process of accurate cost value reconciliation in construction is therefore crucial to working out the modalities of whether a project is likely to end up in the red or black. Such systems can help spot problems at an early stage, allowing companies to tackle the budding problem to get the project back on track. The task might be simple on small projects, which only use one of two sub-contractors, But the bigger the development, the bigger the risk of losing a clear picture of its financial health and status.

Cost value reconciliation in construction is carried out with various processes, depending on the company. But traditional methods using spreadsheets can lead to problems. The biggest of these is the creation of islands of information value and cost are recorded on different documents, in different systems, in different ways and referring to different time periods.

But new software tools are being developed to eliminate such headaches. This construction software enables all invoices to be inputted into a single platform and logged by date. By providing employees with access to the system, they can pull out the vital information and determine whether a project is making money or not with ease. Uniting commercial systems with financial systems, such software provides greater confidence, better decision-making and ultimately better projects. Simmons (2015)

2.5.3 Subcontracting

Subcontracting arrangements are common concept in the building and construction

industry. Relationship between a head contractor and subcontractors has been instrumental to the proper management of many construction projects large and small, public and private. It is important that one understands the working conditions before engaging in a work for another person as they may be employee to or subcontractors with divers obligations and rights. A subcontractor is one who provides services such as labour tools materials and expertise in a sub-contracting arrangement. This business relationship has no form of employment contract. Subcontractors agree to produce a given product or service and are not under the direction and control of an owner in carrying out their work. Subcontractors delegate task on their own discretion.

Workers provide labour and work under the control and direction of the employer in an employee arrangement. The employer determines when, how and where it is done and who does the work as well as. Employees are paid according to the relevant, agreed upon contract of employment and are eligible for leave entitlements (including annual and sick leave). The employer is also responsible for withholding tax and providing a prescribed minimum level of superannuation contribution for each of their employees**.** Nahan (2013).

Some clients who are not ready to pay for the right skills and are reluctant in investing money for experienced subcontractors tend to manage cheaper and less expensive subcontractors. This introduces a greater risk of defects and even the potential for on-site accidents because of communication breakdowns. Simmons (2015).

As always, the largest variable cost in construction is labour, according to Ofori (2008), it can be tempting to take on newcomers to the sector, rather than pay more for experienced artisans such as electricians, carpenters and painters. The challenge clearly isn't a temporary phenomenon. Severe subcontractor shortage has shot up operating cost and hampered productivity gains in construction firms. These issues have become a concern to the construction industry as skills shortage is a challenge facing the industry caused largely by massive labour cutbacks during recession which saw many experienced individuals find new careers. (Moore 2015),

2.5.4 Cash Flow Management

Cash is the most important corporate resource for the day-to-day activities, and proper cash flow is vital to the survival of a construction company this has made commercial management a recognised and important management tool. (Peer, 1982; Singh and Lakanathan, 1992). This was acknowledged by Navon, (1995) who stated that a proper cash flow management is also crucial in serving as a means to obtain loans, as

banks and other financial institutions are apt or liable to lend money to companies that have a current cash flow forecasts.However, in the construction industry a high level of bankruptcy is suffered as a result of poor financial arrangement and inadequate attention to cash flow management. (Calvert, 1986; Boussabaine and Kaka, 1998; Harris and McCaffer 2001).

Inadequate cash resources and failure to convince creditors and possible lenders of money, that the inadequacy experienced is only temporary, is another major cause of bankruptcy hence the need to forecast cash requirements is important in order to make provision for these difficult times before they arrive (Harris and McCaffer, 2001). McCaffer (1979) opined that cash flow forecasting gives a good warning system to forecast possible insolvency and enables timely preventive measures to be considered and taken.

2.5.4.1 Cash flow management approaches

According to Cooke and Jepson (1986), the actual movement of money in and out of a business, is referred to as cash flow . Money entering a business is termed positive cash flow and is credited as cash received. Monies paid out are termed negative cash flow and are debited to the business. Net cash flow is the difference between the positive and negative cash flows. Cooke and Jepson (1986) added that, within a construction organisation, positive cash flow is mainly derived from monies received in the form of monthly payment certificates. Monies spent on a project in order to pay wages, materials, plant, on site and off site administration cost, expended during the progress of the work are known as negative cash flow. The net cash flow will have to be funded by the contractor in a case of cash deficit and in case of cash surplus the contract is self-financing. Short- term bank loans or overdraft facilities according to

Cormican (1985) often come handy to take care of shortfall that may occur between the supply of funds and the need for cash.

A contractor may be forced to take up short term loans at high interest rate, and if they do not suspect a threats from this loans from the financial institutions, it may lead cas shortage and consequently result in liquidation of assets (Cormican, 1985). Other approaches utilised in resolving cash shortages according to Harris and McCaffer (2001) and Kaka and Price (1993) include delayed payment to subcontractors and suppliers, tender unbalancing, utilising company's cash reserves and overvaluation.

Mawdesley et.al.(1997) pointed out the need for financial plan in cash flow management, Which will list out the planned position of the project, income, expenditure and net cash flow, hence allowing for proper monitoring, using project cash flow plan, project monitoring and monthly cost value reconciliation.

2.5.5 Estimating

The costs involved with the project, is the first thing that needs to be done in the production of the estimate. This, principles apply to all construction work.

2.5.5.1 Estimating Construction Costs

The content of the estimate of a construction depends on the type of project, size of the project and the location and the economic state of the construction industry, i.e in the face of shortage of construction projects firms will reduce their tender amount to be attract works, and in increase of construction projects they will increase their tender amount as they are not keen in getting contracts that may stretch their resources, unless it is financially viable. In a recession, construction firms can literally buy work in order to keep their workforce and to ensure some cash flow

Building Construction Costs can vary between builders/developers. This can be traced to the size or purchasing abilities of a company or the discount that it receives from suppliers.

Professional fees that are added to cost of construction differ from project to project. They were based on a fee in the past but due to the competitiveness in the industry for professionals, it has introduced a system where professionals negotiate their fees. This has resulted in reduction in mount paid to professional. The scale normally used ranges from 8% to about 20% or more for more sophisticated developments with complex mechanical, electrical and communication services installations.

Amending the published rates to reflect the true cost of resources as obtained from quotations received for plant, labour and materials and combining these with their calculations and requirements for overheads and profit, reflects the true skill of the estimator

It should be remembered that the price calculated by the Estimator is seldom the tender price which is submitted to the client. The units rates may be amended by the Estimator to take into account individual contractual factors and constraints affecting the unit rate and this makes up the Estimators' cost price.

2.5.5.2 Producing the Estimate

The net estimated cost of carrying out the work is referred to as estimate. It covers all items of expenditure that may be required for the completion of the work. On completion, the assessment is submitted to management to enable them to determine if a tender is to be submitted and the price of the tender

2.6 Legal, Health and Safety

Construction is a high risk industry that comprises a wide range of activities involving construction, alteration, and/or amendment. Examples include building construction, bridge erection, roadway paving, demolitions, and large scale painting jobs. Construction workers activities on site expose them to many hazards such as being struck by heavy construction equipment, electrocutions, silica dust, and asbestos falling from rooftops, unguarded machinery.(Health and Safety Executives, 1996)

In construction work, many of the hazards (a hazard is something with the potential to cause harm) are evident. Most of them can be found on nearly every site. The causes of accidents are well known and often recurring. Too often hazards are just seen as an inevitable part of the job, so no action is taken to control the risks they create. Consequently, the rate of accidents and ill health remains high.

Action is needed to change this according to the Manual Handling Operations Regulations (1992).

The hierarchy of control procedures with practical examples:

1. Avoid working at elevation unless it is essential (eg erect guard rails on steelwork at ground level and then crane the steel and the guard rails into position; provide cast in mesh across riser ducts at the position of services; fix nets using extending poles).
2. Avoid falls by using an existing safe place of work that does not require the use or addition of work equipment to prevent a fall (eg a flat roof with permanent edge protection).
3. Avoid falls by using work tools that protects all those at risk (eg access equipment fitted with guard rails, such as independent scaffolds, tower

scaffolds, mobile elevating work platforms (MEWPs) and mast climbing work platforms (MCWPs)).

4. Prevent accidental falls by using work equipment that protects the person (eg a harness with a short lanyard which makes it impossible for a person to get to a fall position (this is called work restraint) or use a podium).
5. Tone down falls by using work equipment to minimise the distance and consequences of a fall and protect all those at risk (eg nets or soft landing systems positioned close under the work surface).
6. Mitigate falls by using work equipment to minimise the distance and penalty of a fall and protect the individual (eg a personal fall arrest system with the anchorage point sited above the head, or a rope access system).
7. Mitigate falls by using work equipment that minimises the consequences of a fall (eg nets rigged at a lower level, or inflatable injury protection).
8. Mitigate falls through training, instruction or other means (eg ensure ladders are inspected regularly and are used by competent people, demarcate areas to provide a warning, provide adequate lighting, apply sensible housekeeping measures, provide suitable footwear.

2.6.1 Safety on site

2.6.1.1 Setting up the site; Site access

Safe access unto and around the site should be provided for people to move around, and vehicles kept clear of pedestrian, especially at site entrance. Doors that open to traffic routs may require viewing panel or windows. Plan should comprise how vehicles can be kept clear of pedestrians at vehicle loading/unloading areas, parking and maneuvering places and areas where drivers' vision may be obstructed. (Confined space Regulations, 1997)

2.6.1.2 Site boundaries

Construction work should be fenced off and suitably signed, so as to protect people from site dangers and the site from destruction and pilfering.

For jobs that have to be done in separate work areas, there has to be agreement on who controls which area, what fences, barriers, means of separation or permits to work are required to keep, so as to keep both construction workers away from hazards created by others and other people away from hazards created by the construction work (Management of Health and Safety at Work Regulations, 1999)

Make sure there is a system to ensure necessary precautions are kept in place during working hours and that night-time and weekend protection is put in place as required before the site closes. (Confined space Regulations, 1997)

2.6.1.3 Emergency procedures

Fire is the most obvious emergency on site.

In cases of flooding in excavations, tunnels, work near the sea or rivers, waterworks etc, or a risk from toxic gases, these general safety principles can be applied to plan for the emergencies. Some emergencies depending on the nature and magnitude may involve rescue of an injured person, while others may require evacuation of the site in full or in part. For example, planning the first aid attention to be administered on someone injured through a fall in a confined space before being taken to a place of safety. (Confined space Regulations, 1997)

2.7 Planning, Monitoring and Control

2.7.1 Planning

There are two main strata of planning associated with construction projects: strategic and operational (Harris and McCaffer, 2005). Operational plan entails the task a contractor has to do in his contractual responsibility in any type of construction

procurement systems. Gupta, (2010) opined that for success to be attained, proper planning has to be done, this is as a result of the components of project operations which involves a large number of activities and heir constraints on resources which cannot be visualized easily.

Contractors' operational planning entails establishing the activities which gives a clear view of resource requirements that are not visible at the strategic level (Harris and McCaffer, 2005). In addition, a contractor's operational plan incorporates a construction programme of works whose works principally presents the sequence in which the various activities should take place with their associated time frame and resource requirements (Harris and McCaffer, 2005). The contractor's development of his programme of work is a prerequisite stipulated in most conditions of contract used for building projects in Nigeria (Federal Ministry of Housing and Urban Development (FMH & UD), 2006). The contractor's programme of work and method statement are document that conveys the contractor's objective on how to execute his work. To arrive at an effective and efficient method statement and programme of work in construction, project planning techniques are used (Roberts and Wallace, 2004).

However, according to Mbamali and Okotie, (2012) inadequate technical and managerial know-how of the indigenous contractors and their inability to properly use the appropriate project planning techniques has resulted to projects failure in Nigeria.

Understanding how the two types of project planning techniques work and their inherent advantage is of paramount importance to contractors. Bar charts and linked bar charts, line of balance and network method are the common project planning techniques (Bhavikatti, 2012; Chitkara, 2012; Passenheim, 2009; Baily, Farmer, Crocker, Jessop and Jones 2008; Harris and McCaffer, 2005; Seeley, 1986).

2.7.2 The Construction Schedule

The construction schedule is a very vital organizational tool for the project manager, and it serves the same important function for the subcontractors and suppliers participating in the project.

Establishing a strong working schedule entails having an outline of the task to be represented in each activity, the order that they are fit into place, concurrent to the proper predecessor and successor until all tasks are linked and accounted for.

It is sometimes best to begin by listing all of the activities of the table of contents, by sub subdivisions as they emerge in the specification document.

The next action is to decide the level of detail one needs to show on a schedule to assist him in the management of the project. He may develop the schedule and present the information in outline format. A parent task might be concrete and the subsidiary activities will be footings reinforcement bars walls and slabs.

To enlarge the schedule to a CPM schedule, a greater level of detail is required, and milestones become the focal point and mechanism for measuring accomplishment

A milestone is a non-duration activity that can state the actual required start of a task or the actual end date of a task. Setting critical dates in this manner provides for a quick reference in schedule review to see if field operations are meeting scheduled expectations.

Assigning resources to tasks clearly shows an understanding of the scope of work, man-hours required to execute the work and the locations where resources will be used on the construction site. At the signing of the Owner contract, the start date for general contract work is determined, but may be accelerated by joint agreement and the contractor's acceptance of an Owner's "Notice-to-Proceed". Generally to acquire

this information a project manager working with the superintendent generates a plan of action that lists the resources needed over a given period of time, while for trade work attain from the subcontractors their man-hour allocation for the project per activity of work and insert their logic into the master schedule. In creating the schedule on computer, all of the above information is needed for a proper "network", linking all of the tasks with proper relationships literally building the project on paper in a graphically vivid manner assisting all involved parties in seeing the end of construction. (Robert, 2007)

2.8 Delivery and Materials' Management

Materials and inventory management plays a definite role throughout construction process. It is because construction materials contributed 50-60% of the total project costs (Song, 2005 and Nasir, 2008). Materials and inventory management is important especially in large and complex construction projects where there is significant amount of money invested in every single process. Materials and inventory management on-site are made complicated as increasing in project size and complexity. (Kasim*et al*, 2012)

2.8.1 Material Management

Material management can be defined as a process that coordinates planning, assessing the requirement, sourcing, purchasing, transporting, storing and controlling of materials, minimizing the wastage and optimizing the profitability by reducing cost of material.

Building materials constitutes about 60 to 70 percent of a project cost while the remaining cost is for labour. Materials management is important as materials constitute a large amount in construction costs (Lu *et al.*, 2011). This is because the poor inventory management can affect not only to the increase in costs, but also

contribute to schedule and project delays. For large construction projects, the good management and control over inventory is important. It is to ensure that the right quantity and quality of materials and equipments to be easily specified in a timely manner, obtained at reasonable cost and are available when needed.(Bell &Stukhart, 1987).

2.8.1.1 Objectives of Materials Management

1. Efficient materials planning
2. Buying or Purchasing
3. Procuring and receiving
4. Storing and inventory control
5. Supply and distribution of materials
6. Quality assurance
7. Good supplier and customer relationship
8. Improved departmental efficiency

In fulfilling the objectives of material management, it is necessary to establish harmony and good coordination between all employees of materials management departments, and they should have god coordination with other departments of the organisation to serve all production centres

2.8.1.2 Functions of Materials Management

According to Patel (2011), the functions of the materials management are also categorized as primary and secondary functions.

Primary Functions To meet the primary objectives, the primary functions of the materials management are given as follows:

1. Materials Requirements Planning (MRP)
2. Purchasing

3. Inventory Planning and Control
4. Ascertaining and Maintaining the Flow and Supply of Materials
5. Quality Control of Materials
6. Departmental Efficiency

The Secondary Functions

1. Standardization and Simplification
2. Make and Buy Decisions
3. Coding and Classification of Materials
4. Forecasting and Planning

2.8.2 Planning, Purchasing and Receiving

The BOQ is the most frequently used bases for planning activities out of the project. Time, cost, material and labour are the four major elements of planning undertaken on sites. Companies may have two major levels in planning- micro and macro level. The planning should be revised as frequently as possible in order to monitor whether work is progressing as planned.

Ibrahim (2012) stated that purchasing procedure entails the steps as stated below; Step 1 – Material Indent Step 2 – Enquiry to Vendors, Step 3 – Vendor Comparison, Step 4 – Vendor Selection and Negotiations, Step 5 – Purchase Order, Step 6 – Vendor Evaluation

According to Sundersan, M. the system of receipt can be divided into:

1. Receipt from outside suppliers
2. Receipts from internal divisions.

The three documents to be dispatched are copy of purchase order, supplier's advice document and the consignment note. For receipt from in-house divisions, usually

transfer notes and return to stores documents are used. System of receipt starts even before the material reaches the site.

2.8.3 Inspection, Stacking and Storage

There are two ways in which Inspection can happen

1. Pre- dispatch inspection

2. Inspection on site

Inspection is necessary process to be carried out on materials or fabricated products prior to their delivery at site E.g.: precast members. It is the duty of the inspector to examine all materials delivered to the site prior to their being used in the work

The inspector has rights to reject defective material and have it removed from site.

Quality requirements of manufactured goods are expected to be specified in the purchase order

There are three methods of inspection:

1. Visual

2. Tactile

3. Statistical

The space available and company practices on site determines the physical storage system to be adopted.

There are guidelines in the industry that are considered in storage and stacking of certain materials. Materials most times are classified in terms of comfort level of working of the workers. The Basic categories of materials followed are civil, electrical, plumbing, finishes and construction chemicals. The materials are also often stacked as per the specification of the vendor or manufacturer. Relevant IS Codes (IS: 4082: recommendations on stacking and storage of construction materials at site) specifications are also followed. E.g. As per IS: 4082,

1. The materials should not be affected by impurities or atmospheric agencies.

2. Cement should be stored in covered sheds and stacked on timber raised platforms.

3. Reinforcing bars should be stored far away from moisture to avoid rusting and also away from oil and lubricants. Reinforcement bars should be stored according to sizes.

2.8.4 Issuing Material

Issues can be divided into two

1. Issues to consuming departments

2. Issues to outside suppliers for processing or conversion.

Issuing on site does not happen in the case of all construction materials, the consumption of materials especially aggregates are done as and when required on site in respect to the progress of the project. Regarding other materials issues are based on the programme of production. Work orders are printed, based on this and the bill of materials, listing for each material, quantity to be issued for the respective component requiring that material. This automatically controls consumption. Sundersan, M.

2.8.5 Inventory Control

Sundersan, M. defines inventory as "The sum of the value of raw materials, fuel and lubricants, spare parts, maintenance consumables at any given point of time." Inventory management in construction project could be affected by several factors such as; inadequate storage space (Sardroud, 2012), over ordering and double handling (Donyavi& Flanagan, 2009); and incomplete and lack of up-to-date information regarding on-site stock (Navon&Berkovich, 2006). The lack and incomplete of up-to-date information regarding on-site stock is caused by the poor tracking and locating of materials in construction sites. Thus, there is a need for a proper inventory management in order for the materials to be tracked and located easily; and without employing additional costs.

2.8.6 Requisition

Requisition means to apply for progress payments based on work completed at the end of the pay period (usually one month) (Construction dictionary). It is an electronic document, which requires precise accounting information for the commitment, a depiction of material and/or service, the quantity, date, and estimation of cost. (Procurement procedure manual, 2014).

Donald, (2002)stated that Where a formal purchasing department is maintained, construction manager or supervisor usually initiates purchasing and subcontracting via standard form requisition asking the purchasing department to acquire bids for the equipment materials works or services as described in the requisition and the applicable procedure and specification attached. Normal purchasing and contracting practices and procedure are outlined such that they must be sufficiently flexible to cope with and ever changing construction climate to meet special client directions or to comply with other outside requirements. (Donald, 2002).

2.8.7 Purchase order

Purchase orders are documents sent from a buyer to a vendor with a request for an order (Erunke, 2011). According to the construction dictionary, Purchase order is a formal written authorization to a vendor to supply certain goods or services and to bill the buyer for them at the specified price. Acceptance by the vendor makes the purchase order a contract.

The specification and scope which includes, type of item, the quantity and agreed upon price are generally printed on the purchase order, the more specific the order, the more particulars included, the more effective the purchase order will be. A legally binding contract is formed between two parties when a seller (supplier, vendor, etc)

accepts a purchase order. In addition, the buyer should always clearly and explicitly communicate their requests to the seller so there is no confusion when the purchase order is received. Also, in the event the buyer refuses payment, the seller is protected because the purchase order is a binding contract between both parties (Erunke, 2011).

Purchase orders can be traced back to more than 100 years in practice and it's still considered the best accounting practice for managing the ordering of goods. It gives room for companies to spell out, confirm and track every feature of an order placed with a vendor. In construction, helps the contractors to never lose sight of committed costs from the beginning to the end of a project. Efficient construction purchase order/subcontract systems provide such advantages as:

1. Guarding against overpaying or double-paying invoices
2. Ordering flexibility to avoid project delays
3. Verifying delivery of goods
4. Monitoring subcontract retainage

A lot of contractors avoid using purchase order because they think it is time consuming and cumbersome, and this is probably true if an unsophisticated or generic accounting system is being used. Most construction-specific job cost accounting systems, on the other hand, are planned to automate these processes, allowing companies to resourcefully trail and manage all material, supplies and subcontractor expenses. (Uduak, 2006)

2.9 Production on-site and off-site

This considers activities supporting production such as testing, setting out, dimensional checks, and plant maintenance.

2.9.1 Setting out

Setting out involves working out the location and extent of the building on site. Each site is different, so start by establishing the particular conditions. Usually it is the builder's responsibility to place the building correctly on site, but it is important to check where responsibilities lie for individual contracts. (Build right, 2012)

Generally, the owner must indicate the boundaries and ensure boundary pegs are properly positioned. Most builders can undertake building set-outs that are clearly instructed and on easy contour sites. However, for more difficult sites or tight urban infill building where set-out is critical down to the finest measurement, employ a land surveyor to position the foundations. (Build right, 2012)

2.9.2 Plant maintenance

It is only since Second World War that there have been profound advances in engineering and scientific technology that have highlighted the need for more attention to be paid to maintenance of engineering systems (pophaley,2010)

Continual modernization and the pressing need for higher and higher productivity have resulted in the increased development and use of sophisticated & complex machines and equipments. This has resulted in increased capital employed in production equipment (Waeyenbergh & Pintelon, 2002).

When Plant and machine used in construction processes fail, it affects production and consequently loss of revenue, further more next to energy cost, maintenance cost can be the largest part of any operational budget (Hansen, 2006; Lofsten, 2000; Park & Han, 2001). Hence adequate and timely maintenance actions are required which will minimize the incidence of such failures, and increases the reliability of machines and equipments through the effective management of maintenance function.

2.10 Technological Application

According to Capron (2000), communication and computing has immensely affected the way we live work, learn and play, unfortunately in construction industry many companies have not appreciated the positive improvement and advantages that new technology provide to other sector of the economy.

Today a large number of software packages are available to all the discipline of the construction industry and at every stage of the construction process, they provide support for a broad range of activities such as computer aided design and drafting, building visualisation design appraisal

2.10.1 Clean room technology

A room in which; the air supply, air distribution, filtration of air supply, materials of construction, and operating procedures, are regulated to control airborne particle concentrations to meet appropriate cleanliness levels.

Clean rooms are defined as specially constructed, environmentally controlled enclosed spaces with respect to airborne particulates, temperature, humidity, air pressure, airflow patterns, air motion, vibration, noise, viable (living) organisms, and lighting. Particulate control includes:

1. Particulate and microbial contamination
2. Particulate concentration and dispersion

“Federal Standard 209E” defines a clean room as a room in which the concentration of airborne particles is controlled to specified limits.

“British Standard 5295” defines a clean room as a room with control of particulate contamination, constructed and used in such a way as to minimize the introduction, generation and retention of particles inside the room and in which the temperature, humidity, airflow patterns, air motion and pressure are controlled.

Today, many manufacturing processes require that spaces be designed to control particulate and microbial contamination while maintaining reasonable installation and operating costs. Clean rooms are typically used in manufacturing, packaging, and research facilities.

2.10.2 Process simulation

The process of construction is an important link in the building lifecycle. Modern construction processes require complex and dynamic systems which results in difficulty in construction planning, design, site management and construction management, this makes it difficult to handle large project by traditional processes. Virtual construction has provided solution to consumption of physical resources and energy, hence contractors are able to see and understand the construction process and results before actual construction happens (Ming, 2002)

Building information management according to Jianping (2010) helps in avoiding information silo and information gap phenomenon in construction. This system improves many aspect of construction such as dynamic display of construction plan, design and choice of construction plan, layout and optimisation of construction site, construction safety management and dynamic presentation and management of construction schedule.

2.10.3 Bioremediation

Bioremediation is the use of microbes to clean up contaminated soil and groundwater. Microbes are very small organisms, such as bacteria, that live naturally in the environment. Bioremediation stimulates the growth of certain microbes that use contaminants as a source of food and energy. Contaminants treated using bioremediation include oil and other petroleum products, solvents, and pesticides. (EPA).

Bioremediation has the advantage of using natural processes to clean up sites. Because it may not require as much equipment, labor, or energy as some cleanup methods, it can be cheaper. Another advantage is that contaminated soil and groundwater are treated onsite without having to dig, pump, and transport them elsewhere for treatment. Because microbes change the harmful chemicals into small amounts of water and gases, few if any waste by products are created.

Bioremediation often occurs underground and does not cause much disruption to the site or surrounding community. Contaminated soil and groundwater stay onsite, reducing truck traffic, compared with some other cleanup methods. However, area residents and businesses may hear the operation of pumps, mixers, and other construction equipment used to add amendments or improve site conditions to begin the bioremediation process. Excavation and pumping also will occur for ex situ bioremediation. (*Citizen's Guide to Excavation of Contaminated Soil* [EPA 542-F-12-007].)

2.10.4 Management of building resources by reuse and recycle systems

Companies of in various fields have been raising emphasis on environmental programs. In the construction industry as well, companies are taking steps to reduce their impact on the environment. In

Japan, new scheme has been created by the amendment of the low for production to effectively utilize recyclable resources. The promotion in construction industry is performed as 3R (reduce, reuse, and recycle) activity. According to Construct IT (1997) Two types of approaches have been undertaken to pursuit zero emission from a viewpoint of technology. One is an improved approach to pursuit for zero emission

thorough development and applications of efficient construction technologies to realize the 4R (refuse, reduce, reuse, and recycle) program at project level.

Construct IT (1997) Another is an innovative and challenging approach thorough development of relevant material recycle systems at company level, by introducing innovative technologies such as biotechnology. We believe both approaches are necessary to relentlessly pursuit for zero emission in construction, by promoting the 4R program at project level.

On the other hand, major innovative approach is posed on recycling of construction by-product. The major resource to be recycled in construction industry is concrete, which occupy about 40% of total materials used in whole Japanese industry.

Amount of concrete waste estimated will exceed the demand capacity of road sub-base in near future, and capacity of disposal facility will not be able to accept concrete waste.(Yamazaki, 2003)

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

According to Saunders *et al*, (2003), the choice of research method influences the way in which the researcher collects data. Given the scale and complexity of the study, a number of methods are considered in order to capture the diversity of information and data across a number of sources and (Saunders *et al*, 2003).

2.9 Research Design

Burns and Grove (2003) define research design as "a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings". Parahoo (1997) describes a research design as "a plan that describes how, when and where data are to be collected and analysed". Quantitative approach for data collection was used in this research. Relative importance index were used to arrive at the conclusions concerning the site management practiced by expatriate contractors.

The following steps were used to arrive at achieving the aim and objectives of this research work.

1. The site management practices were identified from existing literature. Ten factors were identified, Eight methods for monitoring site management practices and eighteen technological applications were identified.
2. The identified method of monitoring site management practices, factors and technological application were used to conduct a pilot survey in order to test the understanding of the respondents and the appropriateness of the questions.
3. The Ten factors were identified, Eight methods for monitoring site management practices and eighteen technological applications were used to draw up questions for the questionnaires and checklist respectively.

4. The analyzed responses from the questionnaires were used to draw conclusions and make recommendations.

3.2 Research Population and Sample size

With regards to the sampling size in the distribution of the questionnaire, the sampling size was determined based on the formula below considering the fact that the targeted population is known

$n = N/[1+N(\alpha^2)]$

Where;**n** = the desired sample size, **N**= Known population size (83 Expatriate firms, gotten from FIRS Federal Inland Revenue Services)

α =Standard deviation depending on the confidence level.

a. A 90% level of confidence has $\alpha = 0.10$
b. A 95% level of confidence has $\alpha = 0.05$
c. A 99% level of confidence has $\alpha = 0.01$
d. A 99.5% level of confidence has $\alpha = 0.005$

Thus using α =0.05 corresponding to 95% confidence level

Hence n= 83/ [(1+83(0.05)2] = 68

A total of 70 questionnaires were distributed to 70 different expatriate firms whose representatives were Architects, Builders, Surveyors, Engineers, Top management personnel.

3.3 Data Collection

The data were collected from primary and secondary sources. The primary sources were through the use of questionnaire and checklist and the secondary sources were gotten from textbooks, journals and records kept by National Bureau of Statistics (NBS). The primary source entails carrying out a survey through the administration of questionnaires the management of expatriate construction firms in Abuja. A total of seventy (70) questionnaires and checklist were administered to the sample population.

3.4 Research Instrument

The instrument of this study was questionnaires and checklists. In order to collect data and to meet the set objectives of the research; a designed questionnaire based on the objectives of the study was used. The preliminary sections of the questionnaire were on general information about the respondents, these include the respondents' profession, discipline, their role in the organisation, years of work experience. The second section of the questionnaire assessed the factors determining site management practice of expatriate contractors, the third section of the questionnaire assessed the method of monitoring Site management practices by the expatriate contractors.

The checklist assessed the level of Technology Application in the site management practice of expatriate contractors, by identifying the availability of the technological facilities.

3.5 Administration of Data Collection Instrument

As earlier mentioned, a total of seventy (70) questionnaires and checklists were administered to the population. However, a return rate of about 60% and above is expected to be achieved, which is consider sufficient for the study based on the assertion of Moses and Kalton (1971) in Oyedokun (2010) that the result of a survey

could be considered as biased and a little significant if the return rate was lower than 30 – 40%.

3.5 Data Analysis Technique and Presentation

Data obtained in the study was analysed using statistical tools such as the Relative Importance Index (RII), tables, mean, percentages, and charts were used to present the statistical results.

3.6.1 Relative importance index (RII)

Relative importance index was used in the study to rank the effectiveness of site management best practice as implemented by these expatriate firms.

$$\textbf{Relative importance index (RII)} = \frac{\sum fx}{\sum f} x \frac{1}{k}$$

Where,

∑fx = is the total weight given to each attributes by the respondents.

∑f = is the total number of respondents in the sample.

K = is the highest weight on the likert scale.

Ranking of the items under consideration was based on their RII values. The item with the highest RII value is ranked first (1) the next (2) and so on.

The rating of all the factors for degree of significance was based on the value of their respective relative importance index (RII). Ranking of the items under consideration was based on their RII values. The item with the highest RII value is ranked first (1) the next (2) and so on.

Table 3.1 Guide to degree of significance

Degree of significance	Rating
Very significant	0.76 above
Significant	0.67-0.75
Fairly significant	0.45-0.66
Not significant	0.44 below

Source: Vanduhe (2012)

CHAPTER FOUR

4.0 DATA PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS

4.1 Data Presentation and Analysis

This part of the study deals with the presentation and interpretation of data obtained from the field survey, analysis of the data and discussion of findings as they relate to the objectives of the study.

4.2 Questionnaire Design and Response

In order to achieve the objectives of this study, a properly designed questionnaire were distributed. The questionnaires (appendix A) were seventy (70) and were administered to the respondents that included different expatriate firms (architects, builders, surveyors, engineers, management personnel) in Abuja Nigeria. However, not all the questionnaires administered were returned as shown in the table below.

Table 4.1 :Breakdown of Administered Questionnaires

Administered	Frequency (No)	Percentages (%)
Returned	52	74.3
Unreturned	18	25.7
Total	70	100

Source: Field survey 2015

From table 4.1 seventy (70) questionnaires were administered, fifty two (52) questionnaires were returned. Based on the assertion of Moser &Kalton (1971), the outcome of a survey could be deemed significant if the response rate not lower than 30-40%. Therefore, the percentage of the returned questionnaires is adequate for analysis.

4.3 Personal Information

Section A considered the profiles of the expatriate firms, such as years of incorporation,

4.3.1 Years of Incorporation

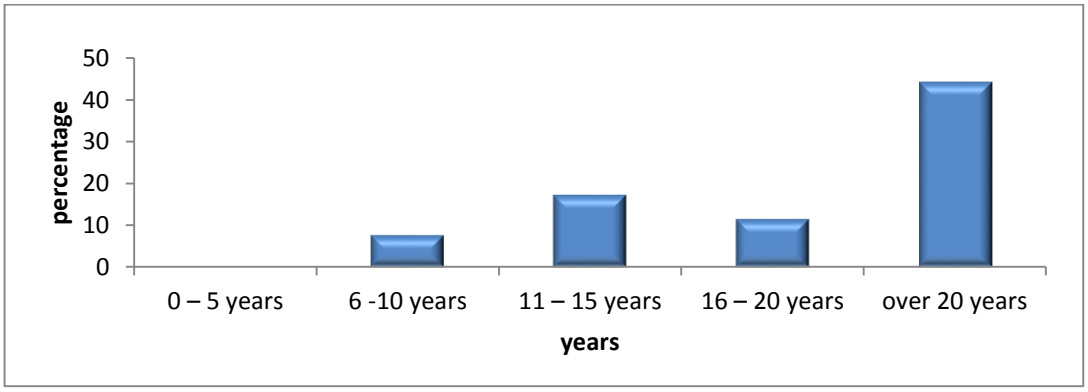


Fig. 4.1 Years of Incorporation

Source: Field survey 2015

Figure 4.1, reveals that a high number of expatriate firms have over 20 years of incorporation, this is followed by firms with 11-15 years of incorporation. Firms with 6-10years of incorporation, has the least response.

4.3.2 Professionals Engaged

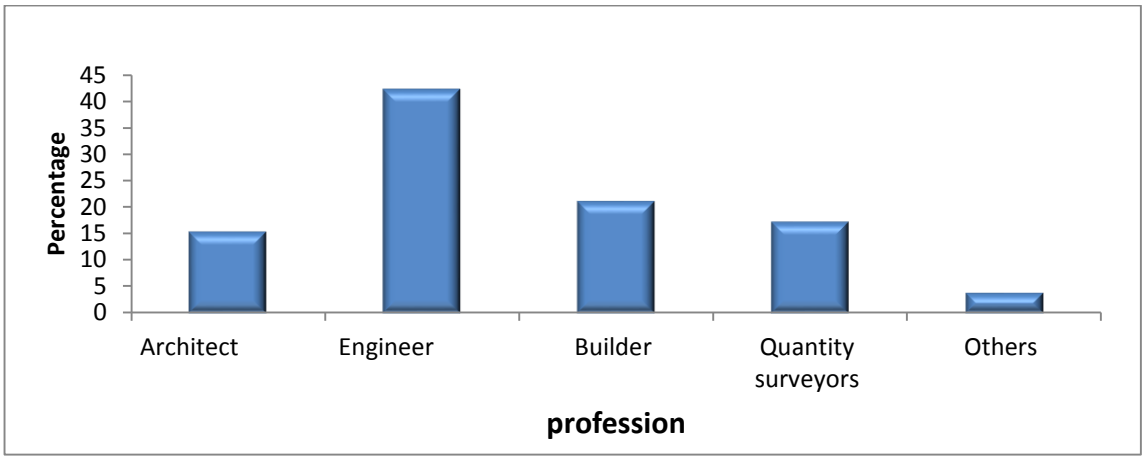


Fig. 4.2 Respondent Profession

Source: Field survey 2015

Figure 4.2, reveals that most of the respondents were Engineers. Hence it can be said that expatriate firms engage more of Engineers followed by Builders then architects. Respondents with other professions had the lowest percentage of response.

4.3.3 Academic Qualification of Respondent

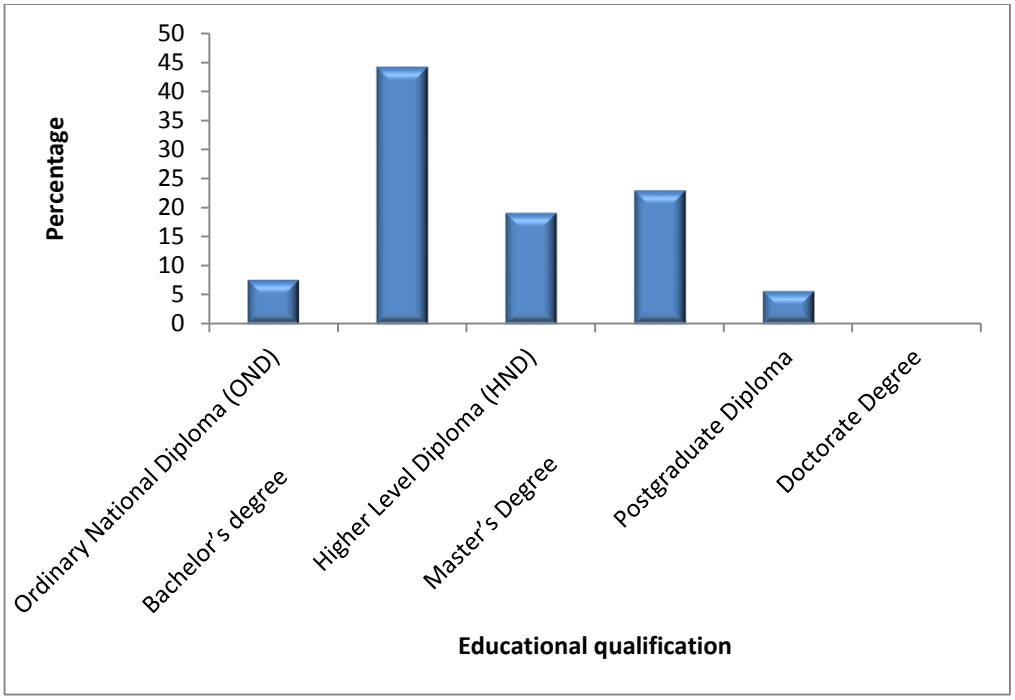


Fig. 4.3 Respondent Educational Qualification

Source: Field survey 2015

Figure 4.3 shows that over one third of the respondents (35.13%) were Bachelor's degree holders, followed by respondents with Higher National Diploma, followed by graduates with Higher National Diploma. Though none of the respondents had PhD, they were adequately positioned academically to the question and give reliable response.

4.3.4 Indigenous Personnel On-site.

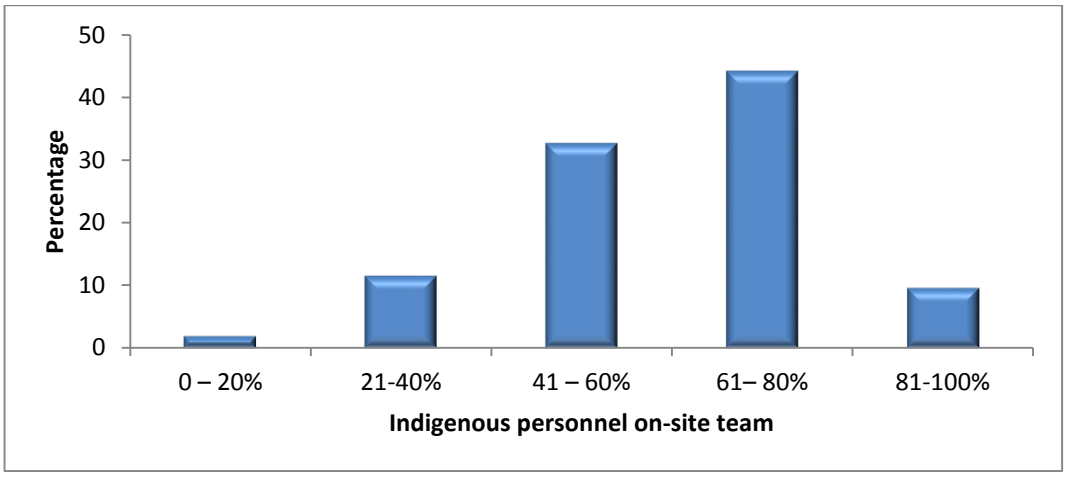


Fig. 4.4 Indigenous Personnel On-site

Source: Field survey 2015.

From figure 4.4, firms with 61-80% of indigenous personnel in their on-site team had the highest percentage; this reveals that expatriate firms engage a great number of indigenous personnel on site. This was followed by firms that engage 41-60% of indigenous personnel in their on-site team. Expatriate firms with 0-20% of indigenous personnel in their onsite team are very few.

4.4 Factors of Site Management Practices

Table 4.2 Factors that enhance Proper Site Management Practice

S/No	Factors	Frequency of Response					∑f	∑fx	Mean	RII	Position
		1	2	3	4	5					
1	Effective materials handling/materials control at the design stage.	0	5	11	15	21	52	208	4.0	0.80	2nd
2	Specification of standard sizes to minimize cutting.	2	6	18	14	12	52	184	3.54	0.71	7th
3	Accurate scheduling of materials to programmed delivery dates	6	4	18	13	11	52	175	3.36	0.67	8th
4	Documentation to set out size, quality and delivery form of materials for estimators' consideration.	3	3	13	18	15	52	195	3.75	0.75	5th
5	Procurement must specify quality, quantity, delivery time and method, and packaging	6	9	19	13	5	52	158	3.04	0.61	9th
6	Effective communication between suppliers and recipient.	7	9	17	17	3	52	159	3.06	0.61	9th
7	Preparation of effective planning programms.	0	5	12	15	20	52	206	3.96	0.79	3rd
8	Establish on-sites procedures for the reception of goods and plan for storage in advance. Materials of high value have to be held off-site until the last moment.	2	0	18	13	19	52	203	3.91	0.78	4th
9	Effective procedures for issuing of material on site	0	4	8	21	19	52	211	4.06	0.81	1st
10	Training of both management and other staff.	6	4	13	17	14	52	191	3.67	0.73	6th

(1=Extremely Unimportant, 2=Unimportant 3=Slightly Important, 4=Important, 5=Extremely important)
Source: Field Survey, (2015)

From Table 4.2 above showing the factors that enhance proper site management practice of expatriate contractors, Effective procedures for issuing of material on site

ranked first with a (RII) of 0.81 which translates to be a very significant feature. Effective materials handling/materials control at the design stage ranked second with a (RII) of 0.80 which is also a very significant feature. Preparation of effective planning programs ranked third with (RII) of 0.79 which is also a very significant feature. “Procurement must specify quality, quantity, delivery time and method, and packaging” and “Effective communication between suppliers and recipient” ranked least (nineth) with an (RII) 0.61 which is a fairly significant feature.

From the research findings above, it can be inferred that expatriate contractors accord top most priority to Effective procedure for issuing materials in respect to site management practice on site, this is as a result of the cost implication of materials and the necessity to avoid wastage and improve proper handling of materials on site.

4.5 Methods of Monitoring Site Management Practice on Site

Table 4.3 Methods of Site Supervision and Administration

S/No	Methods	Frequency of Response					∑f	∑fx	Mean	RII	Position
		1	2	3	4	5					
1	Making use of qualified consultants by the client	6	6	15	11	14	52	177	3.40	0.68	8th
2	Making use of experienced consultants by the client	0	3	15	19	15	52	202	3.88	0.77	4th
3	proper inspection	0	4	7	22	19	52	212	4.07	0.81	2nd
4	Strict implementation of corrective actions during the construction process	0	3	9	19	21	52	214	4.11	0.82	1st
5	Accurate measurement by the quantity surveyor	2	2	13	15	19	52	200	3.86	0.77	4th
6	Making use of non-defective formwork	2	6	10	14	20	52	200	3.84	0.77	4th
7	Ability to read and understand/interpret drawings	0	2	12	21	17	52	209	4.02	0.81	2nd
8	Sufficient concrete cover	0	0	9	37	4	52	195	3.75	0.75	7th

(1=Never, 2=Seldom 3=Sometimes, 4=Often, 5=Always)

Source: Field Survey, (2015)

Table 4.5 shows that respondents ranked implementation of corrective action first with relative importance index (RII) of 0.82 which is a very significant approach. This was followed by "Ability to read and understand/interpret drawings", and "proper inspection" which both ranked second with relative importance index (RII) value of 0.81, these also are very significant approach. least on the list of approach to management supervision and administration are "sufficient concrete cover" which ranked 7th with relative importance index (RII) 0f 0.75 and "Making use of qualified

consultants by the client" which ranked 8th with relative importance index (RII) values of 0.68 which are still considered to have high significance.

From the results above, it can be inferred that expatriate contractors perceive proper adherence and implementation of corrective action in the event of an error or variation, as a vital supervisory approach to solving problems experienced on site.

4.6 Technological Application of Expatriate Contractors

Table 4.4 Availability of Technological Application in site management

s/no	Technological Application	Frequency of Response			∑f	∑fx	Mean	RII	Position
		1	2	3					
1	Office-to-site videolinks	4	16	32	52	132	2.54	0.84	8th
2	GPS (Global Positioning System)	7	9	36	52	133	2.55	0.85	6th
3	Bio-remediation clean-up	12	26	14	52	106	2.04	0.68	15th
4	"Clean room" technology	11	33	8	52	101	1.94	0.64	17th
5	Digital photography for progess reporting	6	11	35	52	133	2.55	0.85	6th
6	Modelling or simulation technologies	4	19	29	52	129	2.48	0.83	9th
7	Recycled plastic components	9	22	21	52	116	2.23	0.74	11th
8	Preassembled air, water, power distribution systems	12	18	22	52	114	2.19	0.73	12th
9	Electronic exchange of CAD files	0	9	43	52	147	2.83	0.94	1st
10	De-construction and reuse systems	9	37	4	52	95	1.83	0.61	18th
11	Composite materials	0	13	39	52	143	2.75	0.92	2nd
12	Automated systems/programmable machines	16	21	15	52	103	1.98	0.66	16th
13	Remote sensing and monitoring systems	8	14	30	52	126	2.42	0.81	10th
14	High performance concrete	4	7	41	52	141	2.71	0.90	3rd
15	Laser guided equipment	17	13	22	52	109	2.10	0.69	14th
16	Computer aided design	0	17	35	52	139	2.67	0.89	5th
17	Company computer networks	13	16		52	114	2.19	0.73	12th
18	E-mail	0	14	38	52	142	2.73	0.90	3rd

(1=Not available 2=No 3= Yes,)

Source: Field Survey, (2015)

From the Table 4.6 above indicating the Availability of Technological Application in site management; Electronic exchange of CAD files ranked first with RII of 0.94 which is very significant. Composite materials ranked second with RII of 0.92 which is very significant. The use of High performance concrete and E-mail had RII of 0.90

were also considered very significant. Computer aided design ranked fifth with RII of 0.89 which is very significant. GPS (Global Positioning System) ranked sixth with RII of 0.85 which is also very significant. De-construction and reuse systems ranked least with RII of 0.61 which is fairly significant.

From the research findings above, it can be inferred that electronic exchange of CAD files is a very common practice in expatriate firms which is as a result of the relationship that exist between other software's used by the professions in the Industry and the Design software thus fostering building information model (BIM).

CHAPTER FIVE

5.0 SUMMARY CONCLUSIONS AND RECOMMENDATION

5.1 Summary of Findings

This study was aimed at assessing site management practice of expatriate contractors in Nigeria with a view to establishing strategy that will enhance the performance of indigenous contractors in Nigeria. Below are the summary obtained from the study.

1. On the factors of site management practice of expatriate contractors, respondents ranked Effective procedures for issuing of material on site ranked first with a RII of 0.81 which is a very significant factor and can be stated that materials management is taken seriously on site.
2. In the method of monitoring Site Management Practice on Site, Strict implementation of corrective actions during the construction process ranked first with relative importance index (RII) of 0.82 which is very significant. This was followed by "Ability to read and understand/interpret drawings", and "proper inspection" which both ranked second with relative importance index (RII) value of 0.81.
3. On the Availability of Technological Application in site management; Electronic exchange of CAD files ranked first with RII of 0.94 which is very significant.This is in line with the conclusion drawn by Jimoh (2012), communication and information sharing is a prime activity in construction as participants are concerned with information exchange, dealing with drawing specification, cost data and other management information for the successful completion of a building.

5.2 Conclusion

Based on the objectives of the research the following conclusions were made

1. Effective procedures for issuing of material on site is a very important factor to be considered in site management practice so as to deal with issues of material wastage, indiscriminate dumping of materials, demand and supply of materials and in the long run proper delivery of the project.
2. Strict implementation of corrective actions during the construction process is the most important method of Site Management Practice on Site.
3. Expatriate firms give information technology a high priority in management and use electronic exchange of information to expedite action on site.

5.3 Recommendation

The following recommendations were made based on the conclusion of the research

1. Indigenous firms should be put in place Proper material management on construction sites, by the project manager, to check the movement of materials and to avoid wastage. This should also include documentation and recording of materials request forms, and using them for decision on material management.
2. Indigenous firms should in the case of a deviation or error, should ensure strict implementation of corrective actions during the construction processes used implored to mitigate the effect of the error and ensure that the project is still on track.
3. Indigenous firms should encourage the use of information technology as a high priority in management and should also ensure the use of electronic exchange of information to expedite action on site.

5.4 Contribution to Knowledge

The following are the contribution to knowledge

1. The research identified effective procedures for issuing of material on site as a very important factor in site management.
2. The research identified strict implementation of corrective actions during the construction process is the most important method of Site Management Practice on Site.
3. The research expatriate firms give information technology a high priority in management and use electronic exchange of information to expedite action on site

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APPENDIX I
DEPARTMENT OF BUILDING

FACULTY OF ENVIRONMENT DESIGN

AHMADU BELLO UNIVERSITY, ZAIRA

Dear respondent,

QUESTIONNAIRE ADMINISTERED TO ASSESS THE SITE MANAGEMENT PRACTICES OF EXPATRIATE CONTRACTORS IN THE NIGERIA (CASE STUDY ABUJA)

This questionnaire is intended to be used to 'Assess Expatriate Contractors site management practices in the Nigerian Construction Industry. It will be used for academic purposes only. You are requested to kindly study and complete the questionnaire as careful as possible.

Thank you.

<u>Section A</u> - General information about respondent

1. Name of Organisation (Optional)
   _____
2. Number of years of incorporation;
   (a) 0 – 5 years (b) 6 -10 years (c) 11 – 15 years (d) 16 – 20 years (e) over 20 years
3. Respondent's Job title/ Designation?
   _____
4. Respondents profession (please tick one)
   (a) Architecture ( ) (b). Engineering ( )
   (c). Building ( ) (d). Quantity surveyors ( )
   (e). Others (please specify_____
5. Position in management
   i. Top management Level
   ii. Middle management Level
   iii. Lower management Level
6. Highest level of Educational qualification (please tick one)
   (a). Ordinary National Diploma (OND) ( ) (d). Bachelor's degree ( )
   (b). Higher Level Diploma (HND) ( ) (e). Master's Degree ( )

(c). Postgraduate Diploma ( ) (f). Doctorate Degree ( )

7. Average years of experience of respondents;
   (a) 0– 5 years (b) 6 – 10 years (c) 11 – 15 years (d) 16 -20 years (e) over 20 years
8. Nature of organization you work for (please tick one)
   (a). construction firm ( ) (b). Real estate Firm ( )
   (c). Project Management firm ( ) (d). M & E services firm ( )
9. What sort of work does your organization execute?
   (a) Civil Engr. Works ( ) (b) Design and Build ( ) (c) Building ( )
   (d) Architectural design ( ) (e) Landscaping ( )

SECTION B

Factors that enhance site management practices

Please rate the level of importance attached to each of the on a scale of 1-5

(1=Never, 2=Seldom 3=Sometimes, 4=Often, 5=Always)

S/No	**Factors**	1	2	3	4	5
1	Have effective materials handling/materials control at the design stage.					
2	Specification of standard sizes to minimize cutting.					
3	Accurate scheduling of materials to programmed delivery dates					
4	Documentation to set out size, quality and delivery form of materials for estimators' consideration.					
5	Procurement must specify quality, quantity, delivery time and method, and packaging					
6	Effective communication between suppliers and recipient.					
7	Preparation of effective planning programms.					
8	Establish on-sites procedures for the reception of goods and plan for storage in advance. Materials of high value have to be held off-site until the last moment.					
9	Effective procedures for issuing of material on site					
10	Training of both management and other staff.					

SECTION C

Methods of Monitoring Site Management Practice on Site

Please rate the level of importance attached to each of the on a scale of 1-5

(1=Never, 2=Seldom 3=Sometimes, 4=Often, 5=Always)

Methods of Site Supervision and Administration

s/no	Method	1	2	3	4	5
1	Making use of qualified consultants by the client					
2	Making use of experienced consultants by the client					
3	proper inspection					
4	Strict implementation of corrective actions during the construction process					
5	Accurate measurement by the quantity surveyor					
6	Making use of non-defective formwork					
7	Ability to read and understand/interpret drawings					
8	Sufficient concrete cover					

Appendix II

DEPARTMENT OF BUILDING
FACULTY OF ENVIRONMENT DESIGN
AHMADU BELLO UNIVERSITY, ZAIRA

Dear respondent,

CHECKLIST TO ASSESS THE MANAGEMENT PRACTICES OF EXPATRIATE CONTRACTORS IN THE NIGERIAN CONSTRUCTION INDUSTRY.

This questionnaire is intended to be used to 'Assess Expatriate Contractors site management practices in the Nigerian Construction Industry. It will be used for academic purposes only.

Thank you.

INSPECTORS: ……

LOCATION/ STREET: …….
DATE: ……..

Mark (√) as appropriate

S/N	**Management, supervision, and administration of sites**	**Yes**	**No**	**NA**
1	Office-to-site videolinks	[ ]	[ ]	[ ]
2	GPS (Global Positioning System)	[ ]	[ ]	[ ]
3	Bio-remediation clean-up	[ ]	[ ]	[ ]
4	"Clean room" technology	[ ]	[ ]	[ ]
5	Digital photography for progress reporting	[ ]	[ ]	[ ]
6	Modelling or simulation technologies	[ ]	[ ]	[ ]
7	Recycled plastic components	[ ]	[ ]	[ ]
8	Preassembled air, water, power distribution systems	[ ]	[ ]	[ ]
9	Electronic exchange of CAD files	[ ]	[ ]	[ ]
10	Deconstruction and reuse systems	[ ]	[ ]	[ ]
11	Composite materials			
12	Automated systems/programmable machines	[ ]	[ ]	[ ]
13	Remote sensing and monitoring systems	[ ]	[ ]	[ ]
14	High performance concrete	[ ]	[ ]	[ ]

15	Laser guided equipment	[ ]	[ ]	[ ]
16	Computer aided design	[ ]	[ ]	[ ]
17	Company computer networks	[ ]	[ ]	[ ]
18	E-mail	[ ]	[ ]	[ ]