Achieving Effective Construction Site Management Practices in Nigerian Construction Industry Based on International Best Practice

Master Thesis

International Master of Science in Construction and Real Estate Management
Joint Study Programme of Metropolia UAS and HTW Berlin.

Submitted on 29.10.2020 from
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My sincere appreciation also goes to my family and friends that have supported in whatever means throughout the duration of carrying out this research work, your love and support has pushed me forward. I want to say that I love you all and I will forever be grateful to you all.

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Conceptual Formulation of the Master Thesis

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Joint Study Programme of Metropolia University of Applied Sciences, Helsinki and HTW Berlin.

Master Thesis for: Olabanji Amos Fayemi

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Topic: ACHIEVING EFFECTIVE CONSTRUCTION SITE MANAGEMENT PRACTICES IN NIGERIAN CONSTRUCTION INDUSTRY BASED ON INTERNATIONAL BEST PRACTICE.

Background

In Nigeria, construction work is becoming more complex technically and administratively as there are several challenging engineering and management problems that occur on the site which most times results to cost and time overrun. Construction projects development involves various stages and comes with site activities where inputs are converted into outputs by the collective efforts of operatives, machine and skilled construction workers, hereby demanding for proper planning (Obiegbu, 2012). Specifically, in Nigeria, the government embraced direct labour practice where the use of human labour is preferred on some of the projects commissioned for development. As these developments is occurring and construction of new facilities are growing, many of these projects have failed the project requirement of on-time completion and with the budgeted estimated cost. Inuwa Ibrahim (2014) ascertained that the indigenous contractors are regarded as unproductive for their inability in adequate planning of projects following contractual requirements. These have attracted the attention to access the construction site management practices outside Nigeria. The need to access site management practices in internationally is to come up with effective means of managing the array
of sites where construction works are currently undergoing in Nigeria and even future sites, to reduce waste and increase efficiency and productivity.

Goals
This research will assess site management practices on international bases with the aim of identifying the conditions for achieving good site management in order to give an improvement to performances in Nigerian construction industry and sites.

Research question
1. What is the present state of construction development in Nigeria?
2. What are the causes of failed management practices in Nigeria?
3. What are the successful site management practices in these developed countries?
4. What is the level of effectiveness of these practice on construction site?
5. What are the conditions for achieving an effective site management practice in Nigeria?

Reference


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Abstract

The construction industry is faced with underlying and visible challenges throughout all the phases of construction leading to several deficiencies. Since the challenges in the industry are constantly occurring throughout fiscal duration, the need to put in measures towards achieving successful site management through measures in the construction industry is essential. With this, the primary aim of this research project is to examine the practices of construction site management by means of an integration of best site management practices for adoption into the Nigerian construction industry with the focus on efficiency through international best practices.

The literature review on site management and related construction practices were undertaken at first. This strictly followed the four case studies incorporated into the research and interpreted with SWOT analysis to bring profound understanding of the concept of the literatures highlighted into the research work. The case studies used were directed to help in examining practices that are functional in other construction industries and to be implemented into Nigeria’s construction industry.

It is concluded that relevant stakeholders in the Nigerian construction industry should be familiar with site management practices early in construction which would help to avoid unnecessary errors that could be avoided in construction. It also expressed that construction professionals in Nigerian construction industry should restrict construction functions to qualified construction professional to handle proceedings related to respective disciplinary problems faced during the construction. The service of a site manager employed would go a long way in maximising materials and other inputs concerned with the construction in order to have an effective construction and solve problems related to a project; and management of the problems. Also, putting in place necessary perceptions and techniques that will be useful to aid site management practice in the country’s construction industry will put measures to standard expected in construction through practices expected from the onset to completion of projects.

Keywords: Site management practices; knowledge management; Knowledge Sharing mechanism
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List of Abbreviations

CPM : Critical Path Method
FLM : Flow Line Method
GDP : Gross Domestic Product
KM : Knowledge Management
LOB : Line of Balance
SWOT: Strength Weakness Opportunity Threat
CHAPTER ONE

1 Introduction

1.1 General Introduction

This chapter brings into notice the circumstances embedded in this research. It commences with a highlight outline of the background of the intended research, statement of research problem, justification for the research. This is further expressed in the aim and objectives of the study with a brief description of the methodology adopted. The structure and content conclude the research.

1.2 Background to the Study

The construction industry is observed to be the bedrock by which other industries operate as it provided the platform by which activities can be carried out for a maximisation of output (Kolawole, 2002). Balogun (2007) cited that the Nigerian construction industry employs up to 20% of the country’s labour force. The industry is characterised by few contractors that employ many labour into production. The construction industry showcases some of the biggest and the complex undertakings in its implementation of several technological methods through the resources consumed in cost, labour and time (Obiegbu, 2002). The latest Nigerian Statistical Facts Sheets on Economic and Social Development, 1999-2003 (Federal Office of Statistics, 2004) In the recent report by the Nigerian Statistical Facts Sheet on Economics and Social Development, construction and building projects shoots up by 9% as at when estimated in 2003. It was believed that the reason for the growth is due to capital implemented and maintenance of projects under the newly accepted policies incorporated into the country’s construction sector. There was also enhanced increase in relative housing projects owned by the government and even that of private projects. Furthermore, there was inflow in the energy and power sector, increase in the country’s foreign capital and buoyant telecommunication sector in advanced finance. This development has contributed a lot to the growth of the Gross
Domestic Product (GDP) of the nation due to the relationship between disciplines present in the construction industry.

In Nigeria, construction work is becoming more complex technically and administratively. Several challenging engineering and management problems occur on the site which most time results to cost and time overrun. Construction projects development involves various stages and comes with site activities where inputs are converted into outputs by the collective efforts of operatives, machine and skilled construction workers, hereby demanding for proper planning (Obiegbu, 2012). Specifically, in Nigeria, the government embraced direct labour practice where the use of human labour is preferred on some of the projects commissioned for development. As these developments are occurring and constructions of new facilities are growing, many of these projects have failed the project requirement of on-time completion and with the budgeted estimated cost. Akinkurolere and Franklin (2005) stated that waste management is a big issue in the Nigerian construction industry. It was obtained that material wastage increases the cost of construction in projects and reductions in the profit of the contractor. This was attributed to poor management and inadequacy in effective waste management awareness among professionals in the industry and that gave the need to involve management practices into construction and management of site to curb some abnormalities in the construction industry. The need for measures to assists the already integrated processes by inculcating site management incentives to workers for adequate handling of construction projects and improves the methods of management and production employed overtime.

Forster (2014) gave the ideal importance of site management as it entails crucial strategic approach to improving the performance expected from a construction project. This is explained by the numerous benefits that the participants involved in construction could gain if site management practice is incorporated fully into construction in order to help in areas, project indicators and perceptonal attributes identified among construction professionals by following standardized guidelines in other functional construction sites internationally and copying such into local construction industry. These project indicators performances are expressed in the quality of work, time spent on project, cost of
construction, waste management and safety of the labour employed on site (Forster, 2014).

The complexity of construction project is becoming alarming as well as the technicality to carry out these projects hence the need for a site manager to be involved in construction is more needed now more than ever to handle site management proceedings in construction. The site manager could help to bring a realisation of various techniques that are very useful and efficient in respect to manipulating principles that are very dynamic in getting the best out of the selected project. Meanwhile, a key project requirement that is becoming more required of site managers is the extent of project sustainability which the construction industry is working towards (Cox et al. 2003; Bassioni et al., 2004). Among them is waste output is crucial (Udawatta et al., 2015). Moreover, the Nigerian construction industry is still at the developing stage as most of the practices employed in the system are traditionally inclined and other challenges faced. The public sector forms the main source of the formation of capital in the construction industry as it channels growth, and the traditional approach used in the procurement process in funding of projects through fiscal capital budgetary in provision (Isa et al. 2013). The use of the traditional procurement system, which gives the Architect the mantle as the head of the construction, to determine the operations on site. The services and technicalities of the structural engineers, building service engineers to executing construction projects which have not been flawless in terms of material and labour wastage experienced on site as in regards when project management is subjected to the service of a Builder (Bamisile, 2004). The Federal Republic of Nigeria (2006) explained the need for a professional (builder) to handle production and supervision of management on site in terms of the materials and the craftsmen involved in order to have a better and organised construction industry.

Inuwa (2014) ascertained that the indigenous contractors are regarded as unproductive for their inability in adequate planning of projects following contractual requirements. These have attracted the attention to assess the construction site management practices outside Nigeria. The need to assess site management practices internationally is to come up with effective means of managing the array of sites where construction works are
currently undergoing in Nigeria and even future sites; to reduce waste and increase efficiency and productivity. Therefore, this research seeks to investigate functional best practices that could be integrated into the Nigerian construction industry in order to have an effective project delivery by means of proper construction site management.

1.3 Statement of Research Problem

The construction industry generally is faced with several challenges emanating from various systems. Challenges have been identified in applying suitable attention towards effectiveness, delivery of standard projects, and construction management system amongst other factors that affect the construction industry. In Nigeria, personnel who are perceived to be best in managing operations and labour works on the site often carry out the role of the site manager. This has contributed to limiting the employed personnel within work frame not totally guided towards an effective construction in site management (Fellows et al. 2002).

Fellows et al. (2002) stated the importance of the labour force employed in construction as it plays an essential role in the quality of service to be rendered and expected on the project. These services are directed to function in terms of the time management, working in correlation to the plan from the design stage of the project. However, the performance of the labour is definitely affected by the level of expertise and experience. With such labour giving the task of working as a site manager with limited technical and management know how, the output expected would be reduced as the subject is set to function within his set capability. When there are problems emanating from the site, in terms of probable material and labour wastage, delays, cost overrun, implementation of unsanctioned variation order etc., the project manager would be forced to change the personnel.

There is also another issue of the traditional system of procurement method majorly used in the Nigerian construction industry. This method gives the Architect the power as the chief head of a particular project who oversees the activities on site. The consultant Quantity Surveyor could also help in with project supervision but his activity is restricted as report and the Architect must grant permission. In cases where the head of this
procurement team in charge of the project has little or no training or skill in site management, activities on site would be affected greatly which would in turn have effect on time of delivery, the cost, quality and of the project. Another issue identified in the Nigerian construction industry is unwillingness of the client to pay for fees pertaining to a site manager. The clients are used to having one of the professionals to handle site management regardless of technical know-how and experience. This has dragged the country’s construction industry to a state where standard site management is not regarded as a norm during tender processes. In order to raise the Nigerian construction industry to a standard accepted industry, there is need to evaluate and inculcate site management practices into construction specifications and contracts that would create awareness into the clients, contractors and project managers into having a standardised construction industry.

1.4 Justification for the Research

The construction industry works towards having various practices in place to govern the activities of construction that will surely have a project of required standard at completion. The awareness of the involvement of a site manager will go a long way in bringing swiftness to the activities to be done on site with more ease as much as possible. Ashworth (2001) highlighted the numerous ways by which a site manager can function in construction by giving instructions on site, directing the affairs pertaining to the site, and making sure those general activities on and off site is managed within the agreeable standard set by the construction team. The need for effective site management in the Nigerian construction industry will put an end to some inconsistencies in the safety, project standard, type of contract agreement, waste management and other sectors that the research would expose in order to have an industry that is not only effective but also efficient.

In as much as other practices involved from the inception to completion of the project is important, putting in measures to arrange necessary management practices is germane to having a construction that is stable and within a set expectation and standard. Therefore, there is a need to put in work in order to identify with concepts and practices
concerned with site management to have a positive effect on site. Several approaches would be looked into to give diversified options when it comes to bringing construction to an effective acceptance by all construction team. Mackenzie et al. (2000) examines the manpower problem in the United Kingdom construction industry as well other industries by highlighting the mismanagement of task allocated to an individual that is not cut out for a particular job. It could be observed however that putting in place scheduled systems that would govern the affairs of participants concerned in construction would enhance the effectiveness of the Nigerian construction industry in which site management practice could be integrated for further efficiency of the industry. This research is therefore aimed to look in depth at management strategies that will minimize the number of reoccurring or repeatable hurdles which occurs on the construction site and reduce the negative impact of unforeseeable issues in construction industries with Nigerian construction industry not being an exception.

1.5 Research Aim and Objectives

The aim of this research project is to investigate construction site management practices through an integration of best site management practices for adoption into the Nigerian construction industry. The specific objectives of the project include:

1. To review practices involved in site management, processes involved as well as management procedures presently employed in some construction industries in order to make inference for improvement in the Nigerian construction industry.

2. To evaluate differences in perception among projects stakeholders concerning integration of site management practice in Nigeria construction industry.

3. To define knowledge management process in relation to its application on a construction site level.

4. To evaluate underlying conditions that mitigates functioning site management practices in some construction industries.

5. To assess approaches to improving construction site management practice in the Nigerian construction industry.
These objectives are accordingly designed to answer the question of causes of failed management practices in Nigeria, the conditions to achieve an effective site management practices in Nigeria and the successful site management practices in developed countries.

1.6 Research Methodology

To attain the objectives of this research, research methods of several combinations were adopted. These include literature review, cases study, and SWOT analysis. Table 1. elucidates the relationship between the research objectives, methods of research adopted to achieve them within a said scope.
<table>
<thead>
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<th>Objectives</th>
<th>Literature review</th>
<th>Case study</th>
<th>SWOT analysis</th>
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<td>To review practices involved in site management, processes involved as well as management procedures presently employed in some construction industries in order to make inference for improvement in the Nigerian construction industry</td>
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</tbody>
</table>

Table 1: Relationships between Research Objectives and Research Methods
(Source: Own tabulation)
This table above shows the summary of the objectives drafted towards achieving the aim of the research. It is divided into sections that contain the highlighted objectives, literature review, case study and SWOT analysis put to function together in bringing better knowledge of the research.

1.7 Thesis Structure and Contents

Chapter One: Introduction

The introductory part of the research is explained in this chapter. It comes with sub topics that range from the background of the study to the research methodology.

Chapter Two: Literature Review

This chapter reviews various literatures, publications, journals etc. that are peculiar to construction site management and other related articles. It gives a better understanding to the stated objectives in the introductory section of the research.

Chapter Three: Research Methodology

The research method employed for the interpretation of the objectives in order to arrive at the aim of the research is explained in this chapter.

Chapter Four: Discussion of findings

This chapter will review findings obtained from the case studies examined. The impact of SWOT analysis is also explained into its relation as a ‘unit of analysis’ in bringing findings discussed and the ones not discussed by the previous researchers.

Chapter Five: Conclusions and Recommendations

Inferences from the methodology discussed is summarized and discussed in this chapter with further correlation of additional information that would help assess the research and further projects that are related to this research in the future.
CHAPTER TWO

2 Literature Review

2.1 General Introduction

In bringing the best evaluation to the objectives of a research, the literature aspect of the research is very essential (Blumberg et al., 2005). This literature review comprises of data, information, and other relevant information concerning an identified topic of a research. This literature is obtained mainly from secondary sources to back up the work carried out by other researcher in relative field or research topic. Fellows and Liu (2003) firmly stated that the body of the literature should be comprehensively studied and not just found and cited without prudish understanding of what it entails. The literature must be able to showcase every form of data, methodology, findings, discussions, and theories etc. that are concerned with a specific work. Gill and Johnson (2002) highlighted the benefits of having a well researched literature in:

- It gives a precise understanding to the research questions by knowing the area to consider;
- It explains the theoretical evaluation of the concepts that the research has inculcated into the research work;
- It brings and bridges a finite gap between research carried out by other researchers by providing a link without neglecting to address the current problem that the research aims to solve;
- It provides insight and exclusive explanation to the topic in details; and
- It justifies the very need for the research to be carried out in the first place by picking up from where the previous researcher stopped by carefully analyzing possible solutions.

Literatures can either be found through primary or secondary sources. Each source has a distinct way of transmitting the information obtained by the researcher. Empirical studies, publications that are theoretically based that represents original work are ways of obtaining primary literature source. The secondary sources include information that are
Neuman (2006) stated the five research procedures to be followed in;

- Getting proper understanding of what to research about;
- Putting up designs related to the search;
- Getting access to research reports;
- Justifying related research articles concerning the search and
- Taking necessary documentations.

### 2.2 Site Management Practices

In a definition provided by Santos et al. (2002), the practice of site management is bring into reality a process in correlation to the successful implementation of construction site in respect of time, place and other factors considered to remain constant. In this context, Illingworth (1998) in his study grouped construction site into three. These include;

- **Open field site:** This is a site where the prospectus building to be erected on the land occupies a definite or specified portion of the construction site. There are spaces made available for other construction activities like storage of construction materials, and also a provision of stead for the workers. Examples are, many civil engineering projects, projects of factory developments, and housing estates;

- **Long and thin site:** The width of this site is considerably small and the length is very long. This type of site has specifics when it comes to the type of project to be executed because it can't be accessed at very many locations. Examples are fuel pipelines, motorways and gas, railway work and;

- **Restricted site:** A site where modern constructions occupy the higher percentage of the site with access to such site restricted to concerned personnel. Examples are some railway or motor, industrial improvement or additions and city centre developments.

The combination of site management practice is group into four of components that are related to one another, these include;
• site layout
• site organization;
• preliminary works; and
• welfare provision (Griffith and Watson, 2004).

Putting in place an efficient site management practice will provide a solid basis on which other activities concerned with the successful implementation of the project is based. It helps in bringing together designs, plans, standards, measures, structures etc, that are related to the project to better construction activities. However, site management is arranged according to the size of the project, the extent at which the contractors are involved in the actual construction. Griffith and Watson (2004) gave a diagrammatic representation of a medium sized contracting organisation showing the activities carried while highlighting that in other contracting type, such as the management contract, the labour of the site labourers are removed.
2.3 Construction Site Management

Recently, the implementation of a successful suit practice is consequential to the increased development experienced in every facet of construction. This new understanding is made possible by stakeholder’s interest and adoption of the methods involved in site management to be incorporated into construction to meet the objectives set down in order to have a project of high performance (Mustapha and Naoum, 1998). This practice is directed towards getting the best of value for money to be spent on the project, timely delivery of the construction, quality and quantity of work done, safety
management of the workers and also waste management. A site that employs the system of site managing is definitely going to have massive reduction in materials wastage.

The precepts and concepts concerned with site management is also concerned to have smooth operation by the site manager in charge of the project. It entails every direction taken, instructions given and followed, periodic and constant supervision, along other regulatory functions embedded into making the management an efficient one within the said standard. The site manager who is in charge of the project is responsible for the activities going on in the site and saddled with the responsibility of reporting every activity to the senior site manager. The role played by the site manager is very crucial in having a hitch free construction as happenings to the project now or later is a consequence of the actions put by the site manager today. Maki and Kerosuo (2015) stated some of the roles performed by a site manager as;

- progress monitoring;
- quality check and quality control;
- scheduling and planning;
- legal compliance;
- man power management and;
- discussion with other stakeholders.

2.3.1 Safety

It is already established that the involvement of site manager to perform the concepts involved in site management is going to improve the nature of the construction amongst other benefits. One of these benefits is bringing a safety protocol into the site by means of well arranged activities currently engaged in on site or activities to be embarked on whenever possible. In a study by (Tam et al., 2004) in a bid to investigate the causes of poor construction in the Chinese construction industry; it was discovered that poor site management practice is the main problem that faces the construction industry of the country mentioned. It was also inferred that some of the workers lack basic safety training that could have guaranteed their lives which would in turn channel them towards giving a
better output than the quality meted out. This study proved the importance of site management to the workers and also the construction activities on site.

2.3.2 Time

A project not delivered within the stipulated period is as good as nothing. The competence of the professionals involved in the construction is questioned. Delay is a major issue in construction. These delays are caused by several factors within and beyond the capability of the contractor. Effective site management has been studied to give a solution to the delay experienced on site. Faridi and El-Sayegh (2006) gave a study that concluded that effective site management and proper supervision on site will reduce effective site related challenges as experienced in the United Arab Emirates. Kumaraswamy and Chan (1998) also discovered the same result with the Hong Kong construction industry. Other studies by several researchers have gave results corroborating the evidence linking practice of site management to delay or enhancement of completion period.

2.3.3 Cost

Long et al. (2004) carried out a study in Vietnam to instigate reasons for cost and time overrun in the country’s construction industry. It was determined that operations linked to site management practice are big determinants in curbing the ever possible challenge of cost overrun. Since the construction industry in a labour intensive one, the extent at which management of construction workers would go a long way in achieving set goals to getting the best out of the quality of time

2.4 Site Management on Construction Sites

Bamisile (2004) pointed the attention to self-motivation in getting the required result concerned with a project. It was explained that force and unethical practices are short comings that are set to ruin the construction work even before starting at all. The need for the team to work and function as a unit putting in mind the different roles tasked in achieving a set standard in respect to the client’s satisfaction. Mohammed and Anumba (2006) defined site management as the one that involves the collaboration of various
activities, which turn basic resources into a finished product with proper organisation. Obiegbu (2012) corroborated Mohammed and Anumba (2006) by seeing construction as the conversion of raw resource inputs into defined functioning output, under the tutelage of a well governed process. This according to Construction IT (cited by Mohammed and Anumba, 2006) include organisation of the estimated materials to be used for the project, labour employed, and other resources which are concerned with relative effects on the cost, information and finance related to the project. Obiegbu (2012) listed some importance of site management practice in terms of adoption as;

- proper usage of resources;
- better quality of work and improved workmanship;
- putting in place health and safety in construction sites; and
- aiding improved relationship among construction professionals for smooth running of operations.

Obiegbu (2012) asserted in order to achieve good site management on construction sites, the identified areas have to be taken very seriously;

- details of the project must be read correctly;
- full comprehension of project requirements;
- proper allocation of materials for the project;
- provision of functional site layout;
- quality control measures to ensure well planned work;
- obeying statutory regulations;
- well annotated execution of project;
- putting measures to guide variation; and
- clarity of roles designated to qualified professionals.

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

- Management, supervision, and administration of sites:
  a. drawing register,
b. minutes,
c. technical information
d. labour allocations,
e. payroll,
f. progress reporting,
g. notices/claims,
h. correspondence, and
i. instruction,

- Commercial management:
  a. day works,
  b. cost-value reconciliation,
  c. cash flow management
  d. estimating,
  e. final accounts
  f. payment,
  g. sub-contracting,
  h. variations and
  i. valuations

- Legal, health and safety:
  a. building regulations
  b. insurance,
  c. health and safety requirements on sites
  d. safety policy, and
  e. management of legal

- Planning, monitoring and control:
  a. resource leveling,
  b. production of Gantt charts,
  c. exception reports,
  d. method statements,
e. project planning and scheduling,
f. progress reports and
g. network analyses

- Delivery and materials’ handling:
  a. activities associated with the management of deliveries and the subsequent;
  b. handleings of materials on site including requisitions, purchase orders, material call off, and plant returns.

- Production on-site and off-site:

  This takes note activities involved in production such as;

  a. Testing;
  b. setting out;
  c. dimensional checks; and
  d. plant maintenance.

2.5 Effective Site Management

Bamisile (2004) asserted the attention to self-motivation in getting the required result concerned with a project. It was explained that force and unethical practices are short comings that are set to ruin the construction work even before starting at all. The need for the team to work and function as a unit putting in mind the different roles tasked in achieving a set standard in respect to the client’s satisfaction. Furthermore, indications that effective site management practices involve a functional contractor’s team in:

- Right persons: it is due necessary that professionals (skilled and unskilled) to partake in the construction activities are within the right frame of mind, technicality and functionality for the work to be executed.

- Communication: there should be adequate dissemination of information from the top of the echelon to the least person in the contractor’s team. No detail should be deemed too insignificant. When right communication is established, false information won’t circulate within the operations.
• Progressing system: this is taking every record, detail of the activities going on and cross referencing it with the stated requirements and objectives before inception. This gives a proper understanding of the speed at which the work is moving and help to make decisions whether to continue with the current pace or increase it a bit.

### 2.6 Site Management Team and Organisational Arrangements

Ashworth (2001) examined the principal functions attributed to a site manager in organising, supervision, ordering, and motivating the workers to carry out site activities. Generally, the site management team has responsibility for:

- Management of production ascertained by contractor within the functionality of the site (Santos et al., 2002);
- Supervision of other personnel on site (specialists and sub-contractors) (Holroyd, 1999); and
- Control of all activities on site (Newcombe et al., 1993).

Walker (2002) gave three important factors that need to be considered in order to satisfy critical success factors in construction. These factors are based on timely completion of the project, getting to a specified level in quality and execution within set budget. Griffith and Watson (2004) provided the representation of the way which organisation arranges activities on site with relevant professionals in charge of each duty. The construction manager in construction management is in charge of other professionals and activities in the construction. The construction manager controls the site manager who in turns cater for the planning, purchasing, organising, cost controlling related practice, health and safety, environment, quality and performances that comes with the work. The site manager is also in charge of the sectional activities along with the supervision responsibility to the gang leader and the tradesmen. However, the precision attached to a project arrangement will vary when considered the degree of the contractor's involvement in the actualisation of the construction. Harris and McCaffer, (2001) emphasized the need for all professionals involved in construction to work hand in hand
with the site manager to put in place site management practice in order to be able to work towards a functional construction at the end of the day.

The team concerned with site management is also saddled with the responsibility of taking accurate records of activities on the site. The information recorded is processed to govern the way forward on site and other activities that could be fused into the construction to make it better. Ashworth (2001) gave examples of site records to be kept as;

- Reports: An accurate record of everything delivered, concerned with daily activities on site like materials delivered to the site, weather condition, labourer’s wages etc.;
- Site diaries: to have in written daily activities on site and that to be conducted in the future;
- Materials received sheets: to keep accurate record of all the materials coming into the site;
- Drawing registers: making available all relevant drawings designed by various design team and other consultants attached to the job; and
- Confirmation of verbal instructions: this is following the instruction given by the Architect in charge of the project. The instructions are recorded in order to validate its authenticity later and for future reference in case of dispute in variation and adjudication.

2.7 The Role and Responsibilities of Construction Site Managers

The site manager is responsible for activities to be carried out on site. The site manager is expected to be vast in every form of human interaction in order to have a unique interpersonal relationship with the labourers on site for better discharge of their duties on site. Griffith and Watson (2004) summarized the major roles attached to construction site managers as;

- Communicating;
- Planning;
- co-coordinating;
• motivating;
• organizing;
• controlling; and
• forecasting.

Furthermore, Styhre and Josephson (2006) expressed their view in the wake of putting the site manager as the leader in charge of the project which hopes to cater for the;

• administration;
• production;
• staff management activities;
• procurement;
• planning;
• leadership works; and
• communication with stakeholders.

In terms of responsibility, the site manager takes care of operational activities on site. Hence, they spend most time on the site and they are always associated with longer working hour than the other professionals involved in the project. Griffith and Watson (2004) showed that site managers spent more time say 25% of their time carrying out administrative work on site, instead of charging themselves with operations happening on site constructively. Figure 2 showcases the position of the construction manager within the organisation. The site managers play the role of technical expert in solving related challenges between head office and operational workers (e.g. tradesmen, sub-contractors and foremen).
Newcombe et al (1993) explained the five basic skills that the site manager must possess in order to be qualified and regarded as a site manager capable of leading operations on site. These five essential skills are;

- Negotiation skills: the site manager must possess the ability to be able to negotiate his way out of a negotiation with the buyer, seller, workers etc.;
- Engineering change skill: ability to bring other activities pertaining to the operation on the site together towards a functional set up;
- Match-making skills: mixing together people that have access to information vital to the project with people that doesn’t have such information to allow free flow of information among the workers on site;
- Teambuilding skills: putting together a team that is ready to carry out specifications aligned with the goals of the project from inception; and
• Skills of bending rules: skills related to going out of norms to find solution to an unexpected challenge met on site and taking adequate responsibility for such change with relevant documentation to back up claims.

2.8 Components of Site Management Procedures

Griffith and Watson (2004) explain the need for definition of roles played by various managers involved in a particular project. These managers vary in form of site manager, value manager, project manager and other sub-manager concerned with carrying out construction instructions. Every personnel concerned with the project should have a concise understanding of roles attached to individual person or group of persons without leaving out work for others to be redundant due to failure in carrying out an identified task. Newcombe et al. (1993) stated site organizations to be adhered to in order to determine the type of approach to be carried out on such construction site. The site organizations are expressed in;

1. The nature and characteristics of the construction;
2. The relative type of the project o be executed;
3. The size of the project as regards its technicality; and
4. The type of procurement method used.

2.8.1 Planning: Site planning encompasses every little and profound details put together for the successful implementation of a building project. The site planning starts from when the client invites the Architect to explain the design that he fancies to when the construction would start with other professionals involved in the work. It also relates to adequate monitoring and controlling of the works by working towards the drafted programme of works and compares the work undertaken against the programme with the output that can be seen thus far (Griffith and Watson, 2004).

2.8.2 Supervision: this is safeguarding that activities going on in the site are well between the required standard set by the contractor in charge. The personnel involved in the project are monitored periodically or always in order to keep an eye on the operations
on site. Supervision also involves the activities in monitoring the materials delivered to the site, standard measure of the work carried out, materials registered offsite etc.

2.8.3 Meetings and reports: construction meetings are aimed to share information regarding everything concerned with the project to bring to date relevant personnel concerned with carrying out activities on site. Reports are crucial as it acts as an instrument used to monitor proceedings on site with the aim of relating information gathered to be discussed during site meetings.

2.9 Construction Site Management Processes

Illingworth (2000) defined process in construction site management as the fusing together of ways materials and equipment are handled and the necessary skill set required to position the materials and the equipment to achieve complete construction, as shown in figure 3. In order to bring into reality pertaining to these fundamental activities, Construct IT (1996) divided construction site processes into five sub processes:

- Management, supervision and administration of sites;
- Commercial management;
- Health and safety management;
- Planning, monitoring and control; and
- Delivery and materials handling.
2.9.1 Management, Supervision and Administration of Sites

These three sections of the process bring into explanation the passing of information from the head office to the relevant sections. The information is processed in terms of the happenings on the site, wages of the labour employed, challenges encountered, variation order received and other instructional or activities concerned with the project to that section of the construction process that will work on the information received in order to have a free flowing work. This information could entail material to be supplied to the site, monthly or weekly wages of the labourers etc. with the aim to relating it to the contractor to take necessary steps in solving them. Forster (1989) explained that it is necessary for site managers to have a form where all these details could be written for easy assessment in case he isn’t at the site for a short while. Important information to be written is further
ensample in notices or claims, drawing register, correspondence, RFIs, payroll, progress reporting, instruction, minutes, technical information and labour allocations.

### 2.9.2 Commercial Management

It expected for the site manager to recognize commercial management as a necessary management technique needed in achieving successful site management and not a technique related to Quantity surveying. It infers that a cost control system could be made available to enable site management to gather conclusions and make predictions on actual cost and that of the estimated cost by a cost consultant. This covers interim payment (award of interim certificate), day work, cash flow, estimating, cost value reconciliation etc.

### 2.9.3 Health and Safety Management

One of the major advantages of involving site management practice in construction is the safety of the workers and their respective health system since the site management practice will bring into light updates of clarity about activities on site. Mohamed (2002) also explained further that the major cause of construction catastrophe have been pinpointed and can be directly attributed to unsafe design and site which could be avoided by involving site management into the activities concerned with the project. Griffith and Watson (2004) opined a distinctive way is the provision of safety forms designed to be answered by supervisors and operatives as way by which health and safety plans are fulfilled over a stipulated part of construction.

### 2.9.4 Planning, Monitoring and Control

These methods put in place different analysis, organisation combed together to get better access to operations carried out on site over a specific period of time. Planning of the details to be involved in the project, from the tender process to be employed, the type of contractor to be assigned the job, type of contract and other relevant information pertaining to the project are discussed even from the early stages of the project. Griffith and Watson (2004) gave the assertion that an effective planning process is synonymous
to its relevance to time and subsequent deliveries. The planning, monitoring and control processes all work together to get the better service in labour, material, quality, time, cost, efficiency, and value and so on. All activities concerned with operations on site are governed by the plans integrated from the start of the project to when it would be completed.

2.9.5 Delivery and Materials Handling

This is majorly concerned with getting the materials needed for the construction at the appropriate time, of the required quantity, in required specification in order for smooth running of the programme of work (Newcombe et al., 1993). Architect’s instruction ordered during the construction, specification, Bill of Quantities and the contract drawings are the four main information type to be considered for delivery and material handlings in construction. In working towards a successful project, the site manager must ensure quality checks which include;

- Checking of the materials thoroughly;
- Using slump test to certify already mixed concrete for correct mixing ratio; and
- Taking physical observation of laid bricks for roughs and edges.

2.10 Problems on the Construction Site

There are lots of problems batting the construction as an industry, project and methods put in place to ensure satisfaction. These challenges are sometimes calculated for while some re discovered during the course of construction. These problems have numerous effects on the time of delivery of construction, quality of the agreed work, cost estimated to cater for all operations in regards to the construction, and finally the value of the project in respect to quantity and standard. Griffith and Watson (2004) listed long working hours in regards to conflicting ideas of the parties present in the management system, persistently high work load and relating to the client for him to realise the value for the money he paid for the services employed into the projects as the main reasons characterised with that of site management. These problems are summarised into three categories as they relate to site management practice which are explained below;
2.10.1 Management and Administration Problems

Site organisations differ from different construction firm as regards policies and methods in executing projects assigned to the firm. These problems are mostly visible when there’s no understanding of these policies and methods explained by the site manager for the workers to follow. There are bound to be revolt within the workers and the quality of the work expected will definitely reduce. It is therefore understandable that site managers must possess necessary administrative skills to manage not only the materials and plants on site but most importantly humans that would operate and carry out operations on site. The most common problems identified are:

- Poor information: passing information that are wrong which has affected the nature of the work carried out and the one yet to be executed (Barber et al., 1999);
- Inadequate planning: this is mostly directed towards the management of the site regarding not providing essential information, tools, materials, equipment, and functional policies for swiftness of work (Barber et al., 1999).
- Motivation issues: owing of wages that ought to be paid at an agreed time of an agreed sum within stipulated contract period (Barber et al, 1999; Ling 1991; and Ogunlana and Olomolaiye, 1989); and
- Shortage of skilled workers: inadequacy in quality manpower to handle technical aspect of the operations on site (Mackenzie et al., 2000).

2.10.2 Technical Problems

- Plant problems: low level of maintenance of plants to be used for work as some contractors prefer to avoid this aspect of construction in order to save cost which in turn would affect the output of such plant (Harris and McCaffer, 2001);
- Existing services: existing facilities that have been constructed before will affect construction as they tend to obstruct construction activity within the said scope. These services include pipelines, water ways, sewer system etc. (Illyingworth, 2000).
2.10.3 Communication Problems

Information flow from top of the echelon to the least person in construction is very cogent when a project will have any form of being successfully completed. The lack of proper and accurate information within the professionals involved in construction will definitely bring a lot of problem to the construction at any stage of the project no matter the best practice employed into making it a successful one. However, information is given out by various construction professionals in Architects, Quantity Surveyor, all Engineers related to construction and other participants and this information shouldn't be neglected no matter how insignificant it might seem (Emmit and Gorse, 2003). Information should therefore be carefully managed and information networks should be systematically designed and monitored (Fryer, 2004).

2.11 Management Approaches to Improving Construction Site Management

The endgame of having a construction is to have a standard project at completion. This project is also directed towards satisfying the client as contractors make sure of getting the best project using any suitable method or approach in executing the project (Harris and McCaffer, 2001). Improvement in terms of construction site management will go a long way in getting more clients into the construction industry through projects of better aesthetical value cored in quality, managed duration and reliability without taking focus away from quality and estimated budget wallet.

There are numerous managerial options employed to improve construction site management. These approaches surfaced in Total Quality Management, Business Process Re-Engineering, Concurrent Engineering and Knowledge Management.

2.11.1 Total Quality Management Approach

Total Quality Management approach is a system of management which imbibes all sort of quality gathered in order to enhance the service offered in the business (Griffith and Watson, 2004). This approach is directed towards reducing or total elimination of defect in construction and related businesses. Several tools and techniques available with this
approach helps firm to have a better-quality management of their respective services rendered. These tools range from the simple one in brainstorming to complicated ones in pareto analysis, failure prevention analysis, matrix analysis, cause and effect diagrams. The advantages of TQM implementation are identified below:

- Enhanced customer's satisfaction;
- Better quality management delivered;
- Waste minimisation; and
- Consistent improved service delivered.

2.11.2 Business Process Re-Engineering Approach

Business process re-engineering approach takes in turn rethinking and radical redesigns of a relative process accustomed to a business in order to have an enhanced performance in critical, advanced modern functionality obtained expressed in swiftness, service, cost time and relative benefits (Ulrich, 2006). This approach can be used to redesign a structure the production process infused into the project in the first place making references to the business process to ensure relevance in adding value to the activities involved (Griffith and Watson, 2004).

2.11.3 Concurrent Engineering Approach

Concurrent Engineering approach tends to work explicitly in identifying with the designs and construction of the project to have;

- better lead times;
- implementing designs which improves cost and quality;
- fabrication;
- activities related to construction; and
- working practices in collaboration and reaching concurrency summit (Evbuomwan and Anumba, 1998).
The application of this principle, it is sure going to be some benefits to be shared between the clients and the concerned party. These may include (Love et al., 1998);

- better understanding of client’s requirement.
- heightened communication and progressive team cooperation.
- better team efficiency.
- Reductions in reworks and variations; and
- Time and cost of project maximised.

2.11.4 Knowledge Management Approach

Knowledge Management (KM) approach is the way of identifying, the most favourable and managing of assets of clerisy in order to create value, enhance relative productivity and benefit, and maintaining advantage related to competitiveness (Webb, 1998). KM gives the organisation to bring together every form of intellectual properties concerned with the best idea possible to bring competencies in every related and non-related field. Tiwana (2002) stated that the primary benefit of KM is to implementation of divided knowledge as a form of management practice for use. The major potential benefits in the implementation of KM approach are expressed as follows (Wong and Aspinwall, 2006);

- Better decision making through enhanced intelligence;
- Quality of productivity and efficiency is improved;
- Standard services, products are made available;
- Better competition for healthy competency;
- Swift solutions to rigid technical problems; and
- Better customer service.

2.11.5 Critical Path Method

Critical Path Method (CPM) defines project in terms of their interlinked activities to be carried out in series in order to execute a planned work in regards to stipulated arrangements before the construction starts. The activities to be carried out is allocated with corresponding resources to carry it out as well as the duration it is going to take for
execution. The link between these activities gives the project a concise precision of definition in terms of confining each activity to a designed aspect and given the prospect of calculating rates attached to the activities involved. This method helps in proper planning, monitoring and execution of construction projects with a well defined purpose before, during and after construction.

2.11.6 Flow Line Method

The Flow Line Method (FLM) approach in construction brings an understanding of defined rates concerned with the sections related to the function and purpose of the project. This brings a form of consistency and uniformity to construction activities as it guides in processes concerned with efficient flow of information, materials and necessary inputs to make the operations on site a very easy one. This method also gives room for the execution of projects in a continuous manner without any form of interference between the other activities carried out on the same construction site.

2.12 Summary

This literature review captures the objectives stated in the previous section of this research by making justification to ways by which construction industry could be enhanced through solving highlighted problems mentioned and application of the approaches the literature was able to review.
CHAPTER THREE

3 Research Methodology

3.1 Introduction

This chapter gives a brief overview of the case studies opted for in this research. The SWOT (Strength Weakness Opportunity Threat) analysis introduced detailed a further description of factors concerned in the construction site to aid a better understanding of the case studies selected.

3.2 Research Strategy and Methodology

Neuman (2006) defined research as a functional way of finding solutions from inference gathered together towards solving a particular problem. This process is well annotated by finding relevant research, documents, publications and other related materials that are relevant to bring out points that could be channeled towards providing solutions to an identified problem by giving a conclusion at the end of the research project.

A research just doesn’t come up like that, it has to catch the attention of the researcher with the intention of finding a solution to such problem in order to establish a fact and better the existence of the users. Love et al. (2002) propounded two approaches in interpretivist, which is also known as phenomenological approach, and the second approach being positivist. The first approach reasons in the line of making inferences through qualitative means of research in order to make contributions from the developed conclusions to knowledge of establishing a fact. The second approach as promoted by Blumberg et al. (2005) gave the positivist as enlightenment obtained through quantitative means of research with the aim of establishing fact also. In getting the best out of the knowledge obtained in regard to a research, there are four essential concepts to be followed towards driving a concrete field of study in terms of relativity.

- **Bias:** Is the internal or external influence that might affect the nature, condition and analysing of the data to be obtained for the research (Leedy and Ormrod,
Neuman (2006) explained how personal convictions and self-belief could creep into research which will affect the outcome of such study even become embarking on the data collected at all. The act could feature during any aspect of the data collection that would be analysed to give an output discussed not free from personal contents (Fellows and Liu, 2003). It is expected of a very sound researcher to be neutral about a research problem and be ready to fish out every source of bias from the research presented.

- **Validity:** This explains the feasibility of the study to be embarked on in relation to the data obtained in respect of the mind of the researcher (Fellows and Liu, 2003). Yin (2003) stated that validity should be in correlation with every ounce of correlation to the objectives intended from the project to that which is concerned with getting the best knowledge available (in this case, site management practices). Also, making sure that the changes provided during the contest of the research fills the gap of change it is meant to cater for.

- **Reliability:** It is expressed that the outcome obtained from the research and relative ones should have a fixed outcome through identified means of testing (Yin, 2003). Reliability should bring to an understanding of the fact that the result should be constant at the end of testing for further scrutinising.

### 3.3 Case Studies on Site Management Practices

### 3.4 Introduction

This chapter analyse and summarise four case studies relating to their management practices in order to explore the practice of inculcating construction management practices that can be employed at the construction site level. SWOT (Strengths Weaknesses Opportunities Threats) analysis is integrated to bring further clarification of the need for the case studies in order of relevance in use into any construction industry no matter the size, but in this case, the Nigerian construction industry. This method was adopted because it is dependable as it relates problems to be identified in some construction projects to various methods and approaches to solving them. Moreover, it is the most reasonable method to opt for due to the ravaging Covid 19 across the globes
making all sectors of the economy to be shut with little or no site managers ready to grant an interview. Interview of available site managers couldn’t be done also due to the ban on international travels from to the Covid 19 pandemic experienced at the time this research is being put together.

The cases opted for are directed towards issues related to the Nigerian construction industry with the bid of analysing and providing solution to these problems by using SWOT (Strengths Weaknesses Opportunities Threats) analysis to bring out salient points in the construction site case study opted for.

3.5 Case Studies

Acquiring enlightenment into achieving effective construction site management, knowledge method approach is included to bring a scope of diversified practices for improving existing site management practices. The SWOT analysis will be interpreted and analysed to give a concise four-step explanatory and qualitative inferences that could be inferred from the construction case study adopted. The case studies were opted for to showcase problems associated with construction site with Nigerian construction industry not immune to these problems. And in trying to seek for the right solutions to these problems, the case studies would present the very need for site management in construction industry by following descriptive analysis of the case studies expressed in well annotated discussions that would span to the next chapter of the research. These discussions of findings will present state of the construction industry in Nigeria would give an idea of site management practices that could be incorporated into the country’s construction industry through already affirmed best practices from developed construction industries in the world.

In making reference to the construction site opted for in this research, Mohammed et al. (2016) identified with six construction sites in the researcher’s published work in *Potential for improving site management practices through knowledge management*. From the research, two of the projects were selected randomly as they meet the criteria needed to be used for this present research in relation to the scope of the study, which is Nigeria. The remaining case studies were selected from another published work by Cole (1991)
in *Construction Scheduling Principles, Practices, and Six Case Studies* and that of *Improvement of Site Management Practice in the Nigerian Construction Industry* studied by Jimoh (2012) represented the construction site in Ondo State, Nigeria while the former represented international construction sites selected. These cases study was opted for to try and bridge the gap between constructions problems experienced in some years back to the challenges identified now.

Mohammed et al. (2006) shared the basic details pertaining to the projects and the researcher also put in effort to draft out historical points related to the projects which was summarized in Table 2.

<table>
<thead>
<tr>
<th>Case</th>
<th>Type of Site</th>
<th>Person Interviewed</th>
<th>Construction Experience</th>
<th>Cost (£)</th>
<th>Procurement Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Pharmaceutical Building</td>
<td>Project Manager</td>
<td>35 years</td>
<td>16 million</td>
<td>Design and Build</td>
</tr>
<tr>
<td>B</td>
<td>Hospital (PFI)</td>
<td>Design Manager</td>
<td>16 years</td>
<td>82 million</td>
<td>PFI</td>
</tr>
</tbody>
</table>

Table 2: Summary of the details of the case study opted for

(Source: Adapted from Mohammed et al, 2006)

The unit of analysis to be employed in interpreting the interviewees is the use of SWOT analysis as indicated in the research methodology. However, this analysis is aimed to give a comprehensive understanding of the details from the construction to interpret the objectives of this research and other relevant details that are germane to this work. These details are expressed in terms of problems of the construction, approach to problem solving, steps taken when errors are made which will constitute the basis for this discussion and other related findings in knowledge management from the case studies highlighted in this research work to assist in answering the objectives of this research.
3.5.1 Case A: Pharmaceutical Building Site

a. Background and Problems on the Construction Site

Project Manager of pharmaceutical building site was appointed as the main contractor to handle the research laboratory pharmaceutical building of three stories with the client being related to the discipline stated above. The building was located at the East Midlands, United Kingdom. It was observed that the contractor in charge of this construction faced a lot of problems when executing this project. The contractor was faced with challenges in getting adequate cooperation from the top management team as there was no motivation for the contractor and the labour employed on site, inadequate communication within parties involved in the project, difficulty in monitoring operations and shortage of labour employed to carry out activities on the project.

This construction site is analysed as follow to give a clearer picture of the happenings going on during the construction of this project.

- **Strengths**
  1. The engagement of a Project Manager in the project to oversee operations
  2. Scheduled meetings to tackle likely problems during construction

- **Weaknesses**
  1. Absence of cooperation among parties involved
  2. Poor dissemination of construction information
  3. Delays in carrying out monitoring duties
  4. Reduced output from inadequate labour force

- **Opportunities**
  1. Implementation of site manager
  2. Effective communication

- **Threats**
  1. Possible cost overrun
  2. Materials wastage
  3. Labour misuse
  4. Substandard project delivery etc.
3.5.2 Case B: Hospital (PFI) Site

b. Background and Problems on Construction Site

The Design Manager of PFI hospital site, practicing as a private individual formed to transact business or promote common interest was able to complete this project of the contract sum estimated as £82 million. During the construction works pertaining to this project, some of the challenges faced at summit were working with information and design that were poorly drawn, materials supplied on the site not of stable requirement, impervious nature of the quality of work, inadequate labour force and delivering faulty and damaged materials on site.

- **Strengths**
  1. Possible team effort
  2. Division of labour
  3. Relative meeting outcome
  4. Progressive report

- **Weaknesses**
  1. Design presented not up to standard information
  2. Materials of lesser required standard
  3. Nonchalance towards quality executed
  4. Material damaged or defective
  5. Having not enough labour force

- **Opportunities**
  1. Project team management
  2. Frequent former meeting

- **Threats**
  1. Persistent variation order
  2. Extended contract duration
  3. Distorted communication
  4. Technical glitches
3.5.3 Case C: Small Theater in Major Building: Non repetitive Project

c. Background of Construction Site

The project to be constructed was a theater designed to be able to accommodate 500 seating capacity. Other elements to be included in the construction of this project are toilets of specified standards, well mixed concrete floors of specified mixing ratio, brick walls of specified standard, adding all that to a well sprayed ceiling suspended, performing stage made of timber, change rooms, with a well aesthetic foyer of high quality. The project the small replica of a gigantic multistorey complex designed and executed by different contractor. It could be inferred from the project when considering the;

- **Strengths**
  1. Problems related to the project is infinitesimal
  2. Swift execution taking clue from previous project
  3. Detailed description of design to be executed.

- **Weaknesses**
  1. Construction being subjected to new method
  2. Regulated information
  3. Understanding complex nature of the design

- **Opportunities**
  1. Consistent employment of the contractor
  2. Fast completion leading to better economy
  3. Employment opportunity

- **Threats**
  1. Ineffective communication
  2. Understanding method policy
  3. Rigidity in executing commands
3.5.4 Case D: 15-Storey Commercial Office Building

d. Background of Construction Site

The fifteen storey commercial office building was executed along the axis of the central office project located in the district. The specifications related to the construction was well contracted out which gives a solid understanding of the prerequisite of the necessity of the project. This basis necessitated in the project spreads across the design of the prefabrication done off site of the highest standard, with no exceptions to the columns, lift shaft walls of required specification, provided with cladding of the appropriate design, and formwork fitted to be permanent, with the aim of getting swiftness out of the round completion of the highlighted project. Some of the problems encountered on the site by the previous contractor were noncompliance to schedule drafted, inadequate planning, restrictions imposed by city councils.

- **Strengths**
  1. Well planned project
  2. Possible effective monitoring
  3. Detailed planning of the construction
  4. Adoption of feasible philosophy

- **Weaknesses**
  1. Possible rigidness form of construction
  2. Comprehending the method applied
  3. Meeting the set contract duration
  4. Restrictions limiting operations

- **Opportunities**
  1. Implementation of the contractor’s principle
  2. Proper delegation leading to faster work hence consistent job offer
  3. Maximum efficiency from the lour employed owing to delegation
  4. Expanding contractor’s brand
• **Threats**
  1. Nonchalance from some workers
  2. Operational mix-up
  3. Skill of the labour employed

3.5.5 **Case E: Construction of the DHL Office**

The construction of the postal service building was carried out by the engineer awarded the contract. The two-storey building was reinforced at the first floor with the specified reinforcement bars specified in the design. The mode of construction is a frame structure, whereby after the foundation, reinforced concrete columns, beams, slabs etc. were constructed prior to the partitioning of the building as designed.

• **Strengths**
  1. Availability of manual labourers on site
  2. Continuous work carried out on construction site
  3. Adoption of feasible philosophy

• **Weaknesses**
  1. Inadequate supervision on site
  2. Light enforcement of site management practice
  3. Over reliance on engineer’s interpretations of sections of work
  4. Inadequate plants at construction site
  5. Nature of the drawing details

• **Opportunities**
  1. Freedom of expression in terms of workability of the labourers
  2. Fast completion of sectional construction work

• **Threats**
  1. Attitudinal behaviors of some workers towards work
  2. Inability to carry out complex construction
CHAPTER FOUR

4 Discussion and Findings

4.1 Case A: Pharmaceutical Building Site

4.1.1 Problems Associated with this Construction Site

There were several problems identified with this case study. Some of these problems stated are;

- Absence of cooperation among parties involved
- Poor dissemination of construction information
- Delays in carrying out monitoring duties
- Reduced output from inadequate labour force

The project manager in charge of the project with the effort to resolving problems associated with this construction work, the project manager's effort to inculcate site management practice to curb these challenges are expressed in concepts as explained by taking;

4.1.2 Approach to Problem Solving

The project manager took the step of having a hearty conversation with other professionals (workers or subcontractors) concerned with the work to have a better understanding of situations related to the construction. This is the bid to create a solution to the problems experienced at work by channeling the expertise of the workers or subcontractors to aid the project. The project manager also gave an avenue where the workers could speak freely about any situation on site and probably make suggestions that could help the labourers on site to perform better.
4.1.3 Construction Knowledge and Approach Taken When Mistake is made

This is expressed in understanding the fact that larger percentage of the skills set to execute a project is embedded in the minds of the workers with little percentage focusing on the other documents like drawing, specifications etc. concerned with the project. The project manager held a meeting to analyse brief and discuss errors that might have happened during human error in interpreting and execution sections of the construction. The errors discussed were documented and well annotated for further explanation of the work to move smoothly.

4.1.4 Knowledge Sharing Mechanism

The instructions concerned with this construction work were documented for the workers to be able to relate to basic details that are significant to the project. The project manager would analyse and report these errors so as to have a clear clarification of the causes of the problems associated with the work.

4.1.5 Relation to the Nigerian Construction Industry

The industry is faced with aforementioned problems that were highlighted in the statement of research problem in this research. The problem of poor cooperation and communication between the workers and the management is one of the major challenges facing the Nigeria construction industry. Another problem is in difficulty in monitoring affairs of the workers and their safety as it poses a threat to the output of the work to be executed. Project manager in the case study organised a meeting to understand what the situations of the site is and discuss solutions to the problems. The essence of the meeting also is to monitor progress of the work, assess the relative risk and making sure the program of work is followed strictly. Project managers in charge of construction in Nigeria industry could adopt this method to relate better with other professionals (Architects, Site manager, Contractor, Civil engineer, Structural engineer etc.) on site in case of complex and large projects in order to have a better project. Also, a well documented detailed work could be made available to the workers to exercise a proper relationship
between their output and the expectation from the project. The project manager in the Nigeria construction industry could also relate with the client and the Architect that designed the project to bring closer their perceptions into the work to make it more relatable in case if one of the top professionals is absent from the work or site. In case a project manager or any other caretaker manager is employed in the Nigerian construction industry, the professional in charge could learn the analytical skill of bringing SWOT analysis to identify sections of the work at the early stage before it escalates to a state where it would slower the operation on site. Furthermore, the SWOT analysis would help the professionals to understand underlying threats and later opportunities that might be hazardous or beneficial to the project during and after the course of execution on the construction site. The professionals in this country’s construction industry could channel the knowledge mechanism approach to follow up the root of problems on site and stick with functional solutions drafted in order to have a site that is well managed hence efficient. Bringing all these into the Nigeria construction industry will definitely increase not only the relationship of the workers involved in the work but also the all round efficiency on and off site which is always beneficial to the construction.

4.2 Case B: Hospital (PFI) Site

4.2.1 Problems Associated with this Construction Site

There were several problems identified with this case study. Some of these problems stated are;

- Design presented not up to standard information
- Materials of lesser required standard
- Nonchalance towards quality executed
- Material damaged or defective
- Having not enough labour force

The design manager in charge of the project with the effort to resolving problems associated with this construction work, the project manager’s effort to inculcate site
management practice to curb these challenges are expressed in concepts as explained by taking;

4.2.2 Approach to Problem Solving

It is very important to have strategies to combat the challenges faced in this construction work. The emphasis was placed on having work of standard quality by randomly or frequently checking for the standard of the work delivered on despite by talking samples of the work done on site. For example, the concrete mixed in a specific ratio would be test through slump test to test the strength of the concrete mixed for the project. Other sections of the project are also tested with samples relative to analyse issues that arose through defective standards and materials. Another approach the project manager used when was consulting with relevant professionals with the project in case a problem is beyond his capability. The design manager was contacted to assist with explaining better the details that the workers on site might find hard to interpret.

4.2.3 Construction Knowledge and Approach Taken When Mistake is made

In every facet, the general execution of a construction work lies in the knowledge, experience and the written documents corresponding to the nature of the construction work to be carried out. In most complex construction, there should be a balance between this knowledge in carrying out the work. In some cases, the workers pride themselves in their technical knowledge coupled with their experience in carrying out work and therefore pay little attention to the drawings, specifications, and instructions related to the construction work. Practically, the workers have to balance this knowledge with the documents related to the work in order to have a better model of the work to be carried out. So in case there is a problem identified, the causes of these problems are identified and solutions are sorted to curb its effect on the operations on site. The company could refer to any inventory pertaining to the company to find construction work that had similar problems and what approach was carried out to overcome them.
4.2.4 Knowledge Sharing Mechanism

Apart from the traditional way of sharing information through meetings and other physical way by interpreting drawings and other details on site, the use of electronic mail could be integrated in companies that have workers with necessary skill set to disseminate information pertaining to the site with ease and comfort. This would help facilitate a rapid execution of the work by combing both the traditional method of sharing knowledge and that of the modernised way of passing knowledge across to participants involved in the work.

4.2.5 Relation to the Nigerian Construction Industry

Getting the correct, specified construction materials for the project is always a big task in the Nigeria construction industry. When substitute materials that are not equivalent to the specified materials are used, the quality of the work to be executed is reduced. And this will also affect the utility of the client in respect to satisfaction to be derived from the constructed work. An unsatisfied client will be unwillingly to pay for any fee to any professional (site manager inclusive) or be advised to involve the services of other professionals in the subsequent construction work when satisfaction from the previous project is not maximised. The construction professionals in charge of a related construction should ensure that right materials are supplied to the site, with adequate supervision to hasten construction project along with replacing damaged materials as swift as possible to detect early problems and have a sound operations on site which will go a long way in bringing a satisfied project to the client. The stakeholders in the country’s construction industry could also channel a balanced knowledge mechanism by making sure that the unskilled workers that are mostly involved in the Nigeria construction industry have a proper utilisation of the documents pertaining to the project; and strike that with their experience gathered from several projects executed before. This will enhance the utilisation of the site effectively for better construction condition. Persistent variation order, extended contract duration, distorted communication, and technical glitches are some of the threats analysed through the use of SWOT analysis. These threats might be difficult to spot without the proper analytical understanding of the concept.
by a professional. The involvement of this professional (site manager) into the Nigeria construction industry would solve numerous challenges that might have been envisaged at the beginning of planning and organizing. Of course, faster work would bring better efficiency; and better efficiency would put the Nigeria construction industry to be two steps enhanced that what it was.

4.3 Case C: Small Theater in Major Building: Non repetitive Project

4.3.1 Problems Associated with this Construction Site

There were several problems identified with this case study. Some of these problems stated are;

- Construction being subjected to new method
- Regulated information
- Understanding complex nature of the design

The project manager in charge of the project with the effort to resolving problems associated with this construction work, the project manager's effort to inculcate site management practice to curb these challenges are expressed in concepts as explained by taking;

4.3.2 Approach to Problem Solving

There is virtually no construction work without challenges. The degree of challenges experienced could either be minor or major. The project manager in charge of the project ensured proper coordination between all the participants concerned with the work. In such a way that, if a problem is discovered, details would be analysed amicably without pointing fingers to who committed the error. Also, the project was subjected to Critical Path Method technique of executing construction work which was aimed to express activities concerned with the project linked together with respective professionals, and allocation of necessary inputs to execute the work in an orderly manner.
4.3.3 Construction Knowledge and Approach Taken When Mistake is made

The nature of the project and the related challenges faced in the construction will determine the type of approach to use. The workers are expected to be familiar with the nature of the construction and any new sections of the work to facilitate a fast approach to coping with the ever-increasing demand of the client as well as the high complexity of construction projects these days. The identified problems are well annotated to the last detail in order for every worker involved in the work to be able to relate with it.

4.3.4 Knowledge Sharing Mechanism

The knowledge sharing mechanism here is the Critical Path Method (CPM) technology engaged in the construction. This technology helps create a meeting of the concerned personnel on the work by assisting in getting a satisfactory level of cooperation among all the construction professionals involved in the work.

4.3.5 Relation to the Nigerian Construction Industry

Critical Path Method (CPM) is an upgrade of the Gantt chart used in construction. This method brings together series of activities pertaining to the project and assigns duration for the precise execution of the work. Each activity sectionalised is confined to a set duration and resources to be managed can be calculated. Most construction firms in the Nigeria construction industry makes use of traditional procurement method in carrying out project work. Very small percentage of the construction firms practice any alien form of method because the cost it would take in training their workers and bringing expert practitioners is deemed unnecessary. This has however, relegated the output of the construction work executed now to what has been experienced in the past with identified problems occurring all over again. The implementation of this CPM on site planning and execution will enhance every aspect of the construction work especially activities carried out on site. It will bring ease of execution, early fault identification, cordiality and other enhanced functionality of the construction industry. Merging that with the Strengths identified using the SWOT analysis in limiting problems related to the project to be
infinitesimal, swift execution by taking clue from previous project, and detailed description of design to be executed. The practicing construction professionals would relate better and come up with project of required standard at the end of the day in having a better construction site.

4.4 Case D: 15-Storey Commercial Office Building

4.4.1 Problems Associated with this Construction Site

There were several problems identified with this case study. Some of these problems stated are;

- Possible rigidness form of construction
- Comprehending the method applied
- Meeting the set contract duration
- Restrictions limiting operations

The contractor in charge of the project with the effort to resolving problems associated with this construction work, the project manager’s effort to inculcate site management practice to curb these challenges are expressed in concepts as explained by taking;

4.4.2 Approach to Problem Solving

The way to solving complex faults in construction might just be the little solutions put together, followed to the lowest details. The contractor in charge of this project ensured free flowing of work by designing two schedules to take care of irregularities in the construction work. The first schedule is the introduction of bar chart into the activities; and the other with the detailed plan of each floor that makes up the multistorey building. This detailed plan spread across activities involved in delivery of the precast slabs, concrete and other materials to be handled and also the labour activities employed on site. The contractor also used the Flow Line Method (FLM), which is an advanced form of Line of Balance (LOB) to systemise the rate of finished sections of the work and analyze rates.
4.4.3 Construction Knowledge and Approach Taken When Mistake is made

The project was a complex project and that implied that every seriously was paid to execute the designs drawn. The labour employed on site where well directed about the activities to be carried out on site through possible information outlet (traditionally and modernly) in order to avoid errors which will lead to unnecessary adjustments and sure cost overrun. In case an error is discovered, it is quickly communicated to relevant professional to rectify the error so as to prevent total damage of the already constructed work.

4.4.4 Knowledge Sharing Mechanism

The knowledge sharing mechanism here is the Flow Line Method (FLM) technology engaged in the construction. This technology helps to focus on tasks executed to be free from obstructions or possible interference in order to get a uniform and consistent form of construction.

4.4.5 Relation to the Nigerian Construction Industry

Flow Line Method (FLM) introduced into this work brought consistency to the output in respect to the task oriented on the construction site. This method could be easily integrated into the Nigeria construction industry to evaluate projects that have been abandoned or having difficulties due to the number of stories involved in the design. It could bring together all functional construction professionals to work together with the same goal of solving planned or unplanned challenges in the country’s construction which would in turn help in delivering a quality project that the ones executed before without being settled by adjudication or litigation to arise from ineffective site management. The construction professionals in the country’s construction industry will also have the luxury of meeting set contract duration with the efficient use of the time, labour and materials allocated for the work. Even with any method applied in the construction, the professional in charge can easily put in detailed plans that will suit the work flow to match the operations set to be carried out on site. Apart from this, a crystal understanding of the
type of labour to be employed for a specific project will enhance the productivity level and the rate of project failure will definitely go down.

4.5  Case E: Construction of the DHL Office

4.5.1 Problems Associated with this Construction Site

There were several problems identified with this case study. Some of these problems stated are:

- Inadequate supervision on site
- Light enforcement of site management practice
- Over reliance on engineer’s interpretations of sections of work
- Inadequate plants at construction site
- Nature of the drawing details

The contractor in charge of the project with the effort to resolving problems associated with this construction work, the project manager’s effort to inculcate site management practice to curb these challenges are expressed in concepts as explained by taking;

4.5.2 Approach to Problem Solving

The contractor in charge of the project had to overcome the flaws in inspection by making provisions of most materials needed for the construction work. There was later introduction of occasional site meetings very early before construction starts to aid in procuring solutions to some of the problems identified during the construction. The details of the drawing used in the construction was explained in simpler languages to both the skilled and the unskilled workers on site in order to have maximum output of service rendered even without the presence of the contractor in charge.
4.5.3 Construction Knowledge and Approach Taken When Mistake is made

The project was not a complex project and that implied that it was fairly convenient in executing the design objectives. The labour employed on site were well directed about the activities to be carried out on site through information passed in order to avoid errors which will lead to unnecessary adjustments and sure cost overrun. In case an error is discovered, it is quickly communicated to the contractor to rectify the error so as to prevent total damage of the already constructed work.

4.5.4 Knowledge Sharing Mechanism

The knowledge sharing mechanism was done through communication from the contractor to the workers on site. The information was communicated from one person (in charge) to other workers (especially the unskilled workers) involved in the work. This is opted for in terms of ease of dissemination to every personnel concerned with the work.

4.5.5 Relation to the Nigerian Construction Industry

Even though the construction was carried out within Nigeria, the problems faced while executing the project was related to some of the problems associated with ineffective site management practice. The little adoption of the practice affected the flow of the construction; and avoidable challenges encountered would have been avoided if there was effective implementation in the first place. In making comparison with other international practice where site management and related practices are implemented, the efficiency of project handling in the Nigerian construction is majorly dependent on how fast and adequate construction professionals in the country embrace site management practice since most of the projects executed are not that complex when compared to the ones constructed internationally.
CHAPTER FIVE

5 Research questions and answers

5.1 Summary

The aim of this research project is to explore the practices of the construction management via an incorporation of best site management practices for adoption into the Nigerian construction industry. The reason for undertaken this research is to investigates existing and functional practices adopted internationally in the construction industries and introducing such practices to the construction professionals in the Nigeria construction industry for an improved construction. To fulfill this aim, the study undertakes a well-defined literature review coupled with case study findings from previous construction carried out outside Nigeria that have successfully implemented practices related to site management. The aim of the research was achieved through highlighted objectives which include;

1. To review practices involved in site management, processes involved as well as management procedures presently employed in some construction industries in order to make inference for improvement in the Nigerian construction industry.
2. To evaluate differences in perception among projects stakeholders concerning integration of site management practice in Nigeria construction industry.
3. To define knowledge management process in relation to its application on a construction site level.
4. To evaluate underlying conditions that mitigates functioning site management practices in some construction industries.
5. To assess approaches to improving construction site management practice in the Nigerian construction industry.

The conclusions drawn from the concepts in the research to answer each objective is summarised below to give a clearer knowledge of what the research annotates.
**Objective 1: To review practices involved in site management, processes involved as well as management procedures presently employed in some construction industries in order to make inference for improvement in the Nigerian construction industry**

The review in the second chapter of this research explains several practices that could be included into construction to have a better construction. Some of these practices were stated as well as procedures to go about in bringing justice to the practices related to site management. The major practices are planning, supervision, meetings and reports while the major procedures are supervision, monitoring, administration of site, delivery and materials handling, management, commercial management, health and safety management, planning, control. It was divulged that site managers are in the best position to carry out these procedures and practices in order to have a construction with little or no glitches at all. Chapter 3 and 4 also supported that these practices help a lot in combating several challenges that related to planning, monitoring and control that are related to a construction site. It is very essential to comprehend the major causes of problems faced in the construction before deciding on the type of practice that would be best for such problems. When the problems have been identified, apparent solutions are drafted to function against such identified problems for smooth running operations on site. The construction professionals in Nigeria could channel these practices and procedure to solve problems related administratively, and other problems from failure to plan for a site manager during tendering processes.

**Objective 2: To evaluate differences in perception among projects stakeholders concerning integration of site management practice in Nigeria construction industry**

As mentioned in the statement of this research, the Architect happens to be the chief consultant of a project. Along with other construction professionals to carry out the construction, the opinion and view of each discipline is considered and necessary skill set is analysed to bring a complete understanding of the concept of work to be executed. In the case studies explained in chapter three, the project manager, design manager, contractors in charge of the project has various ways of solving construction problems.
These unique differences are therefore put into consideration in regards towards solving faults detected during or after the course of the project. Even though some construction professionals might be of the opinion that it is not that necessary to implore site management practices in the Nigeria construction industry, it is evident from the beneficial analysis made that construction professionals should imbibe the act of including a site manager that will in turn carry out site management practices on the site. The way each professional respond to solving challenges in construction would be limited to their discipline expertise. Therefore, whatever perception or opinion of the construction stakeholders in either supporting or mitigating against its full adoption, it is evident that adopting site management practices will assist profoundly in improving quality of work and cut unnecessary cost.

**Objectives 3: To define knowledge management process in relation to its application on a construction site level**

The Knowledge Management (KM) approach is the way of identifying, the most favourable and managing of assets of clerisy in order to create value, enhance relative productivity and benefit, and maintaining advantage related to competitiveness. KM gives the organisation to bring together every form of intellectual properties concerned with the best idea possible to bring competencies in every related and non related field. The integration of knowledge management into the case studies provides an excellent background and understanding of the clinical way of approaching challenges in construction industry. As it is mandatory for any stakeholder in charge of a construction site to have several skills needed to have a successful project, it is also important to have the means of sharing knowledge through a working and systematic mechanism pertaining to the type of challenges faced, project type, nature of the project, also type of labour force employed. The integration of this knowledge mechanism into the Nigeria construction industry will bring a different perspective to problem solving. The stakeholders in the country’s construction industry would be able to tackle any problem that might have proved to be too difficult in past projects. The later part of Chapter 3 explains the knowledge management approach and the way it affects construction positively while Chapter 4 gave an exclusive application of this mechanism in solving
construction problems. This mechanism can be implemented into Nigeria construction industry for proper assessment of work to be carried out on and off sites.

**Objective 4: To evaluate underlying conditions that mitigates functioning site management practices in some construction industries**

There are many factors that could be responsible for mitigations against the implementation of site management practices into any construction industry and Nigeria’s construction industry is not excluded. These factors were summarised in the literature review as management and administrative issue, technical problem and communication problem which formulates the al round factors preventing some construction professionals in adopting site management practices. In the Nigeria construction industry, most contractors are always afraid of having a project that has cost overrun. So, most of these contractors will find any possible means not to inculcate extra fee into the construction. In paying for the acquisition of skill set in bringing a site manager and site practices, most construction firms in Nigeria would prefer to put any construction professional with little experience, expertise and pay lesser fee rather than paying exorbitantly for procuring site management practices. Furthermore, some other factors could also influence the decision in adopting site management practices. These factors are; type of project; location and condition of the site; type of plant and materials available; nature of the project; agreed contract sum etc. These factors would influence the client’s decision to not request for site management practices especially if the type, nature, location, plant and materials, contract sum is small compared to projects with humongous contract sum allocated. This might prompt the construction professional to have a rethink and decide to manage whatever the project would require without having any contemporary method into the project.

**Objective 5: To assess approaches to improving construction site management practice in the Nigerian construction industry**

A construction site with the involvement of site management practices is bound to have better quality of completion than the ordinary project. The literature review in chapter 2 of
the research points to some approaches that can be introduced and followed in order to have better construction in the Nigeria construction industry. These approaches are in form of total quality management, business process re-engineering, concurrent engineering, knowledge management, critical path method and flow line method. These approaches can help to find quick solutions to persistent problems in the Nigeria construction industry. It brings about getting an enhancement in the general output expected from the project to having concepts that can give room for corrections in case errors are made on the project and extend that to using knowledge mechanism approach to solving concurrent engineering problems and other related problems in construction. Construction stakeholders in the Nigeria construction industry could channel the principles of Critical Path Method (CPM) and Flow Line Method (FLM) in carrying out relative activities on site.

5.2 Comparison between the Site Management Practices in Construction Industries

There is a difference between the construction industry in Nigeria and other construction industries in developed countries. The difference in terms of size; nature; complexity, methods of approach; methods of procurement; tendering process and other debatable differences. However, the Nigerian construction industry is that which is developing and also aim to satisfy the ever increasing demand of the client within respected contract duration no matter the method or approach employed in carrying out the construction project. The study carried out by Jimoh (2012) highlighted some of the comments made by the respondents in relation to the state of site management practice in the Nigerian construction industry. These comments revolved round enforcement, proliferation of quacks, foreign firms versus indigenous firms, and government attitude. The researcher concluded that from all indications if the enforcement in place is adequate, many of the problems will have been solved. The issue of quackery, unqualified supervisors, using defective or damaged formwork among other problems will be reduced to their barest minimum by government enforcing relevant methods and legislations to ensure that proper site management related procedures are enforced into the country’s construction industry. There was also suggestion of supplying the right materials to the construction
site (as it is most prevalent in international construction industries) as well as adequate supervision to monitor proceedings on site and employing modern (recent) techniques in carrying out operations on site. There is every need to improve site management practice in the Nigeria construction industry and some of the conclusions observed from the study is encapsulated in the table below.

From the table 3, the Nigerian construction industry could definitely improve in terms of construction professionals employing the services of qualified site managers that will in turn supervise activities on site ranging from materials on and off-site and general supervision of other activities by following stated guidelines set by the government and relevant construction bodies. Also, new methods could be integrated more into the country’s construction industry for big and small construction projects. These methods and approach would improve the quality delivered on site as well as the functionality of the overall services rendered at completion. Apart from these stated observations, the practice involved in site management should be made aware and enforced along with other procedures during all the phases of construction in the Nigerian construction industry. This practice shouldn’t be restricted to big construction and big firms alone, all construction work in the country should implement the practice in measures to an agreeable standard set by the construction body. Communication should be improved especially among small construction firms in the country. The use of technology to deliver necessary information pertaining to the project to relevant personnel is a sure way of improving the general condition on site. There will be minimized errors due to inadequate information or information being sent through the wrong channel. And lastly, highlighted programme of work scheduled to be followed should be adhered to strictly in order to meet the set contract duration. Some construction companies in the country follow this exactly and deliver construction work at the required time, but some of the small or medium companies that can’t cope with variations experienced on site. Provisions should be in contingency to measure up with the scheduled programme irrespective of challenges faced during construction. This will enhance production and elevate the confidence level of the contractor and the workers to tackle successfully similar situations when faced with such in the future construction. Figure 4 shows the general approach in improving challenges encountered on site according to Mohammed (2006).
<table>
<thead>
<tr>
<th>Inferences Cases</th>
<th>Supervision and Government Enforcement</th>
<th>New Method</th>
<th>Awareness and Implementation</th>
<th>Communication</th>
<th>Schedule Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Practices (CASE A-D)</td>
<td>Quality supervision by qualified professionals and fixed regulations by the government</td>
<td>Introduction of new methods into construction e.g. CPM and FLM</td>
<td>High level of awareness and implementation between the client and the construction professional</td>
<td>Effective communication through various mediums</td>
<td>Well planned schedule related to the project e.g. programme of work etc.</td>
</tr>
<tr>
<td>Nigerian Practice (CASE E)</td>
<td>Supervision is occasional by any professional and there are occurrences of little adherence to regulations laid down</td>
<td>Traditional methods are mostly used</td>
<td>The overall awareness and implementation are moderate</td>
<td>Communication is majorly carried out locally</td>
<td>Scheduled design is most times not strictly followed</td>
</tr>
</tbody>
</table>

Table 3: Comparison between International Practices and the Nigerian Practice

(Source: Own tabulation)
Figure 4: General approach in improving challenges encountered on site

(Source: Mohammed, 2006).
6 Conclusions

This chapter summarises the whole concept and illustrations put into the thesis. It begins with the brief overview of the findings emanated from the research, which subsequently rounded up by conclusions drafted from the research. Recommendations for further research concludes this section and the research as a whole.

This study examined the practices of construction site management via an integration of best site management practices for adoption into the Nigerian construction industry. The following inferences can be drafted from the research.

1. Relevant stakeholders in the Nigeria construction industry should be familiar with site management practices early in construction which would help to avoid unnecessary errors that could be avoided in construction.
2. Construction professionals in Nigeria construction industry should restrict construction functions to qualified construction professional to handle proceedings related to respective disciplinary problems faced during the construction. This will help to get the best of service from the construction professional in command of discharging such duty.
3. The client should be made aware of the benefits involved in the adoption of site management practices by explaining the cost reduction techniques it brings into construction along with swift completion and satisfaction maximised.
4. The contractor could attend workshops that would enhance knowledge in terms of international practices and channel that in the Nigeria construction industry to improve production.
5. There should be an establishment of policies to ensure that site management practices are integrated into any construction project that is complex in the Nigeria construction industry.
6. Effective site management saves time, cost and quality; it is then advisable to include its consideration as an important factor during tendering processes in the Nigeria construction industry.
6.1 Recommendations for further Study

This research has addressed several ways of instigating site management practices into the Nigeria construction industry in order to have efficient construction project. Further recommendations to the researcher, construction industry professionals and relevant stakeholders in construction are expressed in;

1. Site management is very essential to having a quality project during and after construction, so it must be adequately integrated into construction practices.
2. The application of complete knowledge management practices could help in site management to cater for some problems in construction.
3. Further research could be carried out to bring the mind of the client towards paying for the services entailed in site management practices by creating a sound awareness of the benefits involved in the implementation.
4. Investigate other related practices that could be integrated into site operations to hasten project delivery on and off sites.
5. To evaluate further the effects of site management practices to all construction stakeholders in the Nigeria construction industry.
Declaration of Authorship

I hereby declare that the attached master’s thesis was completed independently and without the prohibited assistance of third parties, and that no sources or assistance were used other than those listed. All passages whose content or wording originates from another publication have been marked as such. Neither this thesis nor any variant of it has previously been submitted to an examining authority or published.

__________________________________________  ______________________________________
Date                                          Signature of student
References


