

**AN APPRAISAL OF CONSTRUCTION PROJECT PLANNING IN
NIGERIAN INDIGENOUS CONSTRUCTION COMPANIES**

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INDIGENOUS CONSTRUCTION COMPANIES**

BY

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**DEPARTMENT OF BUILDING,
FACULTY OF ENVIRONMENTAL DESIGN
AHMADU BELLO UNIVERSITY,
ZARIA, NIGERIA**

MARCH, 2016

DECLARATION

I declare that the work in this thesis entitled “An Appraisal of Construction Project Planning in Nigerian Indigenous Construction Companies” has been carried out by me in the Department of Building under the supervision of Dr A. D. AbdulAzeez. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this thesis was previously presented for another degree or diploma at this or any other institution.

Name of Student

Signature

Date

CERTIFICATION

This report thesis entitled AN APPRAISAL OF CONSTRUCTION PROJECT PLANNING IN NIGERIAN INDIGENOUS CONSTRUCTION COMPANIES by Bello UMAR meets the regulation governing the award of degree of Master in Construction Management of the Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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ABSTRACT

Planning in construction involve defining the activities, actions, time, cost, durations and performance milestone which will result into successful completion of the project. Previous researches attributed insufficient construction planning to Nigerian indigenous construction companies, this insufficiency in construction planning was found to contribute to their low productivity, profitability, time overrun and cost overrun. This study was carried out to assess construction project planning of indigenous contractors with a view to enhance their performance. The objectives of the research were to assess contractors' perception of construction project planning, articulation of contractors' current method of construction project planning and assessing the efficiency of each contractor's method of planning construction projects. The methodology of the research involve use of purposive sampling technique, sample size of 50 companies was determined using 90% confidence level from a population size of 1920 calculated with sample size table and formula. Questionnaire was self-administered to respondents, questionnaire (A) was administered to project managers of the organizations which contains questions that aim at assessing how organizations plan and what planning entails in their organizations, this questionnaire record 83% response rate. Questionnaire (B) was administered to professionals in the organizations who manage construction on site, questionnaire (B) aim at assessing the effectiveness of construction planning, problems associated with construction planning and how to improve construction planning, questionnaire (B) records 88% response rate. Questionnaires were analyzed and results was presented in tables and bar charts. Findings from the research revealed that construction project planning is insufficient and requires improvement. Cost overrun, time overrun, poor scope control and reduction in profit are problems experienced by

contractors. The failure of construction project planning was attributed to client unethical dealings, lack of integrity in financial dealings of client and poor communication among project members. In order to improve planning of construction project, the research recommends contractors to perform financial and ethical check on client, employ distinct project manager to each project, employ the use of computerised systems and experience in planning construction projects. The research also recommend contractors to improve communication among project team through establishment of reliable and accessible communication channel.

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CHAPTER 1

1.0

INTRODUCTION

1.1

Background of the Study

The guide to the Project Management Body of Knowledge PM BOK (2004) defined project to be a temporary human effort which has definite start and finishing date and also has clear objectives. Henry (2006) identified project to be made up of group of interrelated activities constrained by specific scope, budget and time to deliver specified product or service. Example of projects are construction of a house, building a software and accomplishing a space mission. Hence, a project is characterized by time, scope and objectives.

Construction activities also shares features of a project, this is because construction involve transforming raw materials, finished or semi-finished goods using management, manpower and technology with in an agreed specification of time, quality into a facility. Abimbola (2013) defined construction as series of actions undertaken by an entity which produce, modify or altar building or infrastructure.

Regardless of the nomenclature, every project involve accomplishment of distinct or interconnected stages, these stages are conceptualization, planning execution and completion, and they are termed the project life cycle. For a project to be successful, every aspect of it needs to be prepared or planned. Project planning was defined by PM BOK (2000) as that stage of a project which identify the project activities and how each of the activities will be accomplished. The purpose of planning project is to identify each major task, estimate time and resources required, and provide a frame work for management or owners to review and control its progress.

Construction project planning involve defining the work to be done, its objectives and constraints, choice of methodology and technology on how the construction will be carried out. It also involve identifying key activities that must be accomplished, their sequence and any possible interconnection between activities.

Construction project share similar life cycle with projects of other industries, but Emad (2009) indicated that construction project are unique, because most of the time construction project produce facilities that house or serve as means of future production, they deal with geographical differences, involve assembling of team hired for a specific purpose. According to Abimbola (2013), Construction project also consume a lot of physical materials and make use of physical tools and machineries, they involve several stakeholders and are labour intensive. Due to their unique nature, construction projects are faced with their own unique challenges, they are executed differently and hence requires to be planned differently.

The construction industry in both developed and developing countries may be viewed as that sector of the economy, which through planning, design, construction, maintenance and repair, transforms various resources into constructed facilities (Fred and Janet, 1976). Ibrahim (2012) and Uduak (2006) defined Indigenous construction companies as contracting firms that are fully owned and managed by Nigerians.

In Nigeria, enterprises are classified to reflect their size, location or capability, this classification provide basis for government intervention, socio economic planning and research. Because of labour intensity of construction, construction companies are often categorized according to size of their permanent employees. This classification include that

of Abdul Azeez (2012), who identified four categories, namely; Micro (one to nine employees), small (10 to 99 employees), medium (100 to 299 employees) and large (300 and above employees). Abdul Azeez (2012) indicated that most enterprises in Nigeria are labour intensive and their size can be classified using size of their permanent employee work force.

Effectiveness of construction planning was criticize by researchers such as Graham and John (2005), this criticism has led to debate on the effectiveness of construction project planning. Despite this argument, Francis and Rafi (2004) asserted that it is widely recognized that inefficient planning of construction projects play a role in causing project failure. This failure is still regarded much, considering White and Fortune (2002) reported that success ratio for construction and engineering project are still lower than 40%.

Some critiques of construction project planning, such as Laufer and Tucker (1987) argued that planning and evaluation of planning processes are insufficient, there is emphasis on critical path methods, inexperience of construction process and lack of information gathering methods by construction planners hinders the construction project planning process. Planning of construction project often become more of control-oriented rather than action oriented, construction planning are often presented with complex and technical terms which can only be understood by professionals in construction industry.

Graham and John (2005) indicated that despite the fundamental importance of the debates, recent researches have proceed into refinement of existing planning tools and emphasizing on use of software for construction planning, but neglecting researching to explore organizational context of construction planning. This approach of studying planning has not

provide the required improvement in construction project planning, this is indicated by Basil (2005), who reported that lack of successful construction project planning to be an important factor that lead to death of newly formed small and medium construction firms in Nigeria with in their first five years of in cooperation.

Construction project planning involve identification of activities and actions, time and cost targets, performance mile stone, it is one of the four phases of construction project life cycle. Construction planning was shown to impact project positively, Harris and Mc Caffer (2005) indicated that contractors of the developed countries have embrace planning of construction project, because the performance and profitability of the companies were found to be directly affected by efforts expanded in planning, careful and controlled construction project delivery. But many Nigerian indigenous construction companies are unable to meet their contractual requirements because of their in ability to prepare and implement a good plan for a successful construction project delivery (Aniekwu and Audu, 2010). This according Saleh (2004) has contributed to the inability of the industry in meeting the construction needs of Nigeria

1.2 Statement of Research Problem

The performance of Nigerian indigenous construction companies was found by Ibrahim *et al* (2014) to be hindered by mismanagement, which often result into inefficient planning of construction project. Kirmani (1988) observed that this inefficiency in construction project planning has significantly hinders productivity of the industry to a level lower than that of its multinational counterparts, resulting to major percentage of the total project in Nigeria going to multinational contractors.

According to Aibinu and Jagboro (2002), another major criticism facing the Nigerian construction industry is the growing rate of delays in construction project delivery and other associated problems, which often results into dispute, arbitration, total abandonment and protracted litigation by the parties. These problems, according to Odeyinka and Yusif (1997) are associated with planning and scheduling, they are internal factors in an organization that causes delay in construction project delivery.

According to Inuwa *et al* (2014), Nigerian indigenous construction companies were found to be using their central administration to plan project operations instead of an identified project manager, in appropriate application of planning techniques and non-adoption of computer applications and ICT in planning of construction projects.

In a research by Oladimeji and Ojo (2012), Nigerian indigenous construction companies were found to lack the ability to efficiently and profitably deliver project due to inadequate planning and budgetary provisions among other factors. The outcome of these inefficiencies have been several reports of abandoned or malfunctioned facilities, projects executed at higher sums and frequent cases of collapsed structures. The recurrent nature of these traits create dissatisfaction among clients which result into award of major capital intensive projects to foreign firms especially where quality and completion period are of utmost demand.

Despite the evidence identified in previous literature that linked inefficient planning to negative project outcomes, these researches were unable to harmonize various aspects of construction planning into a single research. Each of the studies, such as Adebayo (1980) was able to identify problems associated with construction planning and concentrate on some aspects of construction planning such as planning techniques, planning technology

and planning manpower. This approach has not provide the necessary solution to the problem of construction planning in Nigeria, and the result has been recurrent experience of same problems through the decades.

The study of Adebayo (1980) select few construction companies and compare the project planning techniques they adopt in planning, this only provide result relating to only planning technique in the selected organizations. But planning is influenced not only by technique but also other aspects of planning such as technology and other external factors. Hence, there is need undertake research in order to study more organizations, more variables relating to construction planning also need to be considered.

Other studies, such as Agbo (2004) and Mohammed (1988) study cost planning relating to construction project, Audu (2001) study how planning techniques affects construction project planning, while Yazid (2009) study the impact of software applications in construction project planning. Each of the researches was able to identify at least an existing problem relating to construction planning but was not able to provide the necessary understanding of the problems collectively, their causes and how to improve planning taking into consideration key variables used in planning of construction projects.

Nigerian indigenous construction companies were shown to be associated with inefficient planning which result into low productivity and growing rate of delay. They were also found to be wrongly adopting methods and procedures of planning which was shown to reduce the profitability of the companies and cause frequent cases of contract abandonment. Inefficiency in construction planning also have a negative impact on the national economy. Researches in construction were able to identify inefficiency in planning but does not

provide holistic approach to understanding current methods of planning used by contractors, why those methods are inadequate and provide solution on how to improve construction planning methods.

1.3 Justification of the Study

Ibrahim (2004) described construction Project planning as the heart of proper project management, this is because it provides the central communication tool for the work of all parties, planning establishes the benchmark for the project control system to track quality and cost (Oberlender,1993). Planning is also the first step to project scheduling, Project Scheduling deals with the time table preparation and the establishment of dates during which various resources, such as equipment and personnel required to perform the activities for completing the project.

Considering the identified benefits of construction project planning, there is need for construction companies to continually study and improve on how they plan execution of construction projects. Hence, this study seek to undertake assessment of contractors planning of construction projects, as a way to provide recommendation capable of improving efficiency in construction project delivery.

Oladimeji and Ojo (2012) highlighted that the total annual volumes of work done by foreign contractors are more likely to be more than that of the indigenous contractors, If this trend continues to occur, Wong and Ng (2010) opined that the survival of indigenous

firms may be threatened. Hence it is important to undertake regular evaluation of indigenous contractor's performance to ensure their viability.

Fred and Janet (1976) identified the disadvantage of bringing in multi-nationals at the planning and design stage, which include insensitivity to local conditions and discouraging development of local expertise in the field. There is also an argument which maintains that the multi-nationals are hesitant to joint venture and train indigenous firms for fear they will provide competition. While this may be true in the long run, in the short run, multi-national and local construction companies are really in two separate markets, and neither will be likely to deprive the other of work.

Project management problems of Nigerian indigenous construction companies can be addressed by training, pre- construction planning, and the application of modern management techniques according to Aniekwu and Audu (2010),). If uncertainties are not considered at the planning stage, cost and time overruns will be experienced during the project implementation stage (David, 2002).

Achuenu, and Bustani (2000) indicated that there is also need to give attention to the development of Nigerian indigenous construction companies to enable them successfully handle any construction work and compete favourably in the future with foreign companies in Nigeria and beyond Nigeria's shores. Hence, the planning issues facing the development of the construction industry in developing countries which include the availability of indigenous planning capabilities and the nature of the information base necessary for sound planning analysis can substantially be increased by the use of computer planning techniques.

As a justification to this study, there is need to evaluate current construction project planning of indigenous contractors, this will help in identifying causes of construction project planning problems and how to mitigate the problems. This assessment need to take broader evaluation of construction planning taking into account all necessary components of construction project planning.

1.4 Aim and Objectives

1.4.1 Aim

The research aim at assessing the construction project planning process of Nigerian indigenous construction companies, with a view to enhancing efficiency in construction project delivery.

1.4.2 Objectives

The objectives of the research are:

- i. To assess the contractors perception of construction planning.
- ii. To articulate construction project planning process that indigenous contractors are currently using.
- iii. To assess the effectiveness of the planning process that contractors are currently using.

1.5 Scope and Delimitation of the Study

The scope of this research is to appraise construction project planning of Nigerian indigenous construction companies in Abuja, Federal Capital Territory (FCT). The choice of FCT Abuja as a case study was adopted because it present fair representation of Nigeria's construction industry. Out of 2960 organizations that are registered as general building and construction companies with Cooperate Affairs Commission (CAC), 1920

have their head office located in Abuja (CAC, 2014), this represent 65%, of the companies that are registered as general building and construction companies in Nigeria.

Kadiri *et al* (2014) argued that FCT Abuja as a case study provide an excellent study area for construction related researches, this according to the researcher is because Abuja has evolved from being administrative capital to also a construction capital of Nigeria, this is in consideration of share amount of construction projects carried out in the FCT. Usman *et al* (2014) described FCT Abuja as a key domain of construction because of opportunities it offers to new and emerging indigenous contractors. This has led to influx and relocation of most construction companies and workers to Abuja.

The research is limited to Nigerians indigenous construction companies because of assertion of previous literatures, such as Basil (2005) who attributed lack of successful construction project planning as an important factor which lead to the death of newly formed indigenous construction companies with in first five years of in cooperation. Harris and Mc Caffer (2005) indicated that multi nationals and contractors of developed countries have benefited from effective construction project planning.

CHAPTER 2

2.0

LITERATURE REVIEW

2.1

Project Planning

The Guide to the Project Management Body of Knowledge (PMBOK 2004) defined planning as the process that is performed to establish the total scope of the effort, time, and resources, refine the objectives and develop the cause of action that is required to attain those objectives. Islam and Faniran (2005) defined project planning as a conscious effort and process that determines the optimal method, sequence and timing of project activities and required resources to maximize the chance for a successful project completion. Project planning is a blue print of desirable future which managers seek to achieve. Stoner *et al* (2006) described project planning as the kind of decision making tool that address the kind of future managers desire to create in their institution, project planning hence involve establishment of goals and suitable course of action for achieving those goals.

The Project Management Institute (PMI, 2013) indicated that project planning has numerous advantages, Dov *et al* (2003) asserted that despite identified benefits of planning, some project management professional are of the opinion that too much planning has a great tendency to reduce individual creative contribution to the project. This in the professional's opinion was because planning restrict individual to just what is planned, it is difficult for individual to introduce new innovation into the project (Dov *et al*, 2003). This claim leads some professionals to propose the use of milestone planning rather than activity planning.

Despite the concern of professionals of planning having tendency to reduce creativity, PMI (2013) opined that there is no genuine reason which shows that a project can succeed without planning. Rather, PM BOK (2004) recommended project managers to invest heavily in planning of their projects, because it is true that planning alone without execution and controlling cannot guarantee success, lack of planning will guarantee failure in a project (Dov *et al*, 2003) .

In Dov *et al* (2003), it was observed that there is a significant relationship between quantity and quality of effort expended in planning of projects. These efforts include, defining client's goals, functional requirements and technical specifications of the products, they collectively have tendency of resulting into an overall project success. Hence, the study concluded that no effort should be spared in the initial stage of projects to properly define the projects goals and its key deliverables requirements through understanding of the end user or client requirements and needs.

Turner (2004) asserted that early planning which clearly identify what the client objectives are, good understanding of such define goals by all the members of the construction team to be the most important factors in determining whether or not a project will be a success. This also show the importance of identifying client goal early at the planning stage and communicating such goal to every member of the project team.

The Council for the Registration of Builders (CORBON) and the Nigerian Institute of Building (NIOB) (2014) described project planning as the time when the project manager define how he wish to achieve the desired project outcomes as embodied with in the objectives and definition of deliverables. CORBON/NIOB Further opined that project

planning requires the project manager to decide which people, resources, budget are required to complete the project. Similarly, Atere (2009) defined planning as the process of identifying all activities that are necessary to complete the job. In the opinion of Mustapha (2011), planning is the most important function of management, which is defined as a management function that is responsible for defining the work to be managed and how it should be carried out.

Ibrahim (2004) also defined project planning as the heart of proper project management, this is because project plan provides the central communication channel for the work of all parties. Planning also establishes the bench mark for the project control system to track the quality, cost and timing of the work required to successfully complete the project.

The above description of planning, can therefore deduced that a successful project planning involves the following actions:

- i. A conscious management decision that requires resources.
- ii. It is a done prior to commencement of work.
- iii. It defines the objective of the project.
- iv. It defines the best possible method of undertaking a project.
- v. It has a long term impact on success or otherwise of the project.

Based on the deduction, project planning “is a conscious management activity that is performed in advance of any action, which define the project objectives and the most economical way of achieving those objectives with in an agreed and realistic time frame”.

2.2

Construction Project Planning

Construction planning is a fundamental and challenging activity in the management and execution of construction projects. Emad (2009) opined that construction project planning is similar to every project planning, this is because construction project are characterized by similar project life cycle like any other project. But due to the unique nature of construction project, Abimbola (2013) indicated that construction planning deserved to be studied separately.

Bamisile (2004) identified that construction projects should be planned specifically in consideration of technology choice, definition of work, estimation of required resources and durations of tasks. Construction project planning also requires identification of any interactions among the different work tasks.

The construction planning process is stimulated through the study of project documents. These documents are identified by Bamisile (2004) to include designs and drawings, estimation of quantities, construction method statements, project planning data, contract documents, site conditions, market survey, local resources, project environment and the client's organization. The planning process of construction projects also takes in to account, the strengths and weakness of the organization involve in the project.

Planning gives an impression that some body is in control, it gives a sense of direction and the likely destination for the project. Planning of construction is generally concerned with completing work of designed quality in a short period as practically as possible which is compatible with economy of production. All future actions of the constructing company in relation to intended construction method, Programme of the work, type of materials, labour,

plant and equipment must be made known to the clients and or his representative, (CORBON/NIOB 2014). Suppliers and sub-contractors should be given an early notice of when their goods and services may be required. Moreover, the constructing organization must have a clear knowledge of what their future commitment of materials, staffing need, labour, plant and equipment will be. Obviously the time needed for planning of a construction project varies from project to project depending on complexity, details available, size of individual project and location of the project.

A plan is a detailed method which is formulated beforehand for doing or making something (Bamisile, 2004). Planning involves all the procedures required to determine what is to be done, who should do it and how it should be done. The overall mission of the project is determine through planning, its set goals as well as developing policies, Programme and procedures for integrating complex systems such as building projects of interrelated future decisions.

Planning has an implication of futurity, and it implies that there is some skill involved in its undertaking for and objective accomplishment. In short a plan is a predetermine course of action.

According to Bamisile (2004), a construction plan has the following common characteristics:

- i. It involve the future.
- ii. It must involve action.
- iii. It must have an element of organizational or personal identification of causation.

The futurity implication of planning suggests that forecasting is an important part of the whole planning process. Anticipation of the state, nature or the result of alternative courses of actions is an important and crucial phase of decision making process (Bamisile, 2004). Conscious effort toward anticipating the technological, economic, political and social climate for the organization helps the planning manager to avoid predictable pitfalls that might be disastrous.

Bamisile (2004) asserted that scientific approach to production begins with complete analysis of the job, analysis of even trivial issues of the project. The production of each component should be planned in terms of the optimum quality of materials, taking into cognizance of labour, plant and equipment resources available. The ideal construction plan is described by Abimbola (2013) to be that which ensure that all components of the project are ready on time, provide an accurate balance of quality, quantity and production time, the project is at the right intended place. Bamisile (2004) also indicated that an effective construction project planning ensure that the work flow is logical and in single direction, providing as minimal as practically possible interference between individual components of the work. All form of machine manoeuvres, materials, plant and equipment allowed for is the minimum that is practically possible, and delays, obstruction and errors due to poor programming of machine to labour input should be reduced to the barest minimum that is practically possible.

2.2.1 Principles of Construction Project Planning

Planning, scheduling and controlling begin right at the project inception stage, and continues throughout the period of project execution. The key principle of planning as indicated by Chitkara (2012) is focusing on starting planning early at life of the project. The

planner or management should include all parties that are to execute the project at the planning of their respective work.

Mustapha (2009) highlighted the need for a project plan to be flexible, the flexibility of the plan allow it to suit prevailing conditions at any giving point in time. The flexibility of the project plan also help in making it suitable for versatile condition rather than restricted to a narrow area of operation.

Chitkara (2012) opined that Project planning cannot be completed without inclusion of calendar duration for all activities to be carried out, the calendar of activities showing when activities are to start and when they are to be completed is term scheduling. The schedule guide the project time by informing the team what is to be done and when it is to be done. Scott (1995) showed that Project schedule indicate important relationship that may exist among activities in the project, such relationship may include activity precedence, what must be finished before what start. Project schedule also show activities that can be performed concurrently.

The effectiveness of a plan is subject to understanding of the plan by all members of the project team; hence it is important to clearly communicate the project to all relevant parties in the project. Scott (1995) indicated that communicating the plan to individuals and group help in avoiding delay, prevents interruption of work and also ensures full utilization of project team.

2.2.2 Levels of Construction Project Planning

Project Planning as a holistic strategy to a desirable future achievement may be quite cumbersome for some complex project, this according to Harris and Mc Caffer (2001)

makes it necessary to prepare a conscience plan of action both at the top management level where key decision are made and also at the operational level where the actual execution of the project takes place.

2.2.2.1 Strategic project Planning

Strategic project planning is carried out at the top management level and is termed the master plan (Scott, 1995). At this level, planning focuses on the overall project objectives, strategic plan defines the scope and objectives of the project, identifies the methods and procedure to be adopted for the procurement of all consumables and utilities in the project. At this stage of planning, as shown in Figure 2.1, the cost of the project is established and financing option defined, the extent, nature and where technology can be applied are identified.

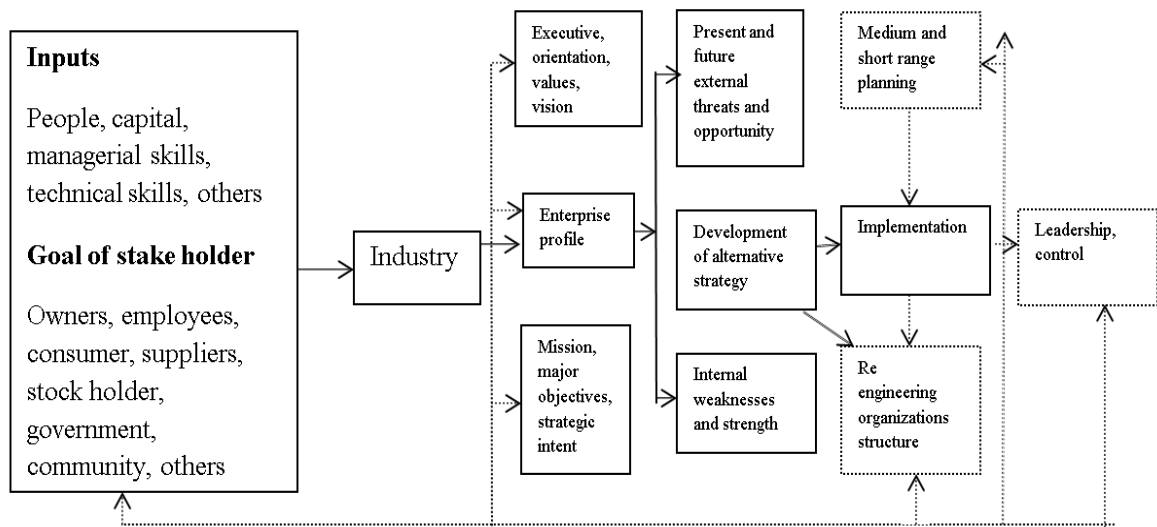


Figure 2.1 Strategic Project Planning Process Model

Source: Heinz *et al*, (2011).

2.2.2.2 Operational Project Planning

At the project execution stage, strategic plan developed by managements is broken down into activity wise component in order to aid operation. Harris and Mc Caffer (2001) described planning at the operational stage as a detailed plan of actions that describe how each activity in the work section must be performed. The plan identify the activities to be done, who should do what activity, when should the actions be carried out. The plan attach resources to each work section, the management are given a perspective on the nature and quantity of each resources that is required in the project. A construction plan stipulating construction method including all process, procedure, personnel needed and machinery is a good example of operational plan.

2.2.3 Steps in Construction Project Planning

Planning of construction project involve the following steps:

- i. Identify Opportunity

Heinz *et al* (2011) indicated that identifying opportunity for undertaking the project has to come before any attempt is made to plan the execution. It will be absolutely unnecessary to plan for a project that doesn't exist. Therefore, seeking for opportunity becomes paramount and important to the management, if it wishes to profitably survive competition. Opportunity can be found within the construction industry and sometimes opportunity due come up in certain sectors that are not directly concerned with construction.

- ii. Defining Client Requirements and Objectives

The definition of client objectives is an important aspects in planning construction project planning (Chitkara, 2012). It is important for contractor to establish objectives for the entire project and also for constituent's parts of the project. This is to be done for the long

term as well as for the short range goals. Objectives specify the expected results and indicate the end points of what is to be done, where it is to be done, where the primary emphasis is to be placed and also what is to be accomplished by the network of strategies, policies, procedures, rules, budget and programs.

iii. Developing Logic Diagram and Project Premises

After identifying objectives, Heinz *et al* (2011) identified the next step of planning to involve establishing relationship that may exist between all activities of the project. It is also important at this stage to establish, calculate and obtain agreement to utilize critical planning premises such as forecast, applicable basic policies and existing company plans. The premises are defined by Heinz *et al* (2011) as the assumption about the environment in which the plan is to be carried out.

iv. Developing Alternative Courses of Action

At this planning stage, Mustapha (2011) indicated that management is required to examine and develop alternative courses of actions, especially those that cannot be identified easily. There is hardly any course of action that can only be performed through only one method. Plans have alternatives which are usually not clear at the beginning of project and sometimes these hidden options prove to be the best alternative.

v. Evaluate the Alternatives

After all possible alternatives course of action are identified, Heinz *et al* (2011) identified the next step in planning project to involve weighing up such alternatives in the light of the planning premises and the client objectives. One course may appear to be very attractive

because of huge financial gain it promise to offer but may require a huge capital outlay which may not be available, and may also have a slow late payback period when compared with other alternatives. Other alternative may offer less financial benefit but may have less risk; other alternatives may suit the long term plan of the organization.

vi. Selecting the Best Alternative

At this point, Chitkara (2012) indicated that the plan is beginning to be adopted, decision are made regarding how the objectives are to be achieved, from the analysis of various alternatives, two or more option may appear to be feasible and viable and the management may decide to adopt several courses of action rather than adopting the option that is regarded to be the best.

vii. Formulating Alternative Course of Action “option B”

After an acceptable course of action is adopted, it is desirable to device another option that can come handy should any part or whole of the plan fails to meet expectation (Heinz *et al*, 2011). This is called Option B.

viii. Quantifying Plans By Budget

At the final planning step, the plan is given some form of meaning, his involve quantifying items on the plan list and converting such quantities into monetary value and hence, a budget is developed. Adebayo (1983) defined the overall budget of the enterprise to represents the sum of total income and expenses with resultant profit or surplus, and the budgets of major balance sheets items such as cash and capital expenditure. Each department or work section can have a separate budget which usually consists of its

individual expense, and the departmental budgets are harmonized into the overall budget.

The identified planning steps are summarized in Figure 2.3.

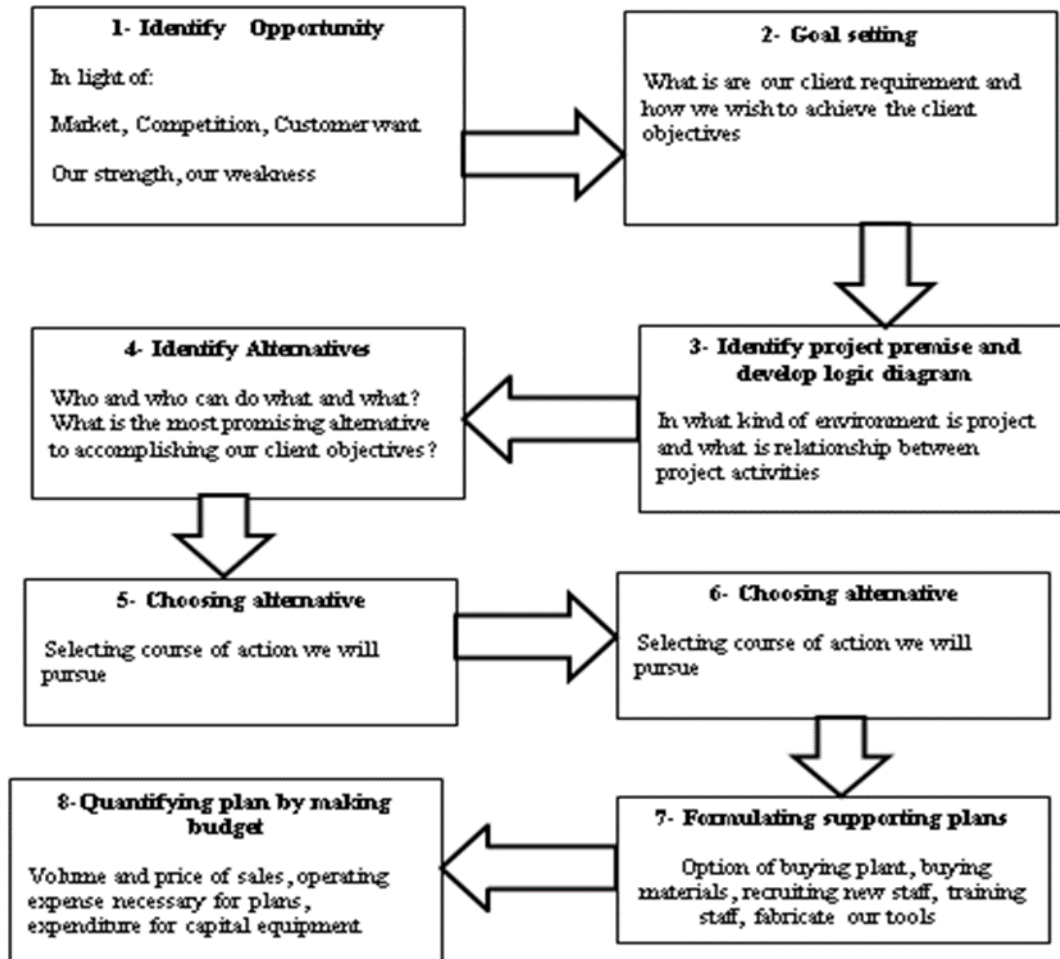


Figure 2.2 Steps in Construction Project Planning.

Source: Heinz *et al* (2011)

2.2.4 Functions of Construction Project Planning

Planning effort is channelled into achieving, or accomplishing certain predetermined goals.

Chandra (2009) identified that an effective plan serves as a basis of organizing work in the project, the plan allocate resources to each activity and serve as an effective communication

and coordination tool between the management team and the execution team. Bamisile (2004) described planning as a futuristic action whose function involve inducing people and organization to look ahead before undertaking any action in the project. The more organization look ahead the more it is likely for them to recognize challenges early before they become problems that can adversely affect the successful completion of the project.

The process of planning as indicated by Chandra (2009) induces a sense of urgency in project delivery, this is due to the calendar nature of project schedule, the schedule defines each activities start and finish stipulated time. Project Plan also serves a function of establishing a basis for monitoring and controlling project progress.

Gibson and Hamilton (1996) also identified the ability of a plan to improve the operational performance of the built facility. Improving the performance of the built facility power consumption, maintenance requirements, and other user related requirements can greatly be improved right at the project execution if such features are identified early by the planner. A well-developed plan also serves a function of reducing frequent occurrences of uncontrolled project growth and changes to the scope.

2.2.5 Benefits of Construction Project Planning

Planning is a process of setting goals and choosing the means to achieve those goals, Scott (1995) indicated that without planning, managers cannot know how to organize people and resources to achieve their organizational goals effectively. Managers, the team and other project stake holders will find it difficult to determine whether their progress is on course or not. It will also be difficult for the management of an organization to effectively control progress in a project without planning.

Chitkara (2012) described an effective plan that will be useful to the organization needs to be set systematically, and it should supersede all form of managerial activity. That is every management activity or action should be planned before such action is executed. Benefits of planning have been identified by numerous literatures including but not limited to Atere (2009), Chitkara (2012). The identified benefits of project planning were grouped into benefit to the client, benefit of planning to the performing organization (contractor) and benefit of the planning to the project team.

2.2.5.1 Benefit of Planning to the Contractor

The performing organization is vested with the responsibility of undertaking the building or erecting the proposed facility (Bamisile, 2004). The contractor undoubtedly undertakes this responsibility with a motive of making financial gain or some other form of gain at the end of the project. The contractor also aim to create a good reputation capable of attracting new projects based on recommendation of the present projects. Scott (1995) attributed efficient project planning with an ability to help contractors to make financial gain at the end of project.

Contracting firms are in constant competition with in the construction industry and also with other competitors that are not necessary in the construction industry. Scott (1995) show that Organizations compete for scarce resources, customer base, market share, quality employee and competition for a good public image. Organizations that carefully plan their project and control such plan to completion of the project have been found to be able to survive and enjoy an upper hand when faced with competition (Bamisile, 2004). This is because, at the planning stage, the organization is able to find the best combination of

resources for the project, it define how feasible and viable the project will be before making of heavy financial commitment.

Gibson and Hamilton (1996) also opined that Organizations that constantly plan the execution of their project have been found to be able to effectively organize and control the progress of its work. This is possible through proper coordination between all relevant departments that are involved in the project. In the plan, all coordinated efforts are channelled towards achieving the set objectives. Because of such coordination, planning allows the organization to easily monitor and control progress, thereby making it easier to implement corrective majors and improvement should there be need for improved.

Abimbola (2013) described construction projects to be unique in nature. Because of their uniqueness, each construction projects present different challenge to the performing organization. At the planning stage, Mustapha (2009) indicated that such unique challenges are identified and alternative solutions are proposed. Solution are then provided early in the project life before the can even have the slightest of effects on the projects. Experience gathered from several projects become useful and handy in the future project, hence planning provides an avenue for problem solving opportunity in time.

Construction is a process which involve transforming raw materials, semi-finished goods into facilities. Adeyemi and Otali (2013) indicated that construction process often involve waste. Construction waste was defined by Adeyimi and Otali (2013) as the difference between the value of materials delivered on site and those properly used as specified and measured in the work. Bossink and Bronwers (1996) reported construction wastages to account for about 20 to 30% of projects cost overruns. Adewuyi and Otali, (2013) indicated

that amount of construction waste generated can be greatly reduced by effective project planning of what should be procured and at what time , hence planning of project has an ability to reduce construction waste there by improving the profitability of projects to the contractor.

2.2.5.2 Benefit of Planning to the Client

The client or client organization was defined by Health and Safety Authority (HSA, 2009) as a person or organization for whom a project is carried out, in the course of furtherance of trade, business or undertaking, or who takes a project directly in the course or furtherance of such trade, business or undertaking.

Majority of construction clients are first time and one-off type client (HAS, 2013). Because many construction client lack good knowledge of the construction projects, most client find it difficult to successfully procure their projects. HSA (2013) opined that early planning help client in selecting a worthy contractor, it also define project objectives and scope. The plan also help client to know the financial implication of his desired projects. Bamisile (2004) indicated that construction planning help client to achieve the project in earliest possible completion time, the plan also avoid interruption of work through scheduling of projects by the contractor.

Construction planning also ensure that the client enjoy the best value for his money in a project, this is because, at the planning stage, the client can conveniently identify possible alternatives and options he can use to achieve the project goals.

2.2.5.3 Benefit of Planning to the Project Team

In the execution stage of a project, team of individual with different skills and specialization are brought together to form the project team. Bamisile (2004) opined that project plan identify all the project members, responsibility and authority in the project. Through the plan, relationships are formed, and the plan serves as an effective communication tool among project team members and also serves as control tool which can easily be referred to in times of disputes and ambiguities.

Chandra (2009) indicated that construction planning creates a sense of responsibility among all the projects team members, this creates a clear image of who should do what and when and with what he should do the given task. This clarity in responsibility creates harmony, understanding and peaceful coexistence among the project team. A harmonious and peaceful project environment becomes more productive and convenient and provides a better chance of sharing knowledge and skills among the project participants.

2.2.6 Factors Affecting Efficiency of Construction Project Planning

Despite identified benefits of planning, effectiveness of project planning is hindered by some factors. Chitkara (2012) and Chandra (2009) relate those factors to the willingness of the contracting organization to effectively implement the plan. Sometimes, organization are reluctant to provide sufficient and effective resources to the planning team. Identified problems militating an effective plan are expressed as follows:

- i. Cost of planning: planning requires the application of resources; these resources include human, techniques, expertise and technology which require some form of financial obligations.

- ii. R Rigidity of work: An activity or project that has been planned restrict the freedom and leverage that individual has in the manner he carry out such event to only that manner described by the plan.
- iii. External Influence: Planning is a futuristic conscious effort is often influenced by external factors which in some instances can change the course of the entire project.
- iv. Data Availability: Planning process requires making concrete decision based on facts. These facts that are used for planning are usually inform of data may not be readily available or may even be erratic in its content.
- v. Time: planning requires time, some project especially in times of emergency may not have the leverage of time
- vi. Client Pressure: some client for construction projects exact a lot of pressure on the contractor to start or finish their project, this has a tendency of affecting what was initially planned.
- vii. Contractors' enthusiasm: some contractors become very enthusiastic about starting or finishing a project, this also affects the planning process.

2.2.7 Reasons for Failure of Construction Project Planning

Having identified factors that limit the effectiveness of project plan, Chitkara (2012) and Chandra (2009) identified that Poor understanding of the comprehensive scope of the project by the project team, In ability of the project team to develop and implement a comprehensive plan, failure of the project team to revise the plan when major changes have been identified and incorporate the new changes into the scope of work, inability of project owner (or his representative) or the project financier to financially support the project, or

provide financial support as at when due, and the failure of project team to reconcile the difference that may arise from conflicting interpretation of the project plan and goals between various stake holders in the project are the major causes that lead to failure of project plan that may have been well formulated. In a summary form, Chandra (2009) identified that project failure is attributed into nine (9) groups, lack of scope management, poor communication in and around the project team, inadequate budgeted resources to the planning and the project as a whole, poorly defined requirements, inaccurate estimates, poor risk management, poorly defined deliverables, over optimism and disregard to knowledge of project management.

The above identified problems can lead to failure of a project plan either individually, in group of two or more or collectively as a whole. The impact and how such problems lead to failure of a project plan is represented in Figure 2.2.

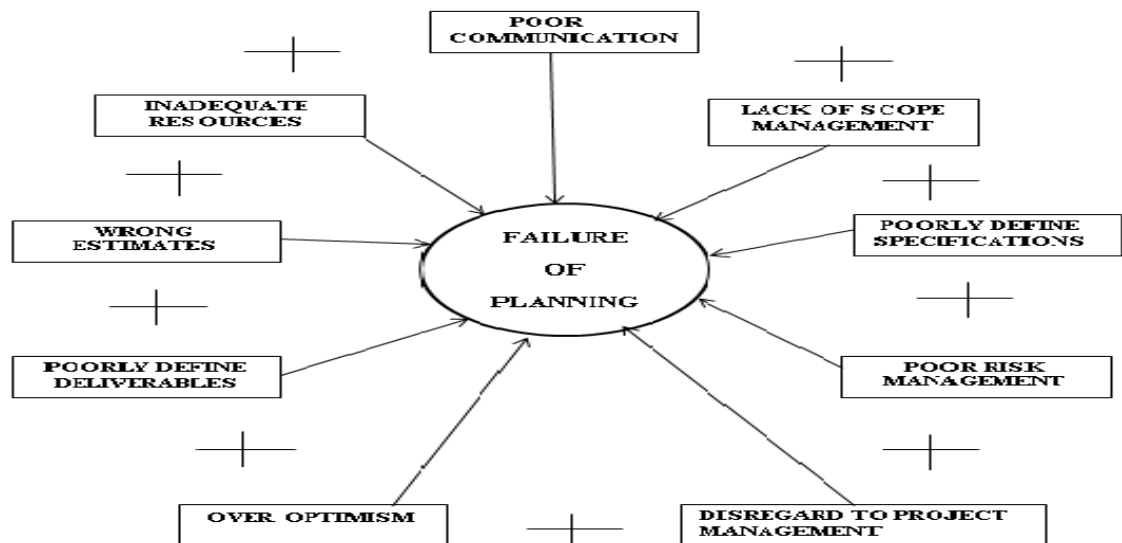


Figure 2.3 Causes of Project Planning Failure

Source: Chandra, (2009).

i. Lack of Scope Management

Often in the life cycle of a project, changes that are not initially planned are added to the project, this is because Projects are about change (Chuck, 2008), and strangely enough, lack of change control is one of the biggest barriers to project success (Chuck, 2008). This is because addition of new requirements to the project scope increases the duration and the cost of the project. The increments of duration and or budget are usually difficult to identify or trace the reason for such disparity, this have a tendency of resulting into misunderstanding and conflict among the project team members and the client.

In order to guard against undocumented scope management, project team as may be headed by the project manager should document all change management process and such documented process should be made known to all members of the project team, and the project manager should ensure that the project team understand, agree and are implementing the new change.

ii. Poor Communication

In a project that is rather planned, failure may still arise because team members do not have the necessary information they need as at when they need it. The PMI (2013) identified communication as a core competency that when properly executed connect every member of a project team to a common set of strategy, goals and actions. Karin (2011) described the goals of project communications is to transfer the right amount of information to the right people, at the right format and at the right time. PMI (2013) revealed that the most crucial success factor in project management is effective communication to all stake holders, the research findings concludes that effective

communication leads to more successful projects that allow organization to become high performers by completing an average of 80% of their projects in time, on budget and meeting original goals.

The communication requirements of all team members should be identified, documented in the project plan and the plan should be implemented. Information regarding who need what, when, where and for what reason should be identified and resolved.

iii. **Inadequate Resources**

In certain instances, a good plan may be rendered ineffective because the project team may be lacking enough number of personnel, necessary skill, members of the team may not be committed to the overall project goal. PMI (2013) opined that inadequacy in planning resources will eventually lead to missing project milestone, extended completion date, and the team members may end up over worked up in order to catch up with deadline if there is any.

Resources allocation problem may be caused by inadequate allocation of all required resources to the project right at the planning stage, or the project is not supported any more by the client, or there was no accurate analysis of all skills and personnel needed for the job (Bamisile, 2004).

Chitkara (2012) opined that problem of resources allocation can be addressed by ensuring that there is continues executive sponsorship by the client or his financial institution, the resources and skills needed to perform the job should also be documented and a plan that gives enough time and resources to get the project completed should be prepared and its implementation should be under strict supervision.

iv. **Poorly Defined Requirements/Specifications**

Chandra (2009) identified a well-conceived project plan can be rendered ineffective by wrong definition of what actually the client wants; this will result into an unhappy client that complains very often about the progress, quality, finance or even the project as a whole. The result of such complain on the contractor usually is to perform what the client want and often at the expense of the contractor.

Idoro (2012) opined that wrong definition of clients wants usually arise because the client requirements in form of client brief was not documented, and so there is no any document to back up or refer to should the client change his requirements, or the client does not sign such agreed document that specify and agreed by all parties on what should be done. In some instances, the contractor may have a different understanding to that which the client actually has.

In order to avoid conflicting understanding between the client and contractor, Idoro (2012) argues that the contractor or the project manager must find out the specific client wants, the functional requirements and technical specifications of the project, document such wants and have it signed in duplicate by all parties to the contract. Every member of the project team should be made aware of the project scope; any form deviation from what is agreed initially should be made known to all parties.

v. **Wrong Estimate**

In some instances, the project team may agree to an unrealistic time line or budget; Anthony (2009) indicated that agreeing to an unrealistic time line or budget will result into failure to perform all the agreed work in the stipulated time or with the stipulated budget, there by faulting the original plan.

Anthony (2009) further indicated that an un-realistic estimate may arise from using an informal or unprofessional way of estimating, underestimating the volume of work to be done and having low confidence in the estimate.

In order to avoid wrong estimates, Robert *et al* (2004) advocated that professional estimators should only be engage with the duty of preparing estimates, the estimate should cover each package of work separately but rigorously and the work package estimate should summed up into overall project estimate. Estimate should be prepared for a specified period of time only, this is to avoid conflict that may arise due to changes in market conditions, and the estimator should avoid preparing an escalated estimate but rather try to prepare an accurate estimate as much as possible.

vi. **Poor Risk Management**

A good construction plan may be made ineffective by occurrence of unexpected events which in turn can cause delay or increase in project expenditure (Shtub and Globerson, 1994), these events could be as a result of natural or man-made phenomenon may also lead to chain effect on activities in the project.

Dahiru and Mohammed (2012) indicated that poor management of risk in a project may be caused by unavailability of a formal way of identifying and managing risk, the project team may just be trying to predict what can go wrong without any form of formal or technical means. The accumulated stress of trying to control slipping mile stone can also lead to poor management of risk.

To effectively manage risk in a project, there should be a formal means of identifying and solving unforeseen events, all work to be done and possibilities of doing them should be listed from which what can go wrong can easily be identified and solution can be provided. There should be a risk register which record and

prioritize every risk that is identified in the project, and also a risk plan on how to solve any risk should be developed.

vii. **Poorly Defined Deliverables**

In a project where there is no clearly defined of exactly what is to be produced, PMBOK (2004) indicated that there could be difficulty in agreeing when the project is completed, and the client keeps asking for more or seeking fulfilment of new demands, this could also lead to rendering the project plan ineffective.

viii. **Over Optimism**

Some projects may at the beginning appear to be routine as indicated by Dahiru and Mohammed (2012), Graham and John (2005) opined that this has a tendency of making the project team go into the project with little or no planning, the team often assume they can get the job done only to realize there is more work to be done than what they actually thought. The result is to have delayed project completion and compromised project quality.

Hence, over optimism in a project is caused by spending less time to understand and plan what the project entails, the client or management may be pushing for immediate take off of the project and poor scope definition all contribute to over optimism in a project.

To avoid optimism in a project, project teams are advised in Mustapha (2009) to take considerable time to fully understand what the project is all about, should also be able to agree to the fact that the work is impossible or it will take longer or requires more resources.

ix. **Disregard to Project Management Knowledge**

The need for knowledge of project management may appear not appear critical to success at the beginning of a project, hence organizations may be reluctant to apply and implement project management skills in every aspect of the project. Anthony (2009) opined that this makes the project planning faulty right from the beginning a, evidence of a faulty planning can only be realized when the project begin to go out of control.

Project team should always consider applying the knowledge of project management when planning any project, the project plan serve as a road map to a successful project completion, if the map is faulty the whole project become faulty, and the best way to have a good plan is to follow the standard and professional way of project management.

2.2.8 Construction Planning at Pre construction Stage

Planning of construction should begin immediately after the company has successfully win the contract award (Bamisile, 2004). Bamisile (2004) further indicated that it is important for the company to ensure that all form of drawings, specification, insurance and penalties are the same with those circulated with the tender documents, if there is any ambiguity or disparity, such should be reported to the client or his representative. Abdulazeez (2012) identified that any submitted report should be documented and an evidence of the report to the client should be provided and stored.

The period between award of contract and start of work is described to be the pre-construction stage by Chitkara (2012). In this period, Bamisile (2004) opined that there is need for submitted bills to be correctly copied into the contract documents, all form of

contract documents should conform to the standard contract documents. The contractor should also ensure that all provisions with respects to sectional completion are same as those on tender documents.

Bamisile (2004) opined that Periods and Fees for any form of notification and statutory requirements should be same as those on the tender, all form of documents relating to the administration and management of the contract form part of the project are complete and accurate, in an event of client willingness to proceed work without complete documentation, the client should sign an agreement bearing responsibility of any liability that may arise due to inadequacy of the construction or contract document.

The overall review of the contract document may be carried out by the central planning department or senior construction manager under the supervision of the contract manager or director, it is essential that key members of the site team are adequately consulted as soon and as often as possible.

Preconstruction meetings should be organize in the mobilization period which is the time lag between award of contract and the date work is expected to commence on site. In this meetings, Bamisile (2004) identified the need to re-examine tender document, this is necessary in order that the management may have a through appreciation of the work involved, and also to allow those saddled with responsibility of production to so decide on the method of production to be used.

At the construction meetings, Abdulazeez (2012) indicated that the management should select construction team, office staff and other construction resources. Provisional order on materials that are likely to be in short supply, or whose prices are likely to escalate within

short period and are not perishable should be placed. All form statutory requirements in securing services, making of obstruction on public utilities should be settled and if there is any form legal financial commitment, the fees should be paid and receipt should be signed by legal officer and stored.

The organization should also make arrangements of Bonds and insurance policies as may be required by the contract. Cash flow tables, including interim payment expectation period should also be prepared.

2.3 Planning Process in Construction

Project planning, is defined by American Association of Civil Engineers (AACE, 2011) as “the determination of a project’s objectives with identification of the activities to be performed, methods and resources to be used for accomplishing the tasks, assignment of responsibility and accountability, and establishment of an integrated plan to achieve completion as required.”

Planning is the process through which the system adapts its resource to changing internal external conditions, Planning must create a feasible frame work and method statement for the execution of the works that provide the basis upon which the work will be performed as indicated by Adebayo (1980). Planning start at an early stage of project conceptualization, and it progress continues through the various phases of the project life cycle from up to project closeout stage or handle over. Planning is a continuous event rather than a definite one time effort. Scheduling refers to steps that are involve with the creation of distinct activities, activity duration and the inter relationships that exist between activities that

represent the plan chronologically and that can be communicated effectively (AACE, 2011).

According to Chitkara (2012) and Chandra (2009), planning construction project consists of the following items:

- i. Defining all the stakeholders of the project, their roles, responsibilities and how they are going to affect scheduling project execution.
- ii. Defining terms of contract, including project delivery methods, which will determine the amount of effort expected from the project team for the planning.
- iii. Identifying resources available for planning and constraints to the planning process.
- iv. Establishing a planning process to determine the scope of work, client requirements and order of schedule.
- v. Review of project plan and approval requirements.
- vi. Defining major activities to be carried out, expected goals to be achieved at the end of each activity, and the preferred sequence in which all the activities are to be completed.
- vii. Establishing a composite plan which is phased based on time required to achieve project completion.
- viii. Selecting a proper project management strategy necessary to establish cost/schedule areas for the further definition of the scope of work.

Developing of planning methodologies that are based on time, like logistics planning, site access plan, in situ concreting plan, heavy equipment mounting plan, long lead material/equipment procurement plans, owner provided material/equipment planning, and other such specific purpose plans.

2.3.1 Work Breakdown Structure (WBS)

Work breakdown structure is defined as a hierarchical structure designed to logically subdivide all the work-elements of the project into a graphical presentation. CORBON/NIOB (2014) identified work break down ability to make or break a project, this according to the report, is because work break down structure sets the foundation for the rest of the project planning, and also helps to ensure proper project baselines, estimation, resources use, scheduling, risk analysis, and procurement.

The full scope of work for the project is placed at the top of the diagram, and then subdivided into smaller elements of work at each lower level of the breakdown. At the lowest level of the WBS the elements of work is called a work package. A list of project's activities is developed from the work packages. Effective use of the WBS will outline the scope of the project and the responsibility for each work package. There is not necessarily a right or wrong structure because what may be an excellent fit for a simple building project may not be sufficient for a more complex building project.

2.3.2 Scheduling in Construction Project Planning

Chandra (2009) defined scheduling as a means of putting plan on calendar basis. In a project, networks diagrams show the sequence and inter dependencies of activities, their time and their earliest and latest completion time (Chandra, 2009). Interdependencies and relationship needs to be scheduled to determine commencement and termination dates of each activity. Using optimum resources or working within resource constraints. Adebayo (1983) described scheduling to be time table of work. Work scheduling is important to the planning process because It simplifies the project plan by adding time to activity,

scheduling validates the time objectives and also optimizes the resources employed in the project.

Scheduling also forecast the input resources and predicts the outcome of the planning; it evaluates the implication of scheduling constraint, thereby pronouncing the consequences of inadequate materials or time on the plan. The schedule shows such consequences as time overrun or delay in the plan.

2.3.2.1 Benefits of Scheduling

By studying operations and the alternative methods of executing the operations, (Chandra, 2009) identified that project schedule provide opportunity to select the most effective alternative to perform the project. It gives a clear idea regarding the required men, materials and equipment at different stages of work. Through the schedule, the management can ensure an optimal utilization of scarce resources and can also monitor the Current status of work is compared with the actual plan. If there is any delay, proper remedial measures can be taken to avoid such delays.

2.4 Construction Planning Resources

2.4.1 Planning Techniques

Planning techniques are usually methods of planning that are employed at project operational stage. Planning techniques involves establishing a method of statement for each activity, its relationship with other activities, timing of the projects and how its affect the overall project completion period. Project planning techniques allows for a detailed look at the project's resource requirements, which are not obvious at the strategic level (Harris and Mc Caffer, 2005).

The common project planning techniques include the bar charts and linked bar charts, line of balance, network methods, and Programme evaluation and review techniques as indicated by Chitkara (2012). Graphical representation and review technique has also been identified as an important planning technique that has been in used in other project management environment such as the military.

The basic network techniques such as Critical Path Method (CPM) and Line of Balance (LOB) are recommended for typical, repetitive projects with comprehensively known scope that is well defined, and the potential changes and risks only slightly affect the entire course of the project (Chandra, 2009). Their application requires precise estimates of the tasks attributes (time, cost and resources); it is also recommended that duration for each activity to be represented by those techniques should be presented as a single value, for example seven working days (Atere, 2009).

2.4.1.1 Bar Charts and Linked Bar Charts

The Bar chart or the Gantt chart was developed by Henry Gantt in 1900 originally for industrial production management and has since been widely used in construction management (Chitkara, 2012). The bar chart is a pictorial representation consisting of two co-ordinate axes; one showing the time and the other showing project operations or activities, and each activity is shown by an individual. The length of the bar represent the project duration. The left end of the bar represents activity starting point while the right end of the bar indicates the end of the activity. Inuwa *et al* (2014) observed the simplicity, visual clarity of the Bar chart to even those with no prior construction experience makes it a very valuable medium for displaying job schedule information.

The bar chart as shown in Plate I, is most useful tool for presentation of schedules, but not as a planning technique in the opinion of Chitkara (2012), but Passenheim (2009) indicated that bar chart is prepared to serve as a control tool for tracking and controlling schedule performance. It provides an easy and convenient way to monitor job progress, schedule equipment and workers, and record project advancement. This makes the bar chart mostly used as a complement of other techniques, especially the critical path method, and as a rough preliminary plan (Passenheim, 2009).

Despite the mentioned advantages of the bar chart, it has the disadvantage of failing to indicate the interrelationship among the activities (Chitkara, 2012); effect of delay of one activity on other activities cannot be seen easily. It does not indicate which activity is critical and available float in the project. Consequently, bar chart does not convey to managers and workers what consideration must be given to the prerequisite activities; it does not reflect the exact progress of the work on the day of review and; it management does not work effectively, where there are uncertainties in expected time requirement of an activity.

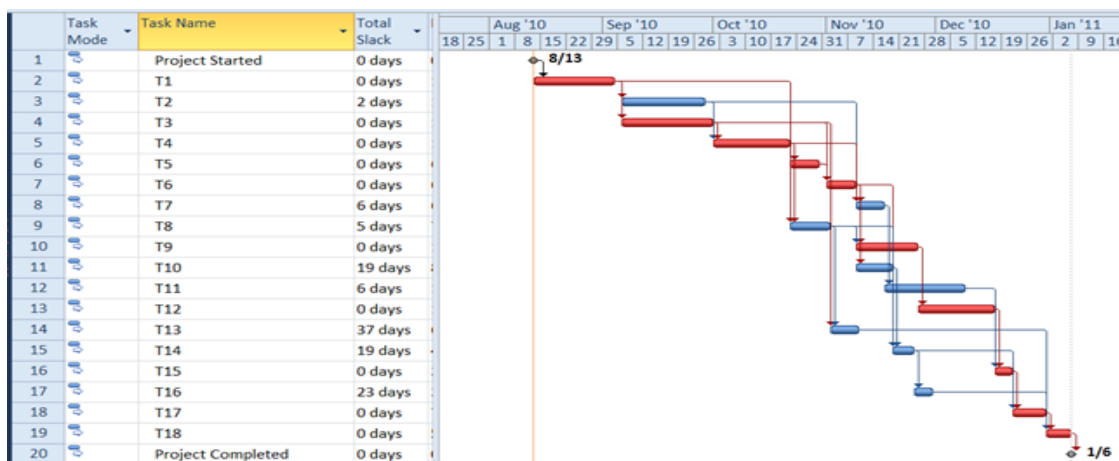


Plate I, Bar Chart (Using MS Project) With Critical Activities Shown In Red

Source: Microsoft Project (2009)

2.4.1.2 Line of Balance (LOB)

Line of balance (LOB) is a planning technique for repetitive work; it is also referred to as elemental trend analysis. The principles employed in line of balance are borrowed from planning and control of manufacturing processes according to Harris and Mc Caffer (2005). The LOB technique is represented in a graph that has a horizontal timescale and, the cumulative output is shown vertically, the bar lines are inclined at different slopes to indicate the rate of work in each of the units.

Harris and Mc Caffer (2005) identified the technique to be suitable for strict operational sequencing and permits a high degree of control, LOB also highlights the importance of activity completion, production rates and relationship between selected activities.

The line of balance as shown in Plate II and Plate III has the disadvantage of showing only a limited amount of information and a limited degree of complexity, LOB can only identify any delay in a unit or other changes in activities but cannot preview any accompanying delay in the total project completion. The type of construction projects in the present era according are complex, less repetitive and with a lot of systems. Hence, the LOB technique cannot adequately address its projects planning and controlling requirements, consequently, considered inappropriate for construction projects planning as shown by Chitkara (2012).

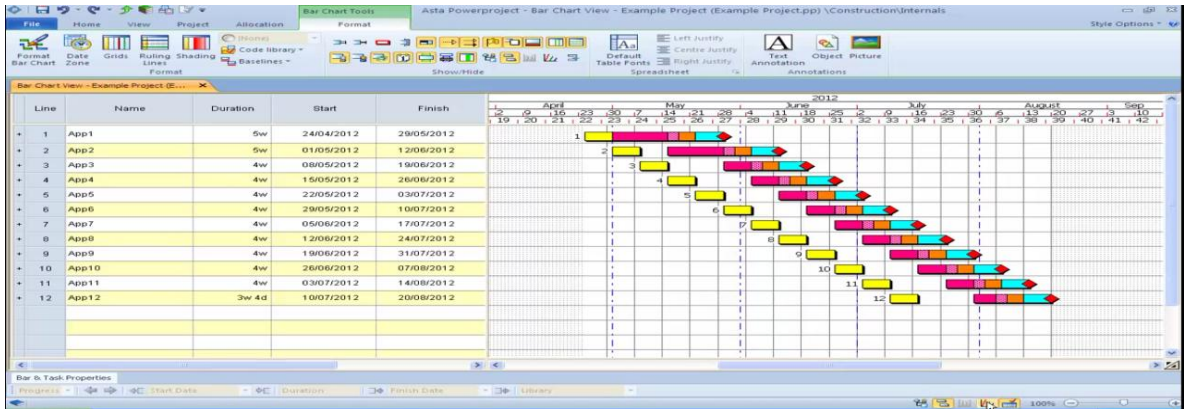


PLATE II, Un-Optimized Line of Balance (Produced With ASTA Power Project)

Source: ASTA Power Project (2013)

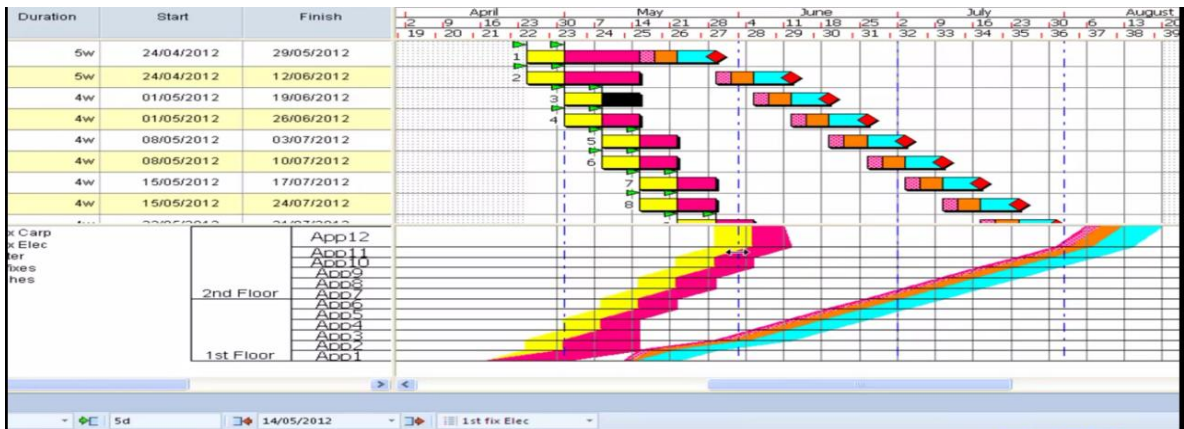


PLATE III, Optimized Line of Balance (Produced with ASTA Power Project)

Source: ASTA Power Project (2013)

2.4.1.3 Critical Path Method (CPM)

Critical Path Method (CPM) is defined by Roberts and Wallace (2004) as a deterministic approach to project planning that uses estimates of activity durations that are reasonably known to be accurate. CPM calculates the minimum completion time for the project, start and finish time of all the activities involved in the project (Roberts and Wallace, 2004). The advantage of using CPM in construction project management includes identification of critical activities, so that management can concentrate on them to maintain the construction

schedule. CPM helps in identifying the best way to crash the project completion period through the identification of activities that can be conveniently crashed without a negative impact on the project.

Through the use of the critical path, Roberts and Wallace (2004) indicated that most economical construction period can be identified and resource scheduling and mobilization can be planned in advance, in event of eventualities, the activities whose progress can be speed up can be identified and necessary actions may be initiated, CPM as shown in Plate IV helps in identifying the best combination of equipment and labour, it helps in identifying slack times for various activities, which help in distributing labour and maximizing the use of the labour force, it rationalizes construction, costing and financing and also serve as information model centre.

2.4.1.4 Program Evaluation and Review Technique (PERT)

This is a well-known and widely used technique for planning whose development is related to the implementation of the Polaris submarine project and Apollo spacecraft program in the 50's and 60's as documented in Atere (2009). The technique introduces a stochastic component to the project planning, assuming that the estimated values are not certain (determined), but may occur according to some probabilistic distribution. The method of PERT estimating may be used for estimating the duration of the task, as well as their costs and other resource requirements.

When planning a project in accordance with PERT, project scheduler does not estimate activity duration point wise (as a single value as in the case of CPM method) but using the three parameters as indicated in Mustapha (2009).

- a. Optimistic activity duration, corresponding to the most favourable scenario to the task.
- m. The most probable value, corresponding to the most typical scenario.
- b. Pessimistic value, representing an extremely unfavourable course of the task.

On the basis of the assumptions and guidance set out in the method, project manager is able to identify the expected duration of each task (weighted average activity time eqn.1) and its standard deviation (eqn.2). For this purpose, the PERT technique originally uses the beta distribution:

$$T_e = \frac{a + 4m + b}{6} \dots\dots\dots (1)$$

$$\Delta t_e = \frac{b - a}{6} \dots\dots\dots (2)$$

Based on the expected times of individual tasks is possible to calculate the expected duration of the project (eqn.3) and its standard deviation (eqn.4).

$$T_e = \text{total expected time from critical path} \dots\dots\dots (3)$$

$$\delta T_e = \sqrt{\sum \delta^2 t_e} \dots\dots\dots (4)$$

Knowing the expected project duration and standard deviation of its critical path allows the probability of completing the project by specific time to be computed using standard statistical tables. The equation below (5) is used to compute the “Z” value found in statistical tables (Z= number of standard deviations from the mean), which in turn tells the probability of finishing the project in the time specified:

$$Z = \frac{T_s - T_e}{\sqrt{\sum \delta^2_{t_e}}} \dots\dots\dots (5)$$

Where:

T_s – Specified scheduled project duration.

T_e – Critical path duration

Z – Probability (of meeting scheduled duration) found in statistical table of normal distribution.

Introducing a component of probability to project planning is undoubtedly strength of the technique.

2.4.1.5 Graphical Evaluation and Review Technique (GERT)

The network planning techniques have certain draw back due to deterministic nature of network structure, they include the following:

1. All predecessors of an activity must be completed before such activity can start.
2. Networks does not recognize activity repetition, if there is any rework, such event is handled as a change request and requires re planning the whole network.
3. The critical path is considered the longest path even though variances allow the likelihood of other paths being longer
4. Networks identify only one ending event to the project, and the only way of completing it successfully is to perform all the preceding tasks in the projects initial scope.

Such drawbacks led to development of new totally probabilistic methods like graphical evaluation and review technique (GERT).

GERT is a network model developed to handle the most complex project planning challenges. Such challenges occur when project planner deals with complicated project activities sequence that is not deterministic in nature. The course of any project can take different paths on the network. Completion of any task is followed by a decision node which allows proceeding with all further tasks, some or any of them which means that looping back to earlier events is acceptable.

Pawel (2013) showed that in order to use GERT in planning process recommend the following steps to proceed:

1. Convert the qualitative description of the project action plan into a network
2. Collect necessary data to describe the branches of network (activity specification, its time distribution, likelihood of being realized, the chance that it might fail and possible alternatives etc.)
3. Determine equivalent function of the network.
4. Convert the equivalent function of the network into the two performance measures: the probability that specific nodes are achieved, the moment generating function of the branches times
5. Analyze the results and make inferences about the system.

The result of the analysis performed with use of GERT is considerably richer than using CPM or PERT techniques. GERT however requires much more information and risk

analysis than simple deterministic network structures. It also needs far more extensive computational requirements, especially when considering large and complex networks.

2.4.2 Construction Documents

Construction documents are prepared by professionals in the construction industry and are often legal requirement to a contract. For an efficient planning, it's important to identify all the necessary documents that are required to successfully complete any construction project.

Bamisile (2004) identified the following contracts documents, the contract document should be reviewed before the commencement of site production, and also they form the basis for the preparation of production management documents:

2.4.2.1 Bill of Quantities

This is the contract document that describes all the work involved, quantity of the work, how the work is to be carried out and the material specification for each work. The bill of quantities also attach monetary value to each item specified and give the overall contract sum.

The bill of quantities should be studied by competent In house professionals such as project manager, senior construction manager or a senior quantity surveyor. The Nigerian Institute of Quantity Surveyors (NIQS, 2012) advocated that all forms of ambiguities, discrepancies, errors and any form change observed from those submitted in the form of tender should be noted and reported to the client or his legal representative for corrections and agreements. All corrections, disagreements and any form of disputes that may arise from discrepancies

in the bill should be corrected and agreed by all parties prior to the commencement of actual site productions.

2.4.2.2 Drawings and Schedules

Drawings and schedules form the standard guide of what is required to be carried out exactly as per the contract is concerned. Bamisile (2004) asserted that all received drawing and specification should be signed, stamped and registered in the document received register in the order they are received, Superseded drawings and schedules should be immediately marked and stamped when the new updated drawings or schedules are received. Drawings and schedules should be carefully examined, and all references thoroughly checked, any missing or ambiguous details should be noted and reported to the source of such drawing or schedule.

2.4.2.3 Specification

The Nigerian Institute of Building (NIOB) (2013), specified schedules and specification that form part of contract should be checked thoroughly to confirm their accuracy and adequacy. Any form of ambiguity or complication should be noted and reported to the relevant source of such specification. Special consideration should be given to national and international guide for material, workmanship and process specifications. Bamisile (2004) opined that were specification given for any item fall short of requirement of national code, such discrepancy should be noted, the issue should be resolved in conjunction with who issue the specification.

2.4.2.4 Conditions of Contract

Condition of contract describes how the contract shall be administered (Bamisile, 2004), it stipulates duties, penalties and responsibilities of all parties involved in the contract. This document should be well examined by a competent, preferably high level member of the contracting organization due to legal implication that can be attracted by default of such conditions.

The mobilization period should also be used to prepare construction production management document, this document should be prepared by a registered builder in the company or as a consulting professional to the contracting organization, and this document include:

2.4.2.5 Construction Planning Report

This is document prepared prior to the commencement of project execution but after award of contract. Bamisile (2004) itemized the content of construction planning report to contain the following items:

- i. Certification on appropriateness of the proposed construction methodology
- ii. Certification of cost effectiveness of the construction methodology.
- iii. That all proposed plant equipment for the project are available and can have access to site as at when due.
- iv. That all interdependencies of activities and activity relationship as represented on the construction Programme are true and accurate.
- v. The possibility of practical completion of the project either in the proposed project duration on the Programme of work.

- vi. The adequacy and relevance of all production management documents
- vii. Making of objective suggestion on better and more economically profitable construction method that will yield same result of similar or better quality.

2.4.2.6 Cost Plan

The Nigerian Institute of Quantity Surveyors (NIQS, 2012) defined Cost plan is a financial map detailing all aspects of cost in the projects. Cost plan is prepared by the quantity surveyor in collaboration with the lead designer and other consultant as appropriate, and it is prepared in advance of commencing of site operations. Cost map provides a guide for expenditure and other financial aspects of the projects. A detailed specification should be prepared before production of the cost plan; this is to ensure that all items described in the contract are sufficiently covered by the cost plan.

NIQS (2012) further indicated that cost plan is subject to cost check, all necessary adjustments are made so that omitted or new items can be included, errors corrected and a quality document produced. The cost plan may be adjusted to reflect the difference between the planned cost limit and the tender figure. In this way the client is kept aware of his likely final cost.

2.4.3 Building Production Management Documents

Building production management document are important construction document that are prepared in the period of waiting before mobilizing to site. These documents are prepared by a registered builder with in the constructing organization or as consultant to the constructing organization or to the client (NIOB, 2013). Building production management documents were attributed by Bamisile (2004) with ensuring smooth operation of building

production process, providing for all necessary guideline on the construction method to be adopted, the project calendar, subject of quality, health, safety and general information as regard the project. Bamisile (2004) identified and described the following documents:

- i. Construction methodology
- ii. Construction Programme
- iii. Project quality management plan
- iv. Project health and safety plan
- v. Early warning system chart.
- vi. Information requirements schedule.

Bamisile (2004) described construction methodology and construction Programme to be the most important building production in planning of construction project.

2.4.3.1 Construction Methodology

This is a document prepared by a professional builder in advance of actual construction works detailing the intended method of carrying out all aspects of the project. The documents describe the method, materials and expertise required to successfully complete the project. It is a unique document that is tailored fitted for each project, Bamisile (2004) identified the important aspects to be considered when designing a construction methodology:

The availability, experience and technical competence of personnel available for the project.

- i. Item of machinery, equipment and tools that are to be acquired either purchased or hired for the project.

- ii. Technological status and availability to such work as at the time of project delivery.
- iii. Condition of contract in terms of restrictions and important requirements.
- iv. Prevailing site conditions.

2.4.3.2 Construction Programme

This is an important part of construction planning which ensure completion of work with in specified duration. It is a diagrammatic representation of what is to be done and when it is to be done. Construction Programme of work primarily represent the sequence in which the various activities should occur with their associated duration and resources requirements. A Programme of work undertaken for the whole project is termed master plan as indicated in CORBON/NIOB (2014), however the Programme can be produced for only a segment or section of the whole projects. Construction Programme aims to achieve the following objectives:

- i. To prepare and keep an agreed document of intent of everything that is required to be done.
- ii. Indicate sequence of operations, and output expected from labour, plant, equipment and all other construction consumables.
- iii. An excellent gauge for monitoring and controlling progress of work.
- iv. Restrict growth and unnecessary expansion of work.
- v. To serve as a guide for evaluating new introduced works into an existing calendar.

The process of preparing construction Programme requires giving attention to some important details as identified by Bamisile (2004):

- i. Labour fluctuation is reduced to the barest minimum by balancing labour gangs.
- ii. Item of plant and equipment should be optimally utilized throughout their stay on site.
- iii. Items that form part of key activities should have their duration included with in their parent activities

Bamisile (2004) identified qualities of a good Programme to include the following:

- i. Simple, free of all unnecessary detail, requiring little or no guidance for its interpretation especially to the client.
- ii. It is prepared based on serious consideration of all construction documents, knowledge of construction process and consultation with other professional and trade leaders with respect to their own area of expertise.
- iii. Easy to review and update requiring few alteration to its existing format.
- iv. Covers all aspects of sites operation through the project duration.
- v. May consist of important notes as a reminder to the project execution team.

2.4.4 Personnel in Construction Planning

A project can be successfully managed only if all the personnel involve are totally dedicated. Project planning requires special skills and wisdom by the management team. Dahiru and Mohammed (2012) indicated that planning construction project cannot be accomplished by one single individual, hence there is need to have a good understanding and relationship between all projects members, all members are required to plan their individual area of responsibility.

Human resources involved in construction project planning come in three categories:

2.4.4.1 The Client or Client Organization

The client or client organization is recognized by the project team as the body that initiates the project and has authority to approve expenditure on the project, the form the project has to take and its timing, the client determine who pays all kind of bills accrued in the project. The project team will find it simpler if all these responsibilities are vested on a single party (Anthony, 2008).

Client have important role to play at the planning stage, this responsibilities cannot be delegated to other team members in the project, such responsibilities include selection of the project team members, acquisition of land, determining the user of the end facility, setting of key dates for events, development of brief and monitoring of project progress. The client is interested more in knowing the financial implication of such projects, times of cash out flow and when deliverables are to be achieved, this should be well planned and be made known prior to start of actual work on site. For an effective planning and administration of the project, client should set the following (Anthony, 2008):

- i. Clear objectives of what is to be done exactly.
- ii. Set the objectives to an initial test to analyse their importance and significance to what he actually intended to achieve.
- iii. Choose a procurement option by making careful reference to his objectives.
- iv. Communicates his objectives clearly to all concerned to avoid conflicting guidance in the project.
- v. Ensure that reaction to unexpected events involves proper revision and consideration of the set objectives.

2.4.4.2 The Project Designer

This is the architect or engineer and other professionals that vested with the responsibility of producing all forms of design for the projects tests and investigations. Anthony (2012) indicated that the architect or engineer is upon employed as the project manager, who is normally required to carry out the responsibility for preparing the plans used by the client in taking the strategic decisions. The activities that are planned by the design team include investigations (surveys), design, analysis, calculations, drawings etc.

2.4.4.3 The Contracting Organization

The contractor's organization has put the greatest effort into the planning process, this is because the result of a well-planned carefully monitored and controlled contract reflect directly in the profitability of the contract and the company (Atere, 2009). The contractors planning effort are divided planning at the estimating stage and production planning. In estimating, a project plan is required to develop the proposed construction methods and hence the estimates

2.4.4.4 The Project Manager

Umar (2014) defined project manager as an individual or organization depending on the size and complexity of the project saddled with the responsibility of planning, organizing, leading and controlling the project to a successful completion. The project manager is at the centre of the project execution from inception to completion. Project manager should be a high calibre person or organization that has the ability to evaluate risk and uncertainties; he should possess quality of honesty and integrity, communication skills, analytical skills and decision making skills.

2.4.5 Information and Communication Technology (ICT) in Construction Planning

Kasim (2011) defined Information Technology (IT) as the use of electronic machines and programs for the processing, storage, transfer and presentation of information. Mutesi and Kyakula (2009) described ICT to be broadly technologies that provide an enabling environment for physical infrastructure and services development of applications for generation, transmission, and processing, storing and disseminating information in all forms. Other than information handling and sharing capability of ICT, Prassanna and Ramanna (2014) identified 31 perceived benefit of ICT which was grouped into four groups as summarized in Table 2.1. The benefit comprises of those related to measures of project success, benefits related to effective team management, benefits related to effective use of technology and finally benefits related to increase in organizational efficiency of ICT in building project management.

Table 2.1: Possible Benefit of ICT Adoption in Construction Project Management.

S/n	Unit	Perceived Benefit	Beneficiary
0			
1	General Project Success	1- Projects completion as per the estimated time 2- Project completion as per the estimated budget 3- Project completion as per the specifications 4- Life cycle concept becomes a competitive factors 5- Projects information obtained in real time 6- Richer information made available to managers 7- Less time spent in query and approval process 8- Reduced risk of errors and rework on projects 9- Effective change management 10- Effective concurrent construction management 11- Complete log of communications tracking purposes 12- Effective material procurement and management 13- Effective contract management 14- Prompt documentation maintained for clients 15- Client satisfaction 16- Reduced administrative costs of document handling 17- More time on managerial works by Project Manager 18- Effective team collaboration and co-ordination	1-Project Team 2- Contractor 3-Client
2	Team Management	19- Effective communication management in the team 20- Greater management control 21- Effective joint decision making 22- Motivation of the work force 23- Increased information portability in the ICT unit	1- Project Team 2- Contractor
3	Use of Technology	24- Reduced paper work 25- Flow of accurate information 26- Ease of retrieval of information 27- Multi locational availability of information	1-Project Team 2- The Industry 3-Contractor
4	Organizational Efficiency	28- Increase in overall organizational efficiency 29- Better information assessment and management 30- Useful information compiled and disseminated to other projects	1-Contractor 2-Project Team

Source: Prassanna and Ramanna (2014).

Computer based applications in planning allow the user to define the activities and resources that are needed to perform the project. Parassana and Ramanna (2014) identified the following are some important project management soft wares that have been identified to be efficient in project planning:

- i. Microsoft Project (MS Project)
- ii. Oracle Primavera
- iii. Asta Power Project

Project management software systems are capable of allowing users to define the activities and resources that are needed to effectively execute the project. Clement and Gido (2009) identified the capability of project management software systems in construction project planning, the features include:

- i. Gantt and PERT Chart:

Project management software systems have an excellent ability to easily, quickly and accurately generate various forms of charts and graphs. Yazid (2010) indicated tha such charts to include bar chart, PERT Chart, and variety of network diagrams. Once the project reference plan is created, modification can easily be entered, and the chart will automatically reflect the changes without having to redraw the whole chart. In the software, precedence of activities can easily be shown and user can easily switch from Gantt chart to network diagram with ease.

- ii. Project Time Estimating

The overall project time constitute the appropriate time estimate of all activities involved in the project. Clement and Gido (2009) Software can easily calculate project duration without having to laboriously add all the individual project time.

iii. Project Scheduling

Software systems build Gantt chart and networks based on the activities and their associated resources provided. Any change in the resources will automatically be updated in the schedule. In addition, users can schedule recurrent task, set priority for scheduled task and also perform reverse scheduling (end day to the first day). Clement and Gido (2009) indicated that software can also be used to define work shift, schedule, elapsed time, schedule task to start as late as possible or as soon as possible and specify Must-start-by or must-finish by date or a no-earlier than or on-later-than date.

iv. Task Management and Interdependencies

Project management software in planning allow user to maintain an activity or task list. For each of the specified task, the user can provide title, start date, finish date, comment and estimated durations (including optimistic, most likely and pessimistic estimates in various times scale. The software system ca also shows any precedent relationship with other task and the people responsible for the task.

v. What-if-Analysis

Project variable that include personnel, payment and time can be tested for variation using software to see the likely effect of such variation. At some point in a project, Clement and Gido (2009) indicated that project team may wish to ask certain question such as “what if an identified activity is delayed by a week” the effect of such delay can be seen through computer simulation.

vi. Work Break Down Structure

Work break down structure is involved with breaking down the project in to all its constituent activities. Yazid (2009) asserted that project planning with software provide an easy way of achieving such task.

2.4.5.1 Criteria for Selection of Software in Planning

Individuals and organizations have different needs for planning with computer software; Clement and Gido (2009) provided the following as a guide to selection of software in planning project.

i. Ease of usage and training requirements

When selecting software for planning, Yazid (2010) also indicated the importance of considering the ease of entering data, existing data modification, ease of generating report, quality of the produced reports and consistency in screen output. The look and feel of the software should also not be ignored because of their ability to create an excellent user experience.

The amount of learning for one to be proficient with the software, the length and cost of training should all be considered.

ii. Capacity

In choosing software for planning, Clement and Gido (2009) indicated that it is important to consider the amount and nature of task you are likely to be carrying out with the software in order to determine if the software can actually perform to the level you required. Consideration should also be made to the number of resources and number of projects you are likely to employ the software.

iii. Available features of the software

Thorough analysis of what is to be done with the software should be carried out prior to the selection of the software. Clement and Gido (2009) highlighted the need for software to be analyzed to see if it is capable of handling the user requirements.

iv. Smooth integration into existing system

Some software systems are only compatible with small range of systems, while there are software systems that are compatible with a vast applications and systems, and operating system. Yazid (2009) affirmed that \it is an added advantage if the proposed software is compatible with current systems you have and have ability to share resources with existing basic office utility software.

v. Security

The level of security provided by each of the prospective planning software should be analysed; consideration should be giving to the most proving secured system.

vi. Reporting capability

Some software systems support only the basic planning, scheduling and cost reports. There are numerous systems that support extensive facilities which include reports on individual tasks, resources, actual cost, committed costs and project progress.

vii. Online support and features

The amount and quality of online support provided by planning software should be compared to other similar products. Consideration of personnel requirements on what kind of help one need from the software online support should be define in time (Clement and Gido, 2009).

2.4.5.2 Advantages of Using Software in Planning

Planning construction project with computerized systems offers numerous advantages which include;

i. Ability to handle complexity

Software systems were design to handle complex and large scale operations efficiently better and faster than when performed manually.

Planning project with few activities and a short duration may conveniently be carried out manually (Yazid, 2009), but project consisting of hundreds or thousands of activities and a long duration of several month or years will be tedious and errors prone for manual planning.

ii. Affordability

There are excellent project management software systems that are capable of performing wide range of planning operations with an affordable budget.

iii. Easy to use, often with self-teaching tutorials

Project management soft wares are easy to use, and are often sold with detailed manual in readable version or video format.

iv. Excellent record keeping ability

Computerized systems have an excellent ability to keep records (Abdulazeez, 2012). Data can be kept on individual team members, schedules, task, cost and resources used. The data can be used to produce high quality reports and helpful in planning future projects.

v. Maintainability and modifiability

Abdulazeez (2012) indicated that project planning with computerized system produce plan that are easy to maintain and update which is difficult to achieve with manual planning methods.

2.5.4.3 Concerns of Using Software Systems in Planning of Construction Project

Construction management and planning with computer systems are not without concern despite their listed advantages. The concern has a tendency of producing negative result from the use of soft wares rather than enjoying the benefits of the soft wares, hence, these concerns should be given proper attention as soon as the decision is made to use them for construction planning, and these concerns include:

i. Distraction

Generally, in using computers, there is a chance of distracting one from concentrating on doing what he is required to do by numerous activities and abilities in the computer or online. Clement and Gido (2012) indicated that in using project management there is also likely hood of distraction from numerous interesting and fun like features.

ii. False Sense of Security

The overwhelming feeling of having power full software by some project managers and planners tend to make them believe in achieving what is practically not feasible or what is out of the software's scope (Clement and Gido, 2009). The planners may have a surprised feeling and believe that even when the project is slipping out of schedule, the software can automatically figure out how to bring the project back on track.

iii. Information Overload

Some project management soft wares have the capability of producing massive amount of data in form of reports, graphs, analysis and diagrams. This amount of

information may be difficult to be comprehended by a novice (Abdulazeez, 2012), this can result into some important information slipping away without been noticed. Hence, Abdulazeez (2012) recommend that it is important when using project management soft wares to request for the necessary result only.

iv. Learning Requirements

Despite the relative easiness in learning how majority of project management soft wares, Clement and Gido (2009) identified that conscious effort must be put for one to be excellent in it, especially if one desires to be able to plan and execute complex projects successfully.

v. Over Reliance on the Software

Due to ease of use, applicability and other appealing features of project management soft wares, project managers tend over rely on the soft wares. Individual with little knowledge of project managing and experience may be required to undertake important project management activity with the software. If one does not have the necessary knowledge of project management, the software cannot make much difference.

CHAPTER 3

3.0

RESEARCH METHODOLOGY

Aroha (2006) define research methodology as the theory of the research and the reason for the way the research has been design. Jarvinen (2004) identified research methods to include field experiment, case study, survey, simulation, subjective/argumentative, descriptive/interpretive and action research, Yin (1994) identified qualitative, quantitative, case study or combination of both as a strategy for answering research questions. Yin (1994) further indicated that the type of research question that need to be answered will determine the appropriate type of research methodology.

3.1

Research Design

Research design is define as the overall plan for connecting the conceptual research problems to the empirical research, Brian (2012) indicated that research design articulate what kind of data is required, what methods are going to be used to collect and analyse this data in other to answer the research question. Figure 3.1 is a diagrammatic representation of the design adopted for the purpose of this research.

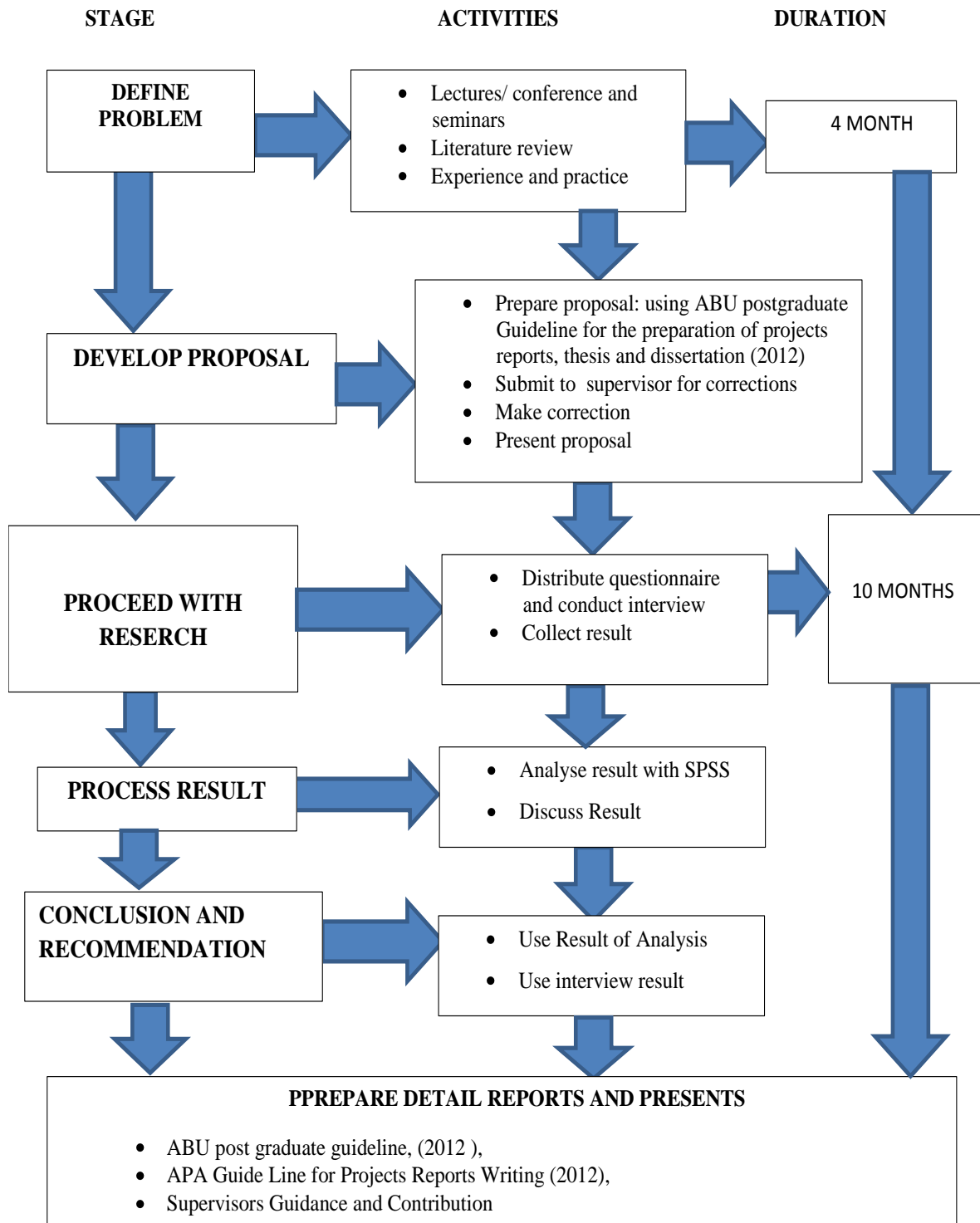


Figure 3.1, Research Design

The approach adopted for conducting research was defined by Jarvinen (2004) as a set a set of research methods that can be applied to similar research objectives and research questions. Yin (1994) shows that Case study approach is appropriate for research that involve answering how questions. This research involve answering how planning is carried, therefore employ the case study approach to achieve its aim and objectives. The research further employ both quantitative (measurable data) and qualitative (non-measurable data) methods of data collection obtain both primary and secondary data respectively.

3.2 Study Area

The study was carried out in FCT Abuja (see scope and delimitations), FCT Abuja is the Nigeria's federal capital territory which was moved from Lagos in 1976. FCT Abuja has seven area council with construction activities evenly distributed across the territory.

Movement of Federal Capital from Lagos to Abuja has brought about expansion in infrastructural need and development, the requirement for more infrastructure in the territory leads to influx of construction companies both indigenous and foreign, this has made Abuja not only administrative capital but also construction capital of Nigeria (Kadiri *et al*, 2014).

3.3 Population and Sample Size

The population of the study was derived from list of construction and general building contractors in Abuja provided by Cooperate Affairs Commission (CAC, 2014). In the list, a total of 1920 contractors were identified to be in Abuja.

To determine appropriate sample size for the study, Singh and Masaku (2014) identified nature of expected data, expected statistical method of analysis, level of precision and confidence to be an important considerations.

Glenn (1992) assert that researches in medical hypothesis such as sensitive drug testing should be carried out at 95% to 99% confidence level, while researches in management, general science and social sciences can be carried even at confidence level of 90% or less., it was also recommended that confidence level of 90% is sufficient for this research, hence sampling in this research was based at 90% confidence level and 10% precision level. Glenn (1992) indicated that for every confidence level selected, a precision level of 3% to 15% is sufficient enough to determine its sample size.

Sample size was found using sample size table in Plate V, the sample size table was prepared based on Yamane (1967) formula in equation one. Sample size table for 95% confidence level at various precision was the only available table identified. Sample size for a population of 2000 at 15% precision was calculated since it will be close to 90% confidence level.

Size of Population	Sample Size (n) for Precision (e) of:			
	±3%	±5%	±7%	±10%
500	a	222	145	83
600	a	240	152	86
700	a	255	158	88
800	a	267	163	89
900	a	277	166	90
1,000	a	286	169	91
2,000	714	333	185	95
3,000	811	353	191	97
4,000	870	364	194	98
5,000	909	370	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99
10,000	1,000	385	200	99
15,000	1,034	390	201	99
20,000	1,053	392	204	100
25,000	1,064	394	204	100
50,000	1,087	397	204	100
100,000	1,099	398	204	100
>100,000	1,111	400	204	100

a = Assumption of normal population is poor (Yamane, 1967). The entire population should be sampled.

Plate V: Sample Sizes at 95% Confidence Level

Source: Glenn, (1992).

In order to validate the calculated sample size, Formula of Al-Subaihi (2003) in equation two was employed to calculate sample size at 90% confidence level.

$$n = \frac{N}{1+N(e)^2} \text{ -----Eqn 1 (Yamane}$$

1967)

n = Sample Size (from a finite sample)

N = Population

e = level of precision (15% precision)

Therefore:

n =?

N = 1920

e = 0.15

Level of confidence (%)	Z	Z ²
90	1.645	2.706
95	1.960	3.841
99	2.576	6.635

Z - the inverse of the standard normal cumulative distribution that correspond to the level of confidence

$$n = \frac{1920}{1+1920(0.15)^2}$$

n= 43 (respondents)

Plate VI: Z values that correspond to the frequently used confidence level

Source: Al- Subaihi, (2003)

$$n = \frac{0.25 Z^2}{e^2} \text{----- Eqn 2 (Al-Subaihi (2003))}$$

n = sample size

Z= the inverse of the standard normal cumulative (from table 3.2)

Distribution that correspond to confidence level

e = level of precision (10%)

$$n = \frac{0.25 \times 2.706^2}{(0.1)^2}$$

n = 46 (46 is adopted as the sample size of the study)

3.3.1 Sampling Technique

The list of CAC (2014) does not however differentiate indigenous companies from foreign companies, or provide information on whether a company is currently active in construction or not, nor indicate possibility of having separate project Planner in a company from project engineer, supervisor or a builder on site. These are some characteristics which the researcher believe will improve credibility of the research findings but could not be ascertained by looking at the population.

Hence, using previous knowledge of the study area, understanding necessary features for a company to be eligible to belong into the research and self-administration of questionnaire, the researcher was able to identify indigenous companies and only such companies are used for the study.

Babbie (1990) identified purposive sampling to be appropriate were research want to study small subset of a larger and heterogeneous population having pre knowledge of the required subset. Palys (2008) also identified purposive sampling is the ability of the researcher to identify and select one well-placed and articulate respondents will advance the research far

better than any randomly selected chosen sample of 50 respondents. This research adopt the use of purposive sampling for its sampling.

3.4 Data Collection

Secondary data for the research was collected through extensive literature review of relevant scholarly materials to the subject matter, which include books, journals and on line verifiable materials.

3.4.1 Data Collection Instrument

Two set of structured questionnaires were design with open-ended and closed-ended questions, the questionnaires aimed at collecting information from sources within each company that are likely to give more accurate and unbiased response.

Questionnaire (A) was design to solicit information relating to respondents perception of what construction planning entails, how his organization plan construction project, who is responsible for the planning, the questionnaire also collect demographic data of the respondents organization. Bamisile (2004) attributed responsibility of planning construction project with project managers, hence the questionnaire was administered to project manager in each organization.

To avoid making project managers judges in their own case, questionnaire (B) was design and it was administered to professional in each company who are involve in execution of the work, they are popularly referred to as site engineers. The questionnaire solicit information relating to respondents perception of effectiveness of construction planning in their organization, possible ways of improving planning, causes of construction planning failure and how to improve planning.

Section A of the questionnaire (A) was used to generate data on the respondent's organizations back ground data. Section B was used to collect information on the respondent's perception of what planning entails. Questions examine what the respondents believe a plan contains and the issues which a proper plan must address. While section C examined what causes planning to fails.

Section A of questionnaire (B) assess the respondents professional background, Section B of the questionnaire assess the efficiency of respondents organization planning process, While section C ask question to determine the efficiency of organizational planning, and also to determine how planning can be improved among the contractors.

3.4.2 Data Collection Procedure

Questionnaires were distributed to 60 indigenous construction companies in FCT Abuja, companies are self-administered with 60 questionnaire (A) and 60 questionnaire (B). Questionnaires from 50 construction companies returned are found complete and accurate for analysis, hence analysis was based on questionnaires from 50 construction companies.

3.5 Methods of Analysis of Data

The choice of method of data analysis was identified by Glenn (1992) to be dependent on the nature of the collected data. Babbie (1990) indicated that descriptive statistics to be appropriate for a research whose data is nominal and ordinal in nature. Descriptive statistical tools such as mean, frequency and chart are recommended interpreting result of nominal and ordinal data (Babbie, 1990).

The collated data was analyzed using the statistical package for the social sciences (SPSS), the application was adopted for its accuracy and versatility in statistical analysis (Abdulazeez, 2014).

3.5.2 Relative Importance Index (RII)

Scott and James (2011) advocated the wider use of relative importance index as a supplement to multiple regression analysis, Relative Importance Indices provide information which is not readily available from indices typically produced from multiple regression (Scott and James, 2011).

(RII) is determined by dividing the mean response with the highest value on the Likert scale used. Decision relating to most significant factor was taken base on the factor having the highest RII point in the group of the identified variables.

CHAPTER 4

4.0 RESULTS, ANALYSIS AND DISCUSSION

4.1 Analysis and Discussion of Result

The data for the research as collected using questionnaire, the two set of questionnaires used for each construction company are merged and analysed as one questionnaire.

4.1.1 Questionnaire Response Rate

Questionnaire was described to be adequate data collection instrument for research that is case study and descriptive in nature (Yin, 1994). Hence, the research employ use of two structured questionnaire administered in pair to each organization in the sample. Result of questionnaire response rate is presented in Table 4.1. The table presented total number of questionnaires distributed, number completed and return, number not returned and each questionnaire response rate.

Table 4.1: Questionnaire Response Rate

	Number Distributed	Number Completed and Returned	Number Not Completed	Number Used for Analysis	Questionnaire Response Rate (%)
Questionnaire (A)	60	50	10	50	83
Questionnaire (B)	60	53	7	50	88

Source: Field Survey, (2014).

The table presented result of questionnaire response, response rate of 83% and 88% was recorded for questionnaire (A) and questionnaire (B) respectively. Yehuda and Brooks (2008) observed that questionnaire response rate used for academic purposes are significantly lower than 100%, they opined that a response rate of 60% or lower is adequate

for scientific research. Therefore response rate of 83% and 88% was concluded to be adequate for the study.

Because questionnaires were personally administered, response rate was observed to be improved, Bauch (1999) opined that coercive administration of questionnaire improve response rate. It was also observed that questionnaire (A) which was administered to Project managers record lower response rate, this is attributed to busy schedule of project managers who often are required to switch between projects in many organization. Site engineers provide better response rate because organization were found to at least employ one permanent technical officer on construction site.

4.1.2 Size of Organization by Number of its Permanent Employee

Based on Abdulazeez (2012) classification of enterprises, section (A) in questionnaire (A) consist of demographic data relating to the project managers of the research sample. The questions aim at assessing the background of the respondents especially relating to knowledge of project management.

Section A of questionnaire type B contains demographic data relating to the Site representative in charge of actual construction and implementation of project plans. The result of organization size based on organizations number of permanent employee is displayed in Figure 4.1

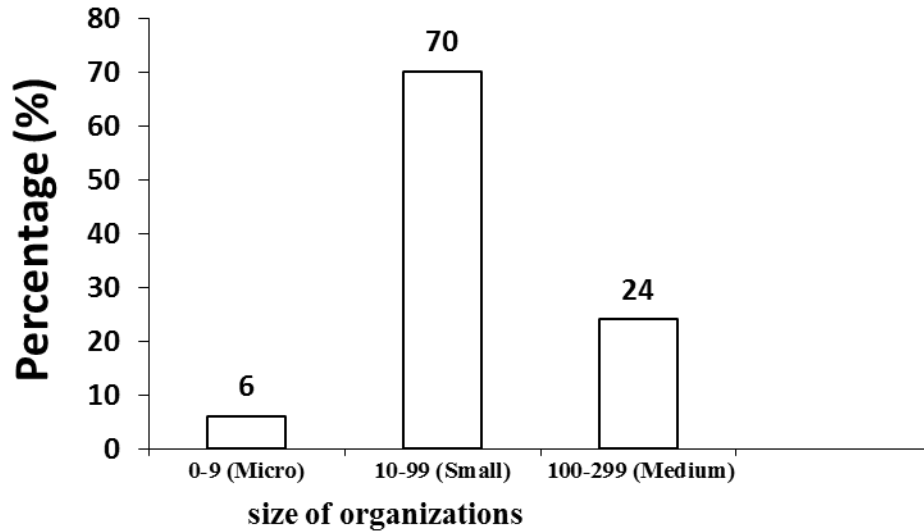


Figure 4.1: Size of Organizations by Number of Permanent Employees

Source: Field Survey, (2014).

The figure show that majority (70%) of the construction companies investigated are classified as Small enterprises because they have permanent employee work force of 10 – 99 employee, 24% are medium enterprises with permanent employee of 100 – 299, while only 6% are classified as micro enterprises because they have permanent employee of 0 -9 employees.

The result shows that majority of the construction companies are small enterprises, employing few employee. The result support previous findings of Adebayo (1983) who attributed slow growth of construction companies to insufficient construction planning.

4.1.3 Organization’s Years of Registration

The age of the respondents organizations taking reference from their official date of registration as cooperate entities are represented in Figure 4.2.

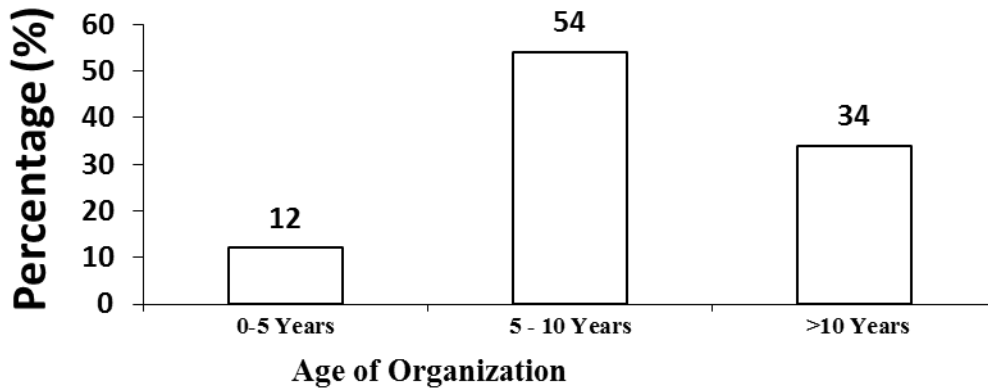


Figure 4.2 Organizations Years of Registration

Source: Field Survey, (2014).

The years of registration of organizations are presented in figure 4.2. Results shows that 54% of the companies have been registered for 10 – 15 years, 34 % of them have been registered for more than 10 years and 12 % were registered for less than Five years.

Despite the decades of existence of Nigerian construction Industry, this result shows that majority of indigenous construction companies sampled and found actively working are actually less than 10 years of incorporation. This is an indication of slow growth of the industry, a robust industry will have a considerate amount of companies that are in operation for decades. For construction companies to survive and grow, Ibrahim (2004) indicated that construction companies must ensure efficiency in planning their construction projects.

4.1.4 Profession of Respondents

The professionals that take control of actual production of construction, interpreted drawings and implement plans for the proposed work are usually referred to as Site engineers, they may or may not be engineers by training neither by registration. This section aim at identifying the profession of those responsible for interpretation and

implementation of the construction plans as prepared by the project manager. Figure 4.3 show the profession of the respondents.

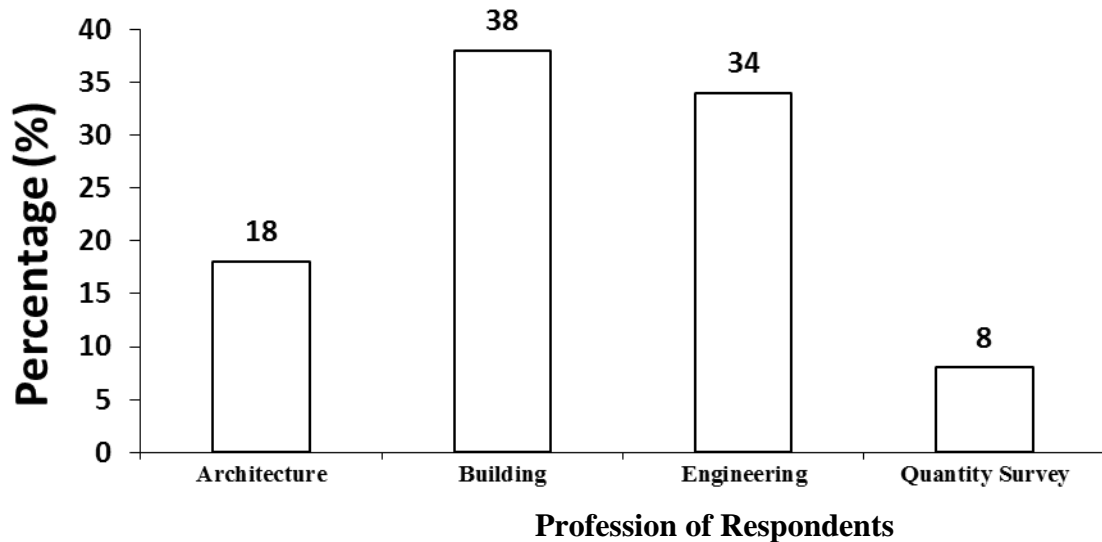


Figure 4.3: Profession of Respondents

Source: Field Survey, (2014).

The figure shows that 38% of the respondents of the second questionnaire are Builders, 34% practice engineering, 18% are architect, while 8 % are Quantity surveyors by profession. The result shows that site operations are not dominated by single profession, it indicate that the industry actually employ different professional in handling site operations. Employing and involving several professional to carry out planning is found to improve planning as indicated by Bamisile (2004), who opined that planning of construction activity should not be restricted to only one professional, but a collective effort in any organization.

4.1.5 Contractors Perception of What Construction Planning Entails

The process and activities of construction planning has been identified through by Chitkara (2012) and Chandra (2009), activities that form part of planning construction have been identified in tabular form, respondents were asked to rank how they agree each of the

activities to be part of construction plan. The ranking as shown in Table 4.2 was strongly disagree, disagree, neutral, agree or strongly agree.

Table 4.2 Contractors Perception of What Planning Entails

Activity	Frequency (F)					ΣF	ΣFX	Mean	RII	Rank
	1	2	3	4	5					
Ensuring that all documents, approvals, plans, drawings and specification are complete, accurate and approved.	0	0	1	8	41	50	240	4.80	0.96	1 st
Precise definition of construction project	0	1	1	15	33	50	230	4.60	0.92	2 nd
Establishing what exactly does the client want	1	1	0	19	29	50	224	4.48	0.90	3 rd
Build project team that march project requirement	1	0	4	22	23	50	215	4.39	0.88	4 th
Identify available resources and constraints in the project	0	0	8	20	22	50	214	4.28	0.86	5 th
Defining exact duration for every activity	0	2	8	23	17	50	205	4.10	0.82	6 th
Serve as a mechanism for scope review and control	0	2	6	30	12	50	202	4.04	0.81	8 th
Setting of Cost, quality and time control mechanism	0	2	5	31	12	50	203	4.06	0.81	8 th

Note: RII= Relative Importance Index, 1= Strongly Disagree, 2=Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree.
Source: Field Survey, (2014).

The result is in agreement with definition of what planning should include, the result further show agreement between literature and practice, because contractors show agreement with construction planning activities as outlined in Chandra (2009) and Chitkara (2012). For a construction project plan to have excellent chance of succeeding, there is

need for planners to ensure all activities identified in Table 4.2 are achieved satisfactorily at planning on how to execute any project.

4.1.6 Responsibility of Planning In the Organization

The work of Inuwa *et al* (2014) indicated that some Nigerian indigenous construction companies were found to be using their central administration rather than project management department to plan the execution of construction projects, while PMBOK (2004) advocated for independent and identifiable project manager should be employed to each construction project. Respondents were asked to indicate who is responsible for planning of construction in their respective organizations. The result is shown in Figure 4.4 as a bar chart.

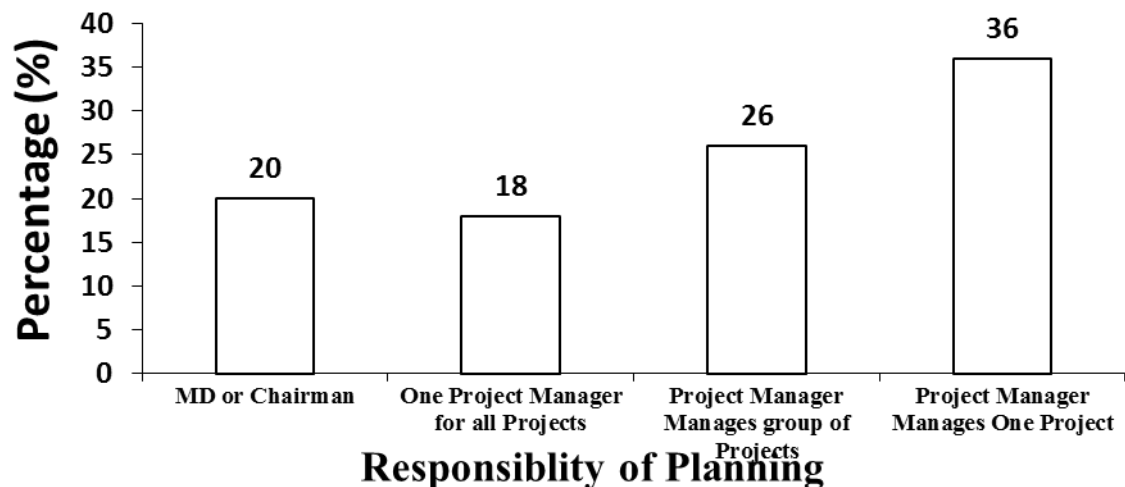


Figure 4.4: Who is Responsible for Planning Construction in the Organization

Source: Field Survey 2014.

The result indicated that 20% of the respondents said their Managing Director (MD) or Chairman plan how projects are to be carried out, 18% said a single project manager manages all their projects, 36% reported that each of the project their organization under

took is managed by a single project manager, while 26% reported that each project manager manages group of projects in their organization.

The result obtain show contractors to be adopting method of construction planning which is not in line with requirement contained in PMBOK (2004). Indigenous contractors were found unable to employ an identifiable project manager for planning and execution of construction projects, This according to Inuwa *et al* (2014) have been important reason for ineffectiveness of construction project planning among Nigerian indigenous contractors.

4.1.7 Problems That Effective Construction Project Planning Can Avoid

Oladimeji and Ojo (2012) attributed efficient construction project planning with ability of providing solution to many construction problems. Wong and Ng (2010), and Oberlender (1993) identified those problems, the problems are presented to contractors in a tabular form to assess contractor's agreement with ability of construction planning to avoid those problems. The result is shown in Table 4.3. The frequency, mean relative importance index and the rank of each item are also included in the table.

Table 4.3 Problems that Effective Construction Project Planning Can Avoid

Problems	Frequency (F)					Σf	ΣFX	Mean	RII	Rank
	1	2	3	4	5					
Cost Over run	0	4	1	16	29	50	220	4.40	0.88	1 st
Time over run	0	3	7	12	28	50	215	4.30	0.86	2 nd
Compromised project quality	4	3	5	18	20	50	197	3.94	0.86	2 nd
Wrong Estimates	0	5	5	13	27	50	212	4.24	0.85	4 rd
Reduced Profit	2	0	6	22	20	50	207	4.22	0.84	5 th
Dissatisfied project team	0	5	7	22	16	50	199	3.98	0.80	6 th
Risk of injury and Hazard	1	6	9	15	19	50	195	3.90	0.78	7 th
Poor scope control	1	5	11	19	14	50	190	3.80	0.76	8 th
Bad name to organization	5	4	8	14	19	50	188	3.76	0.75	9 th
Abandonment of projects	5	6	10	13	16	50	179	3.58	0.72	10 th
Dissatisfied customer	4	5	9	23	9	50	178	3.56	0.71	11 th

Note: RII= Relative Importance Index, 1= Very Unlikely, 2=Not Likely, 3=Quite Likely, 4= Likely, 5= Very Likely

Source: Field Survey, (2014).

The result shows that respondents generally agree planning has the ability to avoid all of the identified problems, as highlighted by mean of each group. The least mean is 3.56 which when approximated to 4.0 will translate to “Likely”, while the highest mean was 4.40 which also translate to “Likely”.

The table further shows agreement between contractors and previous recommendation of Oladimeji and Ojo (2012), this is indicated with respondents agreeing that planning of construction projects has the ability to avoid cost overrun foremost with a Relative importance index (RII) of 0.88, then ability to avoid time over run (RII=0.86) and is likely to avoid compromise in construction project quality (RII=0.86). The ability of construction project planning to avoid dissatisfaction of customer was ranked 10th with RII of 0.71,

ability of construction project planning to avoid abandonment of project was ranked 9th with an RII index of 0.72 while the ability of construction project planning to avoid bad name to organization was ranked 8th with RII of 0.75.

4.1.8 Order in Which Contractors Perform Identified Construction Planning

Activities

Bamisile (2004) also provide a comprehensive activities which must be accomplish to successfully plan construction project. The activities that are necessary for a successful planning of construction project are respondents on a five point Likert scale. Respondents were asked to indicate how often there organization achieve the identified factors before starting any project. The result was tabulated in Table 4.4, which also shows the frequency, mean, RII and rank of each activity.

Table 4.4 Order in Which Contractors Perform Identified Planning Activities

Construction Planning Activities	FREQUENCY (F)					ΣF	ΣF X	MEA N	RII	RANK
	1	2	3	4	5					
Establishing client exact demand	2	0	0	15	33	50	227	4.54	0.91	1 st
Precisely defining the project	1	0	2	18	29	50	224	4.48	0.90	2 nd
Identifying major goals that must be achieved	0	2	2	16	30	50	224	4.48	0.90	2 nd
Identification of resources and constraints in the project	2	2	0	16	30	50	220	4.40	0.88	4 rd
Complete and accurate drawings and documents	1	4	9	13	23	50	203	4.07	0.82	5 th
Building Project team that march project requirement	2	1	10	16	21	50	203	4.06	0.81	6 th
Defining exact duration for every activity and the project duration	0	2	15	17	16	50	197	3.94	0.79	7 th

Note: RII= Relative Importance Index, 1= No idea, 2=Never, 3= Few Times, 4=Some Times, 5=Always
Source: Field Survey, (2014).

The table shows that respondents' organizations generally undertake all the identified activities before starting any project. Establishing what client exactly want has the highest RII of 0.91 and a mean of 4.5 which when approximated to 5.0 translate to organizations always identified what client exactly wants. The activity with least RII rating is establishing project scope review and control which has a mean of 3.82 which when approximated to 4.0 will translate to organizations sometimes establish project Scope and review mechanism.

The result shows discrepancy with requirement of effective construction project planning as outlined in Bamisile (2004). The result also contradict Contractors agreement with requirements presented in Table 4.2, were contractors agree that ensuring complete, accurate and approve documents to be the most important activity in planning construction project. But table 4.4 show that ensuring complete accurate and approved documents was fourth in the order of activities contractors undertake when planning construction projects, this implies that indigenious contractors often undertake project without complete documents or approvals, this is identified as one of the reasons which lead to ineffectiveness of construction project planning.

4.1.9 Means through Which Contractors Accomplish Planning Of Construction

Projects

Usman *et al* (2012) observed that planning of construction is enhanced by application and adoption of information and communication technology, CORBON/NIOB (2014) also documented the advantage of using computer applications and ICT in construction project planning. Adebayo (1980) indicated that involvement of project team members in Planning construction project improve communication and understanding in the project team.

Adebayo (1980) identified that construction planning is done through manual application of planning tools, computer application of project management soft wares and through experience and computer application. Respondents are asked means through which the plan construction project and the result is presented in figure 4.5.

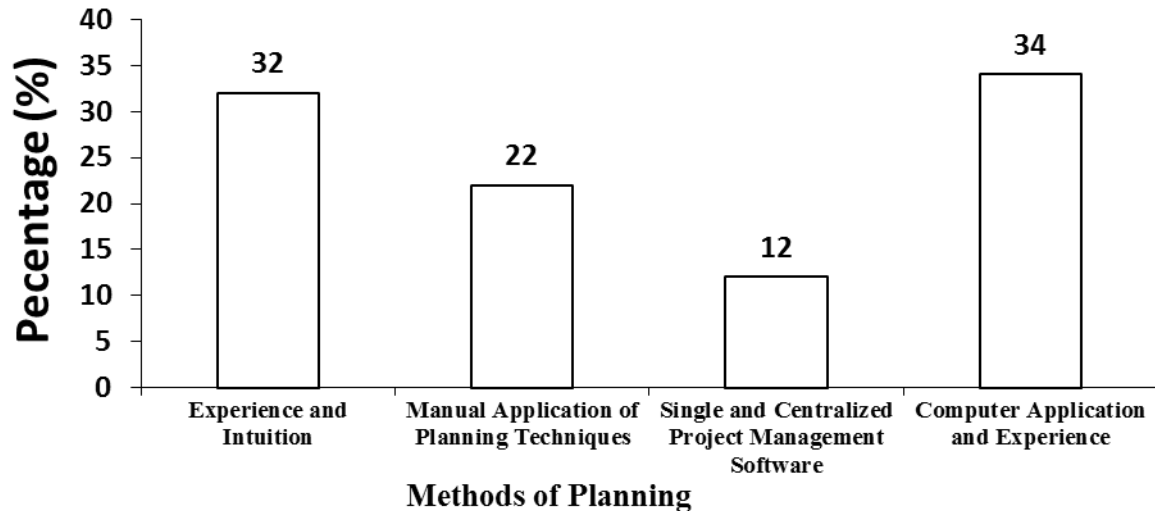


Figure 4.5: How Organizations Plan

Source: Field Survey, (2014)

The result shows that 32 % of the respondents' organization plan through experience and intuition, 22 % plan construction projects using manual application planning techniques, while 12 % organization used project management soft wares to plan project and 34 % of organization investigated uses computer application and experience in planning construction project. This result shows a total of

54 % of indigenous construction companies in Abuja still does not use computers in planning construction project.

4.1.10 Causes of Construction Planning Failure

Chitkara (2009) and Chandra (2009) identified factors that can lead a construction project planning to fail, these factors were identified in Mustapha (2009), list of the identified causes is presented to respondents who are asked to indicate how much they agree or disagree each of the factors can cause project plan to fail on a five point Likert scale.

The result is presented on Table 4.5 showing frequency count, mean. Relative importance index (RII) and rank of each factors as agreed or disagreed by the respondents.

Table 4.5 Causes of Construction Planning Failure

Events	Frequency (F)					ΣF	ΣFX	Mean	RII	Rank
	1	2	3	4	5					
Financial integrity of Client	0	0	2	10	38	50	236	4.72	0.94	1 st
Inadequate Resources Budgeted for Planning	0	0	0	16	34	50	234	4.68	0.94	1 st
Ethical Standards of Client	0	0	4	13	33	50	299	4.58	0.92	3 nd
Wrong Estimates	0	0	0	21	29	50	229	4.58	0.92	4 nd
Poor communication Among Project Team	0	3	3	15	29	50	218	4.45	0.89	5 rd
Poorly Defined Client Requirements	0	2	4	23	21	50	213	4.26	0.85	6 th
Poor Record Management	0	1	8	28	13	50	203	4.06	0.81	7 th
Poor Risk Management	0	1	13	21	15	50	200	4.00	0.80	8 th
Poorly Defined Deliverables	0	2	11	24	13	50	198	3.96	0.79	9 th
External Influence	1	0	15	20	14	50	196	3.92	0.78	10 th
Ambiguity In Team Members Role	1	3	10	21	15	50	196	3.92	0.78	11 th
Disregard to Project Management Rules	3	3	6	23	15	50	194	3.88	0.77	12 th

Note: RII= Relative Importance Index, 1 =Strongly Disagree, 2=Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree.

Source: Field Survey, (2014).

From the table, it can be seen that respondents agree that all the identified factors can cause construction project planning to fail. This is indicated by mean of the least agreed factor, Disregard to project management rules is 3.88 which when approximated to 4.0 translate to “Agree”. Financial integrity of the client and in adequate resources budgeted for planning both have RII of 0.94 and are ranked first. Ethical standard of client and wrong estimates both have RII of 0.92 and are ranked as second most important factors that can cause construction project planning failure. Poor communication has RII value of 0.89 and is ranked third most important factors that can cause project plan to fail.

The result agree with Dahiru and Mohammed (2012) who attributed failure of construction project failure to finance, communication and client related factors, this result further expatiate client related factors that lead to failure of construction planning to be client ethical standard and client financial integrity.

4.1.9.1 Financial integrity of client

Responses gathered from the research shows there is strong agreement (Mean= 4.7) that client inability to honour his own part of agreement on financial matters has a tendency to cause failure of construction planning. The financial integrity of client is described by as the ability of client to maintain and upheld ethical standard in financial dealing throughout the project.

Respondents indicated that there is need for contractor to ensure positive responses for each of the following questions relating to a prospective client:

- i. Does the client truly have enough financial liquidity to execute the project or is he acting on future expectations?

- ii. Has the client Organization approved the exact budget required to complete the proposed project or is approval only giving for the project but not its budget?
- iii. Does the client cash flow with which he wishes to finance the proposed project sufficient to provide interim payments based on proposed modalities of carrying out the projects?
- iv. Is the client credit trust worthy that can provide all payments as agreed and as at when due with no any form of delay?

4.1.9.2 Ethical standard of client

Ethical standards refers to the ability of the client to either undertake or refrain from undertaking un-ethical activities while procuring the project. Respondents strongly agree (mean=4.5) ethical standard of client can cause construction project to fail.

For a successful implementation of project plans, respondents also suggest having positive answers to the following questions:

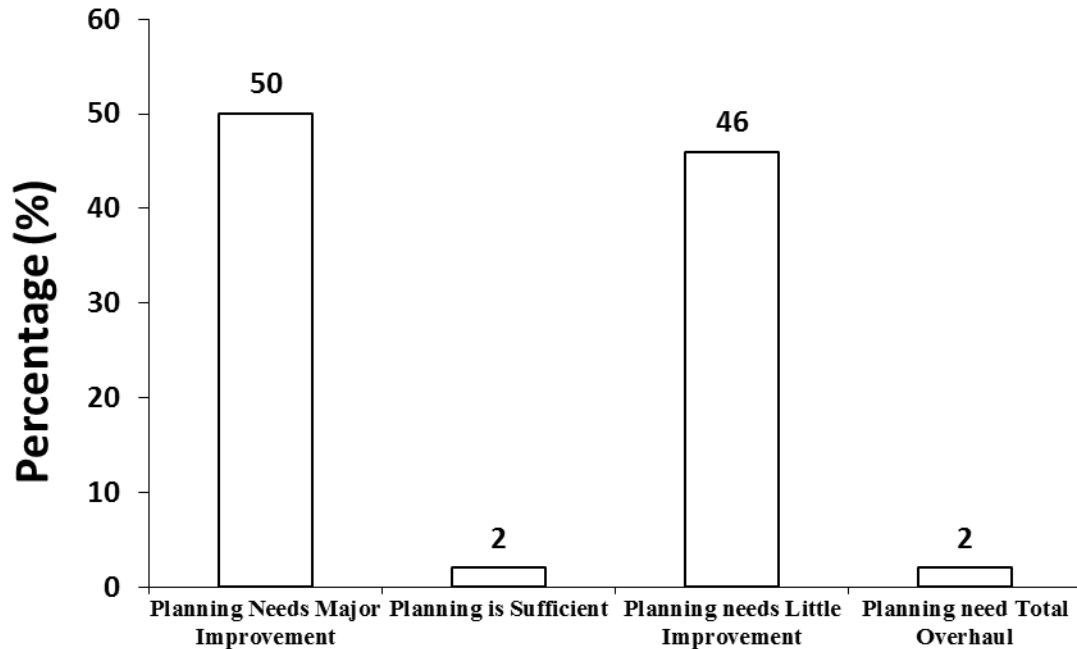
- i. Is the client likely to acquire drawings and designs, seals and stamps through un-ethical manner?
- ii. Is the client Likely to acquire approvals of designs, drawings and development permission through un-ethical means?
- iii. Is the client likely to acquire landed property through on-ethical manner?
- iv. How informed is the client with respect to general statutory requirements for development, or specific requirement relating to a specified area.

4.1.11 Respondents Perception on Effectiveness of Construction Planning

Ibrahim (2012) indicated that the current planning process of indigenous construction companies is not sufficient, this is due to frequent time and cost overruns, slipped milestone and high cost of construction among several factors. This according to Dahiru and Muhammad (2012) are among the factors that make indigenous construction companies unable to address the huge deficit of infrastructural in Nigeria.

In order to assess the effectiveness of the current planning process of the respondents' organizations, respondents were asked to indicate which statement is true with respect to planning in their respective organizations. The options provided are, "the current planning process needs major improvement for it to be sufficient", "the current planning process is sufficient; nothing need to be added or removed", "Little improvement is required to improve the planning process" and "There is need for total overhaul of the current planning process".

Result of responses relating to effectiveness of planning in their organization is presented in figure 4.6, the height of each bar chart represent the group percentage for each response type from the total population.



Perception of Respondents

Figure 4.6 Respondents Perception on Effectiveness of Construction Planning in his Organization

Source: Field Survey 2014.

The result indicated that 50% of the respondents believe the current planning process is not sufficient and need major improvement for it to be sufficient, 46% believed the current planning process is not sufficient, but requires minor improvement for it to be sufficient, 2% reported that the current planning process in the organizations is also not sufficient and requires a total overhaul for it to be sufficient, while 2% responded that the current planning process is sufficient requiring no any form of improvement. The result shows that majority (98%) of respondents believed the current planning process is not sufficient compare to 2% who believed the current planning process is sufficient.

The result validate assertion of Dahiru and Mohammed (2012) who indicated that the inability of indigenous contractors to efficiently plan construction project lead to contractors in ability to supplement huge infrastructural deficit in Nigeria.

4.1.12 Construction Planning Related Problems Affecting Contractors

The output of Nigerian construction industry has been shown to be affected by frequent occurrence of problems, this problems as identified by Ibrahim *et al* (2014), Ubani *et al* (2010) and Kirmani (1988) include time overrun, cost overrun, dissatisfied client, dissatisfied project team and poor scope. Respondents were presented with a list containing the identified problems and were asked to indicate how often their organization experiences each of the problem. Result of frequency of construction planning problems that contractors experienced is presented in Table 4.6

Table 4.6 Frequency of Planning Related Problems Experienced by Contractors

PROBLEMS	Frequency					ΣF	ΣFX	Mean	RII	Rank
	1	2	3	4	5					
Cost Over run	0	5	22	18	5	50	173	3.46	0.69	1 st
Time over run	0	6	27	8	9	50	170	3.40	0.68	2 nd
Poor scope control	1	14	19	6	10	50	160	3.20	0.64	3 rd
Reduced Profit	0	13	22	11	4	50	156	3.12	0.62	4 th
Risk of injury and Hazard	0	14	21	11	4	50	155	3.10	0.62	4 th
Wrong Estimates	1	15	21	5	8	50	154	3.08	0.62	4 th
Dissatisfied project team	1	16	23	6	4	50	146	2.92	0.58	7 th
Dissatisfied customer	8	23	14	2	3	50	119	2.38	0.48	8 th
Compromised in project quality	22	20	6	2	0	50	88	1.76	0.35	9 th
Bad name to organization	28	14	5	2	1	50	84	1.68	0.34	10 th
Abandonment of projects	31	11	6	2	0	50	79	1.58	0.32	11 th

Note: RII= Relative Importance Index, 1 = Never, 2=Sometimes, 3=Quite often, 4= Often, 5= Very often

Source: Field Survey, (2014).

The result shows that, the most frequent problem contractors experiences is Cost overrun with RII value of 0.69, Time overrun with RII value of 0.68 is second, and poor scope control with RII value of 0.64 is the third most frequent problem that respondents organization experience.

The result further indicated the least experienced problem by organization surveyed is compromise of project quality (RII=0.35), Bad name to organization (RII=0.34) and abandonments of project with RII value of 0.32 are ranked 7th, 8th and 9th respectively.

4.1.13 Factors Affecting Construction Project Planning

The process of developing and implementation of construction planning are often hindered by certain factors, Chandra (2009) and Chitkara (2009) provide a list of items affecting planning. These items include incomplete working and production drawings and documents, resources constrained, time constrained, knowledge on how to plan and availability of technology. A list of the identified items was prepared and presented to respondents who were asked to indicate how likely or unlikely each of the items can negatively affect the construction planning in Table 4.7 shows the result of responses of respondents relating to factors affecting planning.

Table 4.7 Factors Affecting Construction Project Planning

FACTORS	FREQUENCY					ΣF	ΣFX	MEAN	RII	RANK
	1	2	3	4	5					
Incomplete working drawings, Documents and Approvals	0	4	2	13	31	50	221	4.42	0.88	1 st
Vague definition of project	3	1	4	15	27	50	212	4.24	0.85	2 nd
Knowledge on how to plan	0	3	10	21	16	50	200	4.00	0.80	3 rd
Time constrained	0	4	5	28	13	50	200	4.00	0.80	3 rd
Lack of planning tools knowledge	1	7	6	19	17	50	194	3.88	0.78	5 th
Un availability of planning technology	1	8	5	21	15	50	191	3.82	0.76	6 th
Resources constrained	6	1	8	19	16	50	188	3.76	0.75	7 th
Leadership of project team	3	5	10	15	17	50	188	3.76	0.75	7 th
Client pressure to start work	3	1	11	13	13	50	173	3.46	0.69	9 th
Contractors enthusiasm	7	1	16	9	6	50	145	2.90	0.58	10 th

Note: RII= Relative Importance Index, 1 = Very unlikely, 2=Not likely, 3= Quite likely, 4= Likely, 5= Very likely.

Source: Field Survey, (2014).

The table shows that incomplete working drawings is the first (RII = 0.88) most likely item that can effect planning. Incomplete working construction documents and approvals (RII=0.86) is the second most likely item that can negatively affect planning, vague definition of project (RII= 0.85) is rank as the third most item that can affect the process of planning.

The result further shows that leadership of the project team and resource constraint were both ranked seventh (RII=0.75), Client pressure was ranked eighth (RII=0.69), contractors enthusiasm (RII=0.58) was ranked ninth. This result supported Dahiru and Mohammed (2012) who identified incomplete documents, finance among other factors that negatively affect construction planning.

4.1.14 Methods of Improving Effectiveness of Construction Project Planning

Figure 4.6 show that majority of respondents believe the current planning of construction in their organization is not sufficient, this is supported by 50% of respondents believe construction project Planning need major improvement, 46% reported that Planning of construction project in their organization requires little improvement, while 2% reported that planning of construction Project requires total overhaul. Based on this finding and recommendation of Dahiru and Mohammed (2012), it is evident that there is need to find ways of improving construction project planning among indigenous construction companies in Nigeria

A list of possible alternatives and ways of improving planning as identified in Chitkara (2012), this alternatives were prepared in a list and presented to respondents on a Five point Likert Scale. Respondents were asked to indicate how they agree or disagree with each item ability to improve planning.

The result on how to improve effectiveness of construction project planning was shown in Table 4.8. The table also show the frequency count for response to each alternative way on how to improve planning, the mean of each item and the rank of the item are also presented.

Table 4.8 Methods of Improving Effectiveness of Construction Project Planning

Possible ways of Improving Construction Project Planning	Frequency					ΣF	ΣFX	Mean	RII	Rank
	1	2	3	4	5					
Use of Computers and ICT	1	0	2	11	36	50	231	4.62	0.92	1 st
Plan should be monitored and controlled throughout project duration	0	0	2	15	33	50	231	4.62	0.92	1 st
Progress meetings and briefing to review plan	0	0	1	22	27	50	226	4.52	0.90	3 rd
Application planning techniques	1	0	3	22	24	50	218	4.36	0.87	4 rd
Making project plan a compulsory document	1	5	8	11	25	50	204	4.08	0.82	5 th
Every member of project team should be part of the planning process	2	2	8	14	24	50	206	4.12	0.82	5 th
Resources for planning should be allocated in the BOQ	1	7	11	8	23	50	195	3.90	0.78	7 th
Only trained Project managers should plan project	1	6	14	17	12	50	183	3.66	0.73	8 th

Note, 1 = Strongly Disagree, 2= Disagree, 3= Likely Agree, 4= Agree, 5= Strongly Agree.

Source: Field Survey, (2014).

Result in the table shows the responses on how to improve planning, the result indicated that respondents generally agree with identified means of improving construction project planning presented in Table 4.8. This is evident considering least mean on the table is 3.66 which when approximated to 4.0 translate to “Agree”.

The items were further ranked in order of how much respondents agree each of them can improve planning. Computer and ICT application (RII= 0.92) was ranked first, monitoring and controlling plans throughout the project duration (RII=0.90) was ranked second while progress meetings and briefing (RII=0.87) was ranked third.

From the bottom of Table 4.7, involving every member of the project team in planning (RII= 0.82) was ranked fourth, Allocation of planning resources (RII=0.78) was ranked fifth, while only trained project managers to plan project (RII= 0.73) was ranked sixth.

Findings of the research is supported by assertion of NIOB/CORBON (2014) who encouraged contractors to adopt use of computerized systems in Construction planning. Mustapha (2009) opined that construction planning should be carried out as a team effort, he further indicated that construction companies should provide mechanism for monitoring and controlling construction planning to ensure a successful implementation.

CHAPTER 5

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The results of major findings in this report are summarized as follows:

- i. Majority of indigenous construction companies in Abuja are small enterprises with permanent work force between 10-99 employees.
- ii. The research indicated that most indigenous construction companies in Abuja are newly incorporated, considering that 66% of companies surveyed are registered with in the last ten years.
- iii. The research gathered that the most important activities which must form part of construction project planning are ensuring complete, accurate and approved drawings and documents (RII=0.96), precisely defining the project (RII=0.92), and establishing exact client requirements (RII=0.90).
- iv. Nigerian Indigenous construction companies surveyed carry out planning of construction project through:
 - Appointment of A project Manager was found to be carried out differently by contractors. 36% construction companies appoint a single project manager for each construction project. 26% of the companies assign a single project manager to group of construction projects, 18% of the companies use only one project manager for planning all their construction projects while 20% of the companies use their central administration to plan execution of all construction projects.

- The research identified that contractors define client exact requirements (RII= 0.900, precisely define the project (RII=0.90), identify resources and constraint in the project (RII= 0.88), but were unable to always ensure completeness and accuracy of construction drawings and documents.
 - The research identified that 34% of contractors surveyed use computer application and experience to plan construction project, 32% use experience and intuition only in planning construction project, 22% plan construction projects using manual planning tools, while 12% use central application in the head office for planning projects.
- v. The present construction project planning was found to be insufficient. This is indicated by 50% of the respondents believing there is need for major improvement in planning, 46% of the respondents believe construction planning needs minor improvement, 2% believe planning process in their organization needs major overhaul, while only 2% of the respondents said the current planning process in their organization is sufficient.
- vi. Findings of the research attributed failure of construction project to client related problem. These are lack of client financial integrity (RII=0.94), inadequate resources budgeted for planning (RII=0.944), client unethical standards and dealings with (RII=0.92) and inefficient communication among project team (RII= 0.89).
- vii. The biggest benefit of planning construction works according to contractors surveyed was found to be its ability to avoid cost overrun with RII=0.88, then ability to avoid time overrun with RII=0.86), then ability to avoid compromise in project quality with

RII=0.86 and planning has the ability to avoid reduction in profitability of projects with RII=0.84.

- viii. The research identified that Cost overrun (RII=0.69), time overrun (RII=0.68), lack of scope control (RII=0.64) and reduced profit (RII=0.64) to be construction planning related problems which are still affecting indigenous contractors.
- ix. Planning of construction project was found to be affected by incomplete working drawings, documents and Approvals (RII=0.88), vague definition of project (RII=0.85) and lack of project management knowledge on how to plan (RII=0.80).
- x. Contractors surveyed indicated that Planning can be improved through application and adoption of computerized systems and ICT (RII=0.92), continues monitoring and controlling of project (RII=0.92), progress meeting and briefing (RII=0.90), and by engaging project team members in planning the project (RII=0.84).

5.2

Conclusion

- i- Contractors surveyed believe planning of construction should ensure all documents and drawings are complete, accurate and approved, clearly define the project and also have a clear definition of what client exactly want.
- ii- The following were found to be attributed to the current planning process of contractors:
 - Not all contractors adopts computer applications and project management software for project planning.
 - Contractors are unable to always ensure complete, accurate and approved drawings and documents in all projects.

- Contractors are unable to appoint a single and identifiable project manager for all projects.
- iii- Despite the identified advantages of planning in construction project, this study found the present planning process adopted by Nigerian indigenous contractors to be inadequate and requiring significant improvement for it to be sufficient.
- iv- The major factors that causes construction planning to fail were attributed to lack of integrity in financial commitment of client, unethical dealing of client and poor communication among the project team members.
- v- Cost overrun, time overrun and reduction in contractors profit were the major problems facing Nigerian contractors, planning was found to be able to address these and other identified problems.

5.3 Recommendations and Areas of Further Studies

To achieve the aim of enhance the planning process of Nigerian indigenous construction companies, the following recommendations were suggested.

- i. Construction companies should always check clients' integrity in financial dealings, and client ethical standard prior to agreeing on any proposed plan on how to execute the project.
- ii. Construction companies should always ensure all documents, drawings, specifications and permits relating to the proposed project are complete (especially for contract type that requires complete drawings), accurate and approved only by the authority that has legal power to issue such approval.

- iii. An open communication forum should be established specifically for any project, the forum should be ICT compliant such as a social a network, and every member of the project (especially the client) should have access to the forum throughout the project duration.
- iv. Construction companies should assign an identifiable single project manager to manage each project, contractors should further avoid using their central administration to plan the execution of construction projects.
- v. Construction project Planners for any project should involve other members of the project team in planning how the project should be carried out, the resultant plan and subsequent review made to the original plan should be communicated to all involve in the project.
- vi. Construction project plans should be monitored and controlled throughout the project duration.
- vii. Further research should develop frame work for effective construction Planning.

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APPENDIX I

QUESTIONNAIRE (A)

**DEPARTMENT OF BUILDING, FACULTY OF ENVIRONMENTAL DESIGN
AHMADU BELLO UNIVERSITY, ZARIA**

**AN APPRAISAL OF PLANNING IN NIGERIAN INDIGENOUS CONSTRUCTION
COMPANIES IN ABUJA**

Research Questionnaire (TYPE A) (Project Manager)

This is M.Sc. research work undertaken to assess the process of planning of construction works in Nigeria, You are kindly requested to Carefully Study this Questionnaire and provide you're most Objective response. All data provided shall be treated as confidential and for academic purpose only.

SECTION A

1) Name of respondents organization / (optional):

.....

2) Please indicate the Size of Your organization

a) 0 – 9 Employees [] (b) 10 – 99 Employees [] (c) 100 – 299 Employees []

d) More than 300 Employees []

3) Please indicate your organization's years of registration

a) Less than 5 years [] (b) 5 – 10 years [] (c) More than 10 Years []

SECTION B

4) Please indicate the level you agree what construction planning should entails:

EVENTS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Precise definition of project					
Establishing what exactly does the client want					
Defining exact duration for every activity and the project duration					
Identify available resources and constraints in the project					
Ensuring that all documents, approvals, plans, drawings and specification are complete, accurate and approved.					
Build project team that march project requirement					
Serve as a mechanism for scope review and control					
Setting of Cost, quality and time control mechanism					
Others					

5) Who is responsible for planning project execution in your organization?

- a) The MD or chairman [] (b) One project manager for all our projects []
 C) Project Manager manages group of projects [] (d) Project Manager manages a project []
 e) Project management department manages our entire projects []

6) Please indicate how planning is likely to avoid the following:

Problems	Very Unlikely	Not likely	Quite Likely	Likely	Very likely
Time over run					
Cost Over run					
Poor scope control					
Dissatisfied project team					
Reduced Profit					
Risk of injury and Hazard					
Wrong Estimates					
Dissatisfied customer					
Compromised project quality					
Abandonment of projects					
Bad name to organization					
Others					

7) How often does your organization achieve the following before starting any project?

Construction Planning Activity	No Idea	Never	Few Times	Some Times	Always
Precisely defining the project					
Establishing what exactly does the client want					
Defining activity and project duration					
Identification of resources and constraints in project					
Identifying major goals that must be achieved					
Building Project team that march project requirement					

8) How does your organization plan?

a) Through experience and intuition []

b) Manual application of planning techniques []

c) Computer Applications of project management software []

d) Computer Applications and experience []

Others.....

SECTION C

10) Please indicate how much you agree each of the following can cause project Plan to fail:

ACTIVITY	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Inadequate Resources Budgeted for Planning					
Wrong Estimates					
Poor communication Among Project Team					
Poorly Defined Client Requirements					
Poor Risk Management					
Poor Record Management					
Poorly Defined Deliverables					
Ambiguity In Team Members Role					
Disregard to Project Management Roles					
External Influence					
Financial integrity of client					
Ethical Standard of Client					
Others					

APPENDIX II

QUESTIONNAIRE (B)

DEPARTMENT OF BUILDING, FACULTY OF ENVIRONMENTAL DESIGN
AHMADU BELLO UNIVERSITY, ZARIA

AN APPRAISAL OF PLANNING IN NIGERIAN INDIGENOUS CONSTRUCTION COMPANIES IN ABUJA

Research Questionnaire (B) (Site Manager)

This is M.Sc. research work undertaken to assess the process of planning of construction works in Nigeria, You are kindly requested to Carefully Study this Questionnaire and provide you're most Objective response. All data provided shall be treated as confidential and for academic purpose only.

SECTION A

1) Name of respondents organization / (optional):

.....

2) Please indicate your Profession:

a) Architecture [] (b) Building [] (c) Engineering [] (c) Quantity
Survey [] (d) Survey [] (e) Town Planning []

SECTION B

3) Which of the following can you say is true with regard to planning in your organization?

- a) The current planning process needs major improvement for it to be sufficient []
- b) The current planning process is sufficient; nothing need to be added or removed []
- c) Little improvement is required to improve the planning process []
- d) There is need for total overhaul of the current planning process []

4) Please indicate how often your organization experiences the following:

Planning Related Problems	Never	Some times	Quite Often	Often	Very Often
Time over run					
Cost Over run					
Poor scope control					
Dissatisfied project team					
Reduced Profit					
Risk of injury and Hazard					
Wrong Estimates					
Dissatisfied customer					
Compromised project quality					
Abandonment of projects					
Bad name to organization					
Others					

SECTION C

5) Please indicate how the following are likely to affect planning

EVENTS	Very unlikely	Not likely	Quite likely	likely	Very likely
Vague definition of project					
Lack of planning tools knowledge					
Un availability of planning technology					
Time constrained					
Resources constrained					
Client pressure to start work					
Contractors enthusiasm					
Leadership of project team					
Knowledge on how to plan					
Incomplete working drawings, Documents and Approvals					

6) How much do you agree the following can improve planning?

Activity	Strongly disagree	Disagree	Likely Agree	Agree	Strongly Agree
Use of Computers and ICT					
Application planning techniques					
Making project plan a compulsory document					
Resources for planning should be allocated in the BOQ					
Only trained Project managers should plan project					
Every member of project team should be part of the planning process					
Plan should be monitored and controlled throughout project duration					
Progress meetings and briefing to review plan					
Others					