

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND  
TECHNOLOGY, KUMASI

COLLEGE OF ARCHITECTURE AND PLANNING

KNUST

DEPARTMENT OF BUILDING TECHNOLOGY

**FACTORS AFFECTING PRE-PROJECT PLANNING IN THE  
GHANAIAN CONSTRUCTION INDUSTRY: IMPACTS AND  
REMEDIES**

BY

DOUGLAS KUSI

BSc. (Hons)

A DISSERTATION REPORT SUBMITTED TO THE DEPARTMENT OF BUILDING  
TECHNOLOGY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR A  
DEGREE OF MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT

SEPTEMBER 2014

## DECLARATION

I hereby declare that this work is the result of my own original research and this thesis has neither in whole nor part been presented by another degree elsewhere. References to other people's work have been duly cited.

**Douglas Kusi (PG9128113)**

**(STUDENT)**

Signature ..... Date.....

**Certified by,**

**Rev. Prof. Frank D.K. Fugar**

**(SUPERVISOR)**

Signature..... Date.....

**Certified by**

**THE HEAD OF DEPARTMENT: PROF. JOSHUA AYARKWA**

Signature ..... Date .....

## **DEDICATION**

This work is dedicated to God almighty and my parents, Mr. & Mrs. James Kusi Asare through whose immense support I have been able to reach this far in my education.

# KNUST



## ACKNOWLEDGEMENT

I wish to express my profound gratitude to the almighty God for the guidance and help given me throughout this programme. A special appreciation also to my supervisors, Rev. Prof. F.D.K. Fugar who guided me and helped greatly to make the completion of my thesis possible. My heartfelt thanks go to Arc. K.A. Yeboah, the Managing Partner of Avangarde Design Service Limited for his support. To Yaa Mensah, Arc. Kojo Erzuah, Ing. Michael Afunya, and all the staff at Avangarde Design service, I express a sincere gratitude for standing in for me to enable me go through my programme. I also thank my lovely sisters, Pharm. Doris Owusu Afram and Dr. Jennifer Badu for their spiritual support through prayers and encouragement that enabled me to keep on course. I will also not forget my brothers, Kwaku Boakye Kusi, Maxwell Kusi for support, advice and encouragement. I am also grateful to my childhood friend, Stephen Kojo Boachie for your financial support.

To my MSc class mates, I thank you all as you always boosted my morale to move on by checking on me regularly to find how I was faring with my work. Lastly my sincere thanks go to all who in various ways have helped to make my research work complete especially construction workers who were respondents to my questionnaire. May the almighty God richly bless you all.

## ABSTRACT

In Ghana Projects are often rushed without sufficient budgetary allocation and proper assessment about the need. The detailed briefing on the functional and technical requirements of construction projects is not carefully assessed by developers or owners and consequently creates lapses in the design and construction process. The aim of the study was to examine pre-project planning processes in Ghanaian construction industry and identify factors and impacts affecting the planning process. In collecting data for the study, a questionnaire was developed to assess the perception of clients, consultants and contractors on the relative importance of the factors and impacts identified. In all 80 respondents in the Ghanaian construction industry within the Accra metropolis participated in the study. In analysing the data for the study, Relative Importance Index (RII) method was used to determine the relative importance of each of the factors and impacts identified. The five-point scale ranged from 1(not important) to 5 (very important) was adopted and transformed to relative importance indices (RII) for each. The study identified the following in descending order as the 5 most important factors from a list of 14 , affecting the pre-project planning processes (feasibility studies) in the Ghanaian construction industry: (1)Stakeholder representation, (2) funding(resources for the study), (3)Time, (4)rewards and recognitions for team members, (5)project team leadership. Furthermore the study revealed the following as the 5 most important impact of the factors from a list of 10 affecting the pre-project planning processes in the Ghanaian construction industry in the descending order of : (1)project cost, (2)project completion time (3)excessive change order, (4)quality of work (5) demoralization of parties. The findings of the study also showed that in Ghana, relevant stakeholders are not well represented during the pre-project planning stage of the project. The study further shows that design professionals and the clients are the 1<sup>st</sup> and 2<sup>nd</sup> most well represented stakeholders in the pre-project planning process whereas external stakeholders are the least represented. Moreover, the study further showed that in Ghana the amount of resources committed to the pre-project planning process and the level of motivation given to project team members during the planning processes are mostly not adequate. From the study, it was concluded that the pre-project planning process in Ghana is affected by several factors identified above. These identified pre-project planning factors were found

to impact the process in several areas including project cost, project completion time, excessive change orders, and quality of work, demoralization of parties, project profitability just to mention a few. Based on the findings of the study, some recommendations have been made to ensure effective and efficient pre-project planning process in the Ghanaian construction industry

# KNUST



## TABLE OF CONTENTS

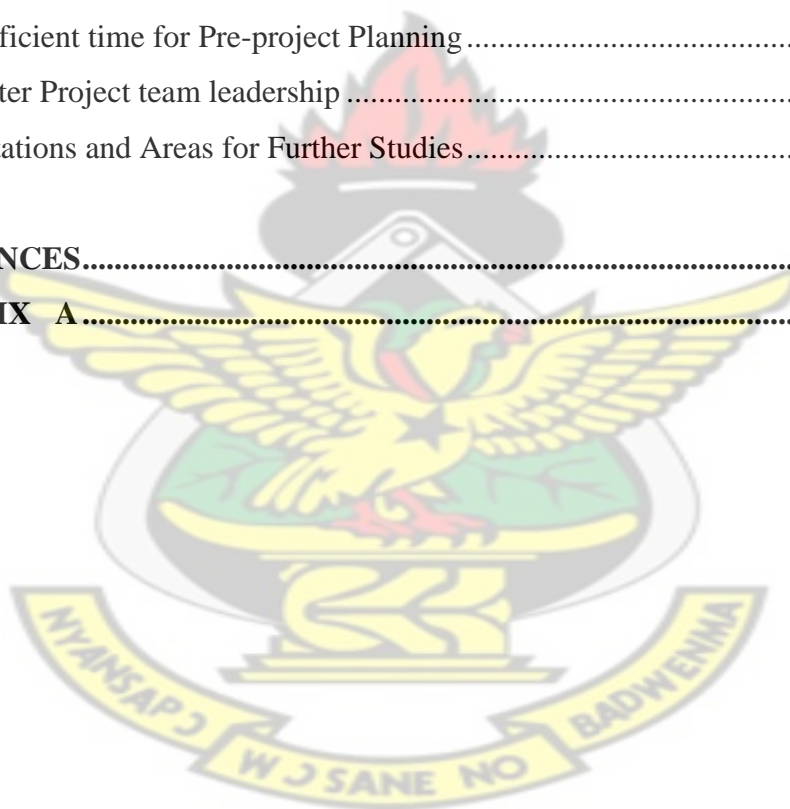
| Contents  | Pages        |
|---|--------------|
| DECLARATION .....   | i            |
| DEDICATION .....  | ii           |
| ACKNOWLEDGEMENT .....                                     | iii          |
| ABSTRACT .....  | iv           |
| TABLE OF CONTENTS .....                                   | vi           |
| LIST OF TABLES .....                                      | ix           |
| LIST OF FIGURES .....                                     | x            |
| <br><b>CHAPTER ONE .....</b>                              | <br><b>1</b> |
| <b>INTRODUCTION.....</b>                                  | <b>1</b>     |
| 1.1 Background of Study .....                             | 1            |
| 1.2 Problem Statement .....                               | 5            |
| 1.3 Research Questions .....                              | 6            |
| 1.4 Aims and Objectives .....                             | 6            |
| 1.4.1 Aim .....   | 6            |
| 1.4.2 Objectives .....                                    | 6            |
| 1.5 Significance of Study .....                           | 7            |
| 1.6 Scope .....   | 7            |
| 1.7 Research Methodology .....                            | 7            |
| 1.8 Organization of Study .....                           | 8            |
| <br><b>CHAPTER TWO .....</b>                              | <br><b>9</b> |
| <b>LITERATURE REVIEW .....</b>                            | <b>9</b>     |
| 2.1 Planning of Projects .....                            | 9            |
| 2.1.1 Who is responsible for planning projects? .....     | 10           |
| 2.1.2 Stakeholder's involvement in project planning ..... | 11           |
| 2.2 Project Life Cycle .....                              | 13           |
| 2.3 Pre-Project Planning .....                            | 15           |



|                                      |  |           |
|--------------------------------------|--|-----------|
| 2.4                                  | Pre-project Planning Processes .....                                 | 16        |
| 2.5                                  | Impact of Pre-project Planning .....                                 | 20        |
| 2.6                                  | Impact of inadequate Project Planning .....                          | 21        |
| 2.7                                  | Key Fundamentals of the Pre-project Planning Process .....           | 23        |
| 2.7.1                                | Alignment during Pre-project planning .....                          | 24        |
| 2.8                                  | Project Scope Definition .....                                       | 31        |
| 2.8.1                                | Key issues about project scope .....                                 | 34        |
| 2.9                                  | Pre-project Planning Tools .....                                     | 37        |
| 2.9.1                                | Alignment thermometer .....  | 37        |
| 2.9.1.2                              | Project Definition Rating Index .....                                | 38        |
| <b>CHAPTER THREE .....</b>           |  | <b>40</b> |
| <b>METHODOLOGY .....</b>             |  | <b>40</b> |
| 3.1                                  | Research Design.....   | 40        |
| 3.2                                  | Data Collection .....  | 40        |
| 3.3                                  | Sampling Principle.....  | 41        |
| 3.4                                  | Sampling Technique .....   | 42        |
| 3.5                                  | Population .....   | 42        |
| 3.6                                  | Data Analysis .....  | 43        |
| <b>CHAPTER FOUR.....</b>             |  | <b>44</b> |
| <b>DISCUSSION AND ANALYSIS .....</b> |  | <b>44</b> |
| 4.1                                  | Socio Demographic Characteristics of Respondents .....               | 44        |
| 4.2                                  | Stakeholder's Involvement in Pre-project Planning Process .....      | 45        |
| 4.3                                  | Pre-Project Process, Resource Utilization and Team Productivity..... | 47        |
| 4.4                                  | Factors Affecting Pre-Project Planning (PPP).....                    | 52        |
| 4.5                                  | Impact of Factors Affecting Pre-Project Planning.....                | 54        |



|  |           |
|--|-----------|
| <b>CHAPTER FIVE .....</b>  | <b>57</b> |
| <b>SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATION.....</b>                    | <b>57</b> |
| 5.1 Summary of Finding .....   | 57        |
| 5.1.1 Resource utilization and team productivity in the pre-project process..... | 57        |
| 5.1.2 Factors Affecting the Pre-Project Planning Process .....                   | 58        |
| 5.1.3 Impact of Factors Affecting Pre-Project Planning Process.....              | 58        |
| 5.2 Conclusion .....   | 59        |
| 5.3 Recommendation .....   | 59        |
| 5.3.1 There is the need for relevant Stakeholder representation .....            | 60        |
| 5.3.2 Ensure adequate and available source of finance .....                      | 60        |
| 5.3.3 Sufficient time for Pre-project Planning .....                             | 60        |
| 5.3.4 Better Project team leadership .....                                       | 61        |
| 5.4 Limitations and Areas for Further Studies.....                               | 61        |
| <b>REFERENCES.....</b>   | <b>62</b> |
| <b>APPENDIX A .....</b>  | <b>65</b> |



## LIST OF TABLES

|  |    |
|--|----|
| Table 4.1: Socio Demographic Information of Respondents.....                       | 44 |
| Table 4.2: Stakeholders Involvement in the Pre-Project Planning Process .....      | 46 |
| Table 4.3: Pre-Project Processes, Resource Utilization and Team Productivity ..... | 48 |
| Table 4.4: Factors Affecting the Pre-Project Planning Process .....                | 53 |
| Table 4.5: Impact of Factors Affecting the Pre-Project Planning Process .....      | 55 |



## LIST OF FIGURES

|  |    |
|--|----|
| Figure 2.1 Graphical representation and definition of Alignment..... | 25 |
|--|----|

# KNUST



## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of Study**

The government of Ghana, as in many countries, is the major developer and therefore dominates the economic viability of the construction industry. Billions of cedis of the taxpayers' money is committed to construction projects annually through budgetary allocation, donor funded projects and Foreign Direct Investment. Much of the remittances from Ghanaians abroad and resources of the private sector go into investment in the building and construction industry (Ghanaian chronicle, 2007). We often complain about delays in building and construction projects and the poor performance of contractors executing various government projects but nothing is done to address these perennial problems.

Often a time, construction projects are not properly preplanned with commonly cited reasons including perceived lack of time or deficiencies in organizational expertise and drive thoroughly perform pre-planning tasks (Gibson et al., 2006; Rahmat & Shah Ali, 2010).

In Ghana, political considerations and sensitivities override detailed preparation and planning of construction projects. Projects are often rushed without sufficient budgetary allocation and proper assessment about the need. There is insufficient time for thorough feasibility studies and project analysis. The detailed briefing on the functional and technical requirements of construction projects is not carefully assessed by developers and consequently creates lapses in the design and construction process.

For a successful construction project to be achieved, the design information and documentation, including drawings and specifications should provide the contractor with a clearly defined basis to plan the resource needs of the project. Design risk is increased whenever work is started before the architect or engineer has had sufficient opportunity to fully ascertain the developer's needs. A brief is a very specialized task to be undertaken by an experienced person who can treat it with great care. Failure of the architect or engineer to gain a full insight into the developer's operations, and then give him the fullest possible picture of what is possible and what is not within the parameters of the brief, results in design changes and creates construction problems which many times, results in cost overruns. There is the tendency for architects and engineers to design without adequate information and knowledge, not only on the availability of materials they recommend but also as to their performance in the environment for which it is being recommended

Each year, the central government or private agencies contract with private-sector firms for the design, construction, and renovation of facilities. A basis must be developed for each project prior to awarding the design contract to a private-sector firm. This basis is developed through a process called pre-project planning, which includes all activities from project initiation up to but not including detailed design. A lot of important decisions are taken during this preliminary stage of the project. The decisions the client/owner make at this preliminary stage (pre-project planning stage) have far reaching consequences for the successful delivery of the project

Pre-project planning is a “...process encompassing all the tasks between project initiation and the beginning of detailed design. It begins with a project concept to meet a business need and ends with a decision whether to proceed with detailed design of the proposed project.” (Gibson, Wang, Cho, & Pappas, 2006, p. 35). While this definition is in a construction context, the main premise can be extended to facilities or other types of projects: make a plan before moving forward with technical details and implementation. A project team should preplan to develop enough information to make a sound judgment on whether continuing with the project actually makes sense (Construction Industry Institute, 1995).

The pre-project planning includes all activities from project initiation up to but not including detailed design. These activities include organizing the planning team, evaluating and selecting options, defining the scope of the project itself (i.e., the type of facility the agency wants to build or renovate, its proposed cost, schedule, and quality), and making a decision about whether to proceed with the project. Pre-Project Planning (PPP) for capital facilities, also known as project feasibility study, requires a multi-disciplinary team effort involving professionals specializing in marketing, architecture, engineering, planning, cost estimating, organization, construction, and finance. Over the years, research has shown that higher levels of pre- project planning effort can result in significant cost and schedule savings (Sherif & Price, 1999)



The primary party responsible for the pre-project planning phase of construction projects is the owner. There are several reasons for this. First, only owner employees have the proprietary knowledge and perspective of why the facility is needed, how it will be operated and maintained, and what special needs exist. The owner or client's pre-project planning involves close cooperation of the design, construction, legal and financial professionals. Depending on the owner's experience in construction project management, owner may utilize specialized in-house staff or augment in-house staff with experienced people. But when a project requires highly specialized skills and a large number of additional staff, owners usually find what is more cost effective to engage design professionals and construction managers. This is true of owners who do not regularly oversee construction projects or do not have in-house engineering departments. The owner enhances project quality and performance by contracting experienced designers and constructors who have been involved in similar projects before. (American Society of civil Engineers, 2012).

Pre-project planning has long been a subject of discussion in the building industry. Many guides have been developed, and much knowledge resides with experienced practitioners (Griffin, 1972; Pena, 1987; Billings, 1993; Preiser, 1993; Haviland, 1996; Cherry, 1999; American Society of Civil Engineers, 2000) as cited in (Gibson Jr & Pappas, 2003). However, in many cases pre-project planning is not performed well in the building industry of which the Ghanaian construction industry is of no exception. Consequently, the building sector suffers from poor or incomplete project scope definition, frequently

experiencing considerable changes that result in significant cost and schedule overruns (Gibson et al., 1997; Cho et al., 1999; Cho, 2000).

One of the major sub-processes of the pre-project planning process is the development of the project scope definition package. Project scope definition is the process by which projects are defined and prepared for execution. It is at this crucial stage where risks associated with the project are analyzed and the specific project execution approach is defined. Success during the detailed design, construction, and start-up phases of a project is highly dependent on the level of effort expended during this scope definition phase (Gibson & Hamilton, 1994)

## **1.2 Problem Statement**

In Ghana, Projects are often rushed without sufficient budgetary allocation and proper assessment about the need. There is insufficient time for thorough feasibility studies and project analysis (Ghanaian chronicle, 2007). The detailed briefing on the functional and technical requirements of construction projects is not carefully assessed by developers and consequently creates lapses in the design and construction process. As a result most projects especially the government projects end up being abandoned or not completing on time as a result of improper planning (Ghanaian chronicle, 2007). The tax payer's money which would have been used for other productive ventures gets locked up in uncompleted projects. This study seeks to investigate into pre-project planning process and its impacts in Ghanaian construction industry.

### 1.3 Research Questions

1. What factors account for ineffective pre-project planning processes in the Ghanaian industry?
2. Of what impacts do these factors have on the Ghanaian construction industry
3. What can be done to enhance effective pre-project planning processes and the impacts it poses on the ordinary Ghanaian?

### 1.4 Aims and Objectives

#### 1.4.1 Aim

- The purpose of this study was to examine the pre-project planning process and identify the factors and impacts affecting pre-project planning process in the Ghanaian Industry and to propose necessary remedies.

#### 1.4.2 Objectives

To achieve the above aim, the under listed objectives would be set

- Identify the factors affecting pre-project planning processes in the Ghanaian construction industry.
- Identify the possible impact of the factors affecting pre-project planning processes on the construction industry.
- Propose necessary remedies

### **1.5 Significance of Study**

A lot of studies elsewhere have examined the pre-project planning processes into detail. This study seeks to identify the factors and impacts affecting the pre-project planning process in the Ghanaian construction industry.

### **1.6 Scope**

The scope of the study was limited to some selected contractor, developed and consultancy firms within the Accra metropolis.

### **1.7 Research Methodology**

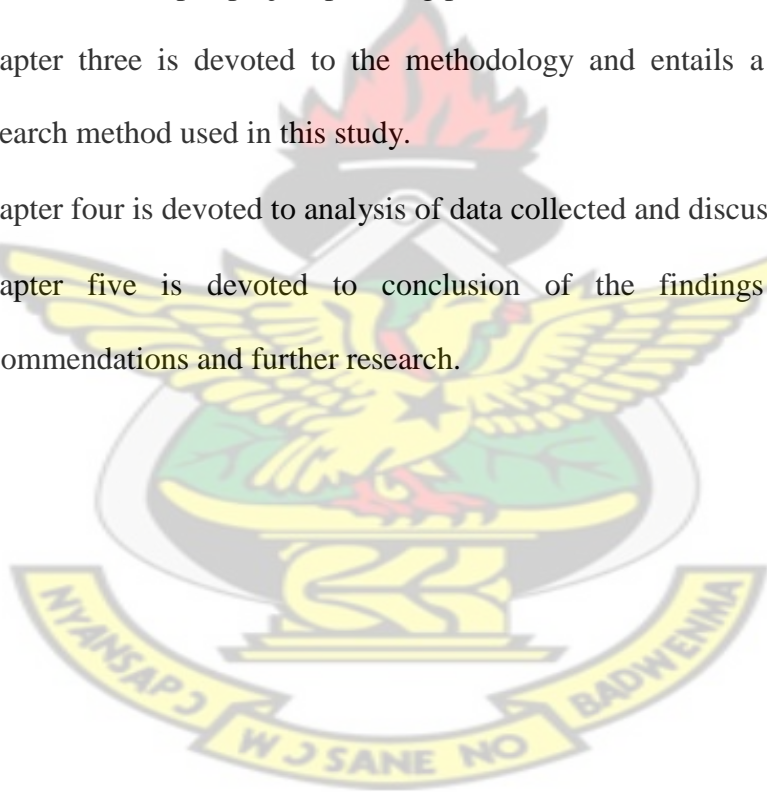
In collecting data for the study, a questionnaire was developed to assess the perception of clients, consultants and contractors on the relative importance of the factors affecting pre-project planning and their impacts. The questionnaire was divided into three parts. The first part, section “A” requested the background information of the respondents and also examined the pre-project planning practice in the Ghanaian construction industry. The second part of the questionnaire, Section “B” was developed to achieve the first objective (identify factors affecting pre-project planning in the Ghanaian construction industry) of the study. The third part of the questionnaire focused on the impacts of the ill-pre-project planning in Ghanaian construction industry.

Similar to the second part, respondents were asked to highlight the importance of each of the possible impacts and factors identified. A five-point Likert scale (where 1 = unimportant, 2= of little importance, 3 = moderately important, 4 = important, 5 = very important) was adopted to rank the importance of each of the possible impacts and factors identified.

## 1.8 Organization of Study

The research is organized into five chapters as follows:

- Chapter one is devoted to the general introduction of the study, problem statement, aims and objectives of the research and research methodology adopted.
- Chapter two is devoted to the literature search and touched on areas Pre-project planning processes, alignment during pre-project planning, pre-project planning tools, project definition rating index, impact of pre-project planning, key fundamentals of pre-project planning processes.
- Chapter three is devoted to the methodology and entails a description of the research method used in this study.
- Chapter four is devoted to analysis of data collected and discussion of results.
- Chapter five is devoted to conclusion of the findings of the research, recommendations and further research.





## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Planning of Projects**

Each year the central government agencies contract for the design, construction, and renovation of facilities. The budgeting process requires agencies to set requirements and priorities before submitting their budget requests to the central government. For facilities the setting of requirements begins when an individual or group (e.g., facilities program manager, senior executive, elected official) identifies the need for a program or facility, ideally based on strategic or master planning. The agency then initiates a process to gather information and validate the need for the facility relative to a program and to its mission. The requirements phase (referred to as pre-project planning) includes organizing a planning team, selecting and evaluating project options, defining the scope of the project (type of facility, size, cost, quality) that would fulfill the requirements, and then making a decision on whether to proceed with the project. (Gibson Jr & Pappas, 2003)

If the project does proceed, the next step is to develop a document to serve as the basis for advertising and awarding a contract for detailed design. This document is typically referred to as a scope of work for design. It details the services to be provided by the contractor (deliverables, format, deadlines) and the project scope of work (i.e., the type of facility the agency wants to build or renovate its proposed cost, schedule, and quality). Developing a scope of work for design presents a number of challenges. Ideally, the resulting facility should support the fulfillment of an agency's mission and programs for



decades and meet the short-term needs of the users, all within cost, schedule, quality, and political constraints. (Gibson & Hamilton, 1994)

### **2.1.1 Who is responsible for planning projects?**

An owner is principally responsible for the planning that takes place before the award of the construction contract. This planning involves close cooperation of the design, construction, legal and financial professionals. Depending on the owner's experience in construction project management, owner may utilize specialized in-house staff or augment in-house staff with experienced people. But when a project requires highly specialized skills and a large number of additional staff, owners usually find what is more cost effective to engage design professionals and construction managers. This is true of owners who do not regularly oversee construction projects or do not have in-house engineering departments. The owner enhances project quality and performance by contracting experienced designers and constructors who have been involved in similar projects before. (American Society of civil Engineers, 2012)

The decisions that developers or clients make at the preliminary and construction stages of the project, have far reaching consequences for the successful delivery of the project. If developers are better informed and educated about the implications of the various delivery systems and decision-making, most of the construction problems may be reduced in Ghana. In Ghana, political considerations and sensitivities override detailed preparation and planning of construction projects. Projects are often rushed without

sufficient budgetary allocation and proper assessment about the need. There is insufficient time for thorough feasibility studies and project analysis.

Before entering into contract with a constructor, the owner begins developing general plans for construction. This planning does not include specific construction means, methods or procedures which are primarily the responsibility of the constructor. Instead this planning focuses on the issues that must be addressed before the constructor can begin the work at the construction site. Principal among these are the specific project goals and objectives. (American Society of civil Engineers, 2012)

The key aspects of pre-project planning for construction includes; assessment of the owner's capabilities the evaluation of resources available for construction, regulatory guidelines, construction site development, the review of construction alternatives and contract arrangements (American Society of civil Engineers, 2012).

### **2.1.2 Stakeholder's involvement in project planning**

A facility project has many stakeholders, including, but not limited to, the facility owner, users, contractors who design and construct it, building managers and operators, architects, engineers, technical reviewers such as fire and security personnel, taxpayers, and the surrounding community. Issues that should be addressed when developing a project scope of work include identifying the stakeholders, involving them in the process at appropriate decision points, and establishing clear lines of responsibility. During the development of a project scope of work, objectives for sustainability, accessibility,

maintainability, and security, needs to be addressed and tradeoffs for purposes of mission or functionality made as necessary. (Burke, 1993)

Facilitating effective communication among and between stakeholders with technical and nontechnical backgrounds representing a wide range of experience and viewpoints can be a challenge. For example, building users may know what functions the facility will need to accommodate but may not understand how those needs translate to space requirements, layout, supporting infrastructure such as roads or utility systems, and so on, and may not understand the cost and schedule implications of changing requirements after the start of detailed design. Architects and engineers, on the other hand, may understand the design requirements but may not be familiar with the functions, programs, and political pressure that the owner and/or user is trying to accommodate. Involving a diverse group of stakeholders in the development of a project scope of work raises issues of lines of authority and accountability for project decisions. Determining who will be responsible for evaluating the performance of individual team members and contractors becomes a critical issue.

Matching the acquisition strategy with the type of project, its schedule, and its funding requirements is a key, but often overlooked, step in delivering facility projects that meet the agency's overall objectives. Selecting the most appropriate acquisition strategy can help ensure a successful outcome. Choosing an inappropriate acquisition strategy, on the other hand, can undermine the best pre-project planning effort. The elements that should

be included in a scope of work for design will vary depending on the acquisition strategy (design-bid-build, design-build, construction management, etc.).

## 2.2 Project Life Cycle

To achieve its objectives, any project has to go through the various phases within the process characterized as the project life cycle. Different definitions have been provided for the project life cycle.

1. For example, Morris's (1992) as cited by Sherif and Price (1999) definition of project life cycle comprised five major phases:
  - pre-feasibility and feasibility;
  - design;
  - conceptual;
  - detailed; procurement; construction; and
  - Start-up.
2. Barrie and Paulson's (1992) as cited by Sherif and Price (1999) definition comprised:
  - conceptual and feasibility;
  - engineering and design;
  - procurement; construction; and
  - Start-up.
3. Austin and Neale's (1986) as cited by Sherif and Price (1999) definition comprised:
  - briefing;
  - design;
  - tendering;
  - construction; and
  - Commissioning.

Their definitions are mainly restricted to building and civil engineering projects. Heisler's (1994) definition comprised the execution and the close out phase. The execution phase includes both design and construction; however, his definition is mainly associated with non-construction activities.

4. According to the Construction Industry Institute (1997), as cited by Gibson and Hamilton(1994) the project life cycle comprises four phases, they are namely:

- business planning or feasibility analysis;
- pre-project planning;
- project execution; and
- Operation.

The first phase is sometimes called feasibility analysis rather than business planning. The second phase corresponds to the organize and select alternatives and is sometimes referred to as conceptual planning. The third phase corresponds to the development of the project definition and decision-making is sometimes called detailed scope definition. The fourth phase corresponds to the detailed design, procurement, construction and startup is sometimes called project execution (Gibson & Hamilton, 1994). Each division is broken down into sub-divisions, which further define each phase in the life cycle of a project. This definition of project life cycle is more appealing since it is developed within the whole spectrum of construction and reflects the CII (Construction Industry Institute) concern with pre-project planning phase.



### 2.3 Pre-Project Planning

Pre-project planning is a terminology that is called differently in different literatures. It is called inception and feasibility by Hughes (1991), Othman et al. (2004) , Al-Reshaid et al. (2005) , pre project stage by Kagioglou et al. (1998) , pre-design stages by Best and Valence (1999) , project initiation stage by smith and Jackson (2000) and pre-project planning by Gibson et al (2006) as cited by Farzin & Sareh ( n.d.)

According to Gibson *et al.* (1994) as cited by Sherif and Price (1999), pre-project planning can be defined as “the process of developing sufficient strategic information for owners to address risk and decide to commit resources to maximize the chance for a successful project.

The definition stated above clearly implies that pre-project planning is a process that requires a great deal of information to help identify the areas of risk as early as possible. The definition also relates the success of a project to the available resources. These resources can be technical or human. It also demonstrates that pre-project planning is an owner driven process. Gibson *et al.* (1994) as cited by (Sherif & Price, 1999) explained that the pre-project planning phase occurs after business planning where the project idea is initiated and prior to the project execution. Research has demonstrated that achieving project objectives in terms of time, cost and quality is closely related to the efforts spent during the pre-project planning phase (Gibson & Hamilton, 1994). This view is also expressed by Sullivan *et al.* (1997) as cited by (Sherif & Price, 1999) who emphasized



that more time and effort devoted at this phase will increase the chance of a project being successful.

Terms commonly used for pre-project planning include front-end planning, front-end loading, feasibility analysis, programming/schematic design, scope definition, scope management, and conceptual planning.

## **2.4 Pre-project Planning Processes**

The pre-project planning process can be summarized into four major steps: organize for pre-project planning, select project alternative(s), develop a project definition package (which is the detailed project scope of work), and decide whether to proceed with the project (Construction Industry Institute, 1995) as cited by Gibson and Pappas (2003)

The Construction Industry Institute in 1995 summarized the major processes of pre-project planning as follows;

### **Organize for pre-project planning comprises:**

- Select the team responsible for ensuring that pre-project planning based on skills and experience.
- draft charter which defines the team's responsibilities; and
- Prepare pre-project planning plan based on the charter and available resources. This includes documenting the methods and time schedule for completing the pre- project planning activities to be performed by the team.

### **Select project alternatives comprise:**

- analyze existing technology to meet the owner's requirements;
- evaluate sites in terms of strengths and weakness to meet owner's needs;
- prepare conceptual scopes and estimates by gathering the required information in a format that allows any future comparison based on project objectives; and
- Evaluate alternatives by looking at the available options and select the best.

### **Detailed scope definition comprises:**

- analyzing project risks;
- document scope design;
- define project execution plan;
- establish project control guidelines; and
- Compile project definition package.

Several important implications flow from this generic view of the pre-project processes. It is mainly owner focused. The processes and principles are not specific, but can be applied to any company with certain modifications.

The pre-project planning process includes defining the project's scope and planning for execution. It is during this crucial stage that risks are analyzed, preliminary designs are formulated, critical decisions are made, and the specific project execution approach is defined. The process is structured to include a clear set of approval gates or decision points that require the owner to make a formal decision to proceed to the next step. Incorporating approval gates also provides the opportunity to document progress and the decision on whether to proceed with the project. When personnel turnover occurs

between the time a project is initiated and final commissioning, such documentation can be invaluable in providing continuity with respect to decisions made by the team.

Inadequate or poor pre-project planning has long been recognized as one of the most significant variables that can negatively affect a facility project (Smith and Tucker, 1983). Inadequate project scope definition inevitably results in the need for changes, which in turn interrupt project sequencing and rhythm, cause rework, increase project time and cost, and lower the productivity as well as the morale of the work force (O'Connor and Vickroy, 1986) as cited by Gibson and Pappas (2003). A Business Roundtable (1997) report showed that 49 of 50 projects with excellent project scope development met all project objectives, while fewer than one in three with less than adequate pre-project planning met their objectives. Presenters from the private sector reiterated the importance of pre-project planning at a recent conference sponsored by the National Research Council (2002) as cited by Gibson and Pappas (2003).

Over the past 10 years, researchers at the University of Texas have conducted several research projects to investigate pre-project planning, including the project scope definition process. These studies have included more than 250 facility projects representing approximately \$8.2 billion. More than 500 industry practitioners have participated in these studies, and the project planning processes of more than 100 organizations have been analyzed. (Gibson Jr & Pappas, 2003)

Research results have shown that thorough pre-project planning leads to improved performance (cost, schedule, and operational characteristics) for both industrial and building projects (Construction Industry Institute, 1995; 1996; 1997, 1999; Gibson et al., 1997; Wang, 2002) as cited by Gibson and Pappas (2003).

Findings from these studies have also shown that success during the detailed design, construction, and start-up phases of a project depends heavily on the participation of stakeholders in pre-project planning activities, the level of effort expended during the project scope definition phase, and the thoroughness of the project scope of work. (Gibson Jr & Pappas, 2003)

This research has also shown that the pre-project planning process needs to be tailored to the specific project type and complexity. Building projects differ from industrial projects in various ways, including the approach to the planning, design, and construction of facilities; the owner's perspective; the architectural focus; and a building's functions. Nonetheless, there are many similarities. Like the industrial sector, the building industry generally suffers from poor or incomplete pre-project planning. As in the industrial sector, pre-project planning in the building sector is a process that needs to have input from a wide variety of individuals and should have significant owner involvement (Cho et al., 1999) as cited by Gibson and Pappas (2003). The federal government has many different types of facility projects that require pre-project planning, including office buildings, research facilities, prisons, maintenance facilities, court- houses, and military housing. Different levels of effort and participant skill sets are required for different types

of projects. Recognizing the appropriate levels of effort and the skills that are needed is difficult yet critical for project success.

## **2.5 Impact of Pre-project Planning**

Most construction projects begin with the recognition of the need for a new facility. This often occurs long before the start of design and construction. The pre-project planning phase includes the development of the concept of the project, including the basic decision of selecting the concept that will be used for the execution of work. Pre-project planning is critical to achieving project goals; it provides important outputs to the remaining project processes such as engineering and construction. The pre-project planning phase also represents the most important point in the project life cycle. It is the stage that has the most influence on the outcome of a project. It is during this phase that crucial decisions regarding project scope are made. These early decisions regarding the project's scope will be a major influence on the project's cost and schedule. Planning is a process of decision-making; however, it is necessary to make decisions throughout the project life cycle. Ahuja (1994) as cited by Sherif and Price (1999) explained that planning is most effective when it is performed early in the project and the impact of decisions made early is usually greater than those made during later stages. Gibson and Dumont (1996) as cited by Sherif and Price (1999), Sherif and Price (1999), revealed that the ability to influence overall project cost is greatest at the beginning of the project where expenditures are relatively low.



## 2.6 Impact of inadequate Project Planning

Measurement of effective pre-project planning has been the subject of much study. Merrow et al. (1981) developed a practice use metric for first-of-a-kind facilities that consisted of several variables, including process flow development, execution approach, and site characterization. This metric became the basis for benchmarking services such as those provided for Department of Energy environmental projects in the mid-1990s (Independent Project Analysis, 1996). A white paper by the Business Roundtable (1997), based on benchmark data, reported that projects with effective pre-project planning are more likely to meet cost, schedule, and operational objectives. Inadequate pre-project planning is the most significant determinant affecting project performance in the Construction Industry Institute's (CII) Benchmarking and Metrics database. Its relationship with established performance metrics is highly correlated, and CII considers pre-project planning to be a best practice. More recently, it has measured pre-project planning and other practice use metrics as well as performance metrics (Construction Industry Institute, 2000). Building and industrial projects with thorough pre-project planning have consistently outperformed other projects in terms of cost, schedule, and number of change orders, as shown in

**TABLE 2.1 PDRI score ranges and project performance**

| Performance  | <200               | >200                | Difference |
|--------------|--------------------|---------------------|------------|
| Cost         | 1% above budget    | 6% above budget     | 5%         |
| Schedule     | 2% behind schedule | 12% behind schedule | 10%        |
| Change order | 7% of budget       | 10% of budget       | 3%         |
|              |                    |                     |            |

**Source: construction Industry Institute 1999**



Table 2.1 compares project performance for a sample of 62 industrial projects worth \$3.9 billion using a 200- point Project Definition Rating Index (PDRI) 3 score cutoff. These data show the mean performance for the projects versus execution estimates for cost and schedule and the absolute value of changes as a percentage of total project cost. Projects with a PDRI score under 200 (a lower score is better) statistically outperformed projects with a score above 200 (Wang, 2002). The PDRI score was determined just prior to the beginning of detailed design, and the differences in performance parameters are statistically significant.

A similar evaluation was performed on a sample of 78 building projects representing approximately \$1.2 billion. Table 2.1 summarizes the project performance and PDRI score using the same 200-point cutoff. Again, projects with better scope definition (lower PDRI score) significantly outperformed projects with poorly defined scope at the 95-percent confidence level. A subsample of 25 similar projects from one owner organization in this evaluation showed a construction cost savings of 3:1 for every dollar invested in planning (Wang, 2002).

The mean percentage of total project cost spent on pre-project planning activities for all of the building projects in CII's database was 2.4 percent, which indicates a significant return on the investment of planning resources compared to total savings in budget, change orders, and time (Construction Industry Institute, 2000).

In summary, in the studies cited here and in many other investigations, pre-project planning has proven to be a key ingredient in determining whether a project will ultimately support an organization's mission and meet the owner's requirements. An investment of approximately 2 to 5 percent of a project's total cost will fund a cost-effective approach to increase the probability of success in the execution phase of the facility building process and can lead to better life-cycle operational performance. This level of project scope definition is a prerequisite to preparing an effective scope of work for design.

**TABLE 2.2: PDRI score ranges and project performance**

| Performance  | <200               | >200                | Difference |
|--------------|--------------------|---------------------|------------|
| Cost         | 1% above budget    | 6% above budget     | 5%         |
| Schedule     | 2% behind schedule | 12% behind schedule | 10%        |
| Change order | 7% of budget       | 10% of budget       | 3%         |

**Source: construction industry institute 1999**

## **2.7 Key Fundamentals of the Pre-project Planning Process**

Key fundamentals of an effective pre-project planning process are outlined in the following discussion to assist owner organizations in evaluating and enhancing existing processes or in developing new ones.

***The organization should ensure that it is performing the “right” project. This requires leadership and stakeholder involvement.*** The pre-project planning team should ensure that the proposed project will meet the strategic intent of the organization with respect to its mission and needs. Pre-project planning should begin with good leadership, effective and appropriate involvement of key stakeholders, and a detailed determination of project objectives and requirements. It is important to ask many questions and manage the expectations of the project sponsor and the project team. The team must be chartered

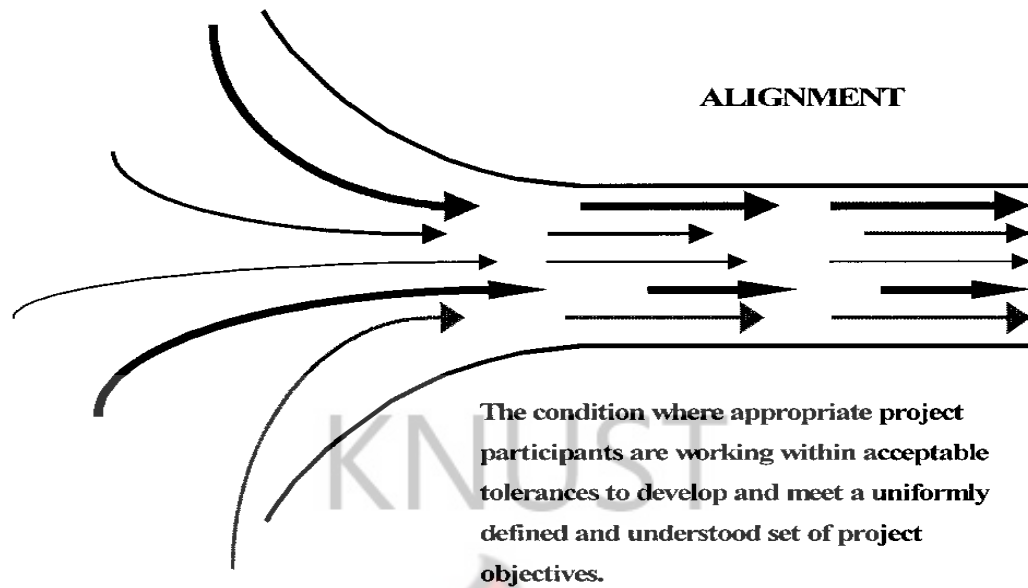
and given adequate resources by project sponsors to allow it to explore and choose the most cost-effective project alternatives in terms of site and technology options.

### **2.7.1 Alignment during Pre-project planning**

Research has shown that stakeholder identification and team alignment are critical to project success (Gibson Jr & Pappas, 2003). A typical preproject planning team is comprised of individuals representing a wide variety of functional groups with diverse priorities, requirements, and expectations. These individuals may be as varied as building managers, maintenance supervisors, construction managers, technical representatives, future tenants, scientists, military officers, or cabinet officials (Construction Industry Institute, 1995) Agreement among members is essential for any team to focus on the same objectives. Agreement can only be achieved through aligning project teams toward the same objectives to reduce conflict and disputes.

Figure 2.1 presents the definition and a graphical representation of alignment (Griffith and Gibson, 2001) as cited by (Gibson Jr & Pappas, 2003). Each team member brings different priorities and expectations into the pre-project planning process.

Alignment is the process of incorporating all of those distinct viewpoints into a uniform set of project objectives that meets the organization's needs. Alignment should be developed and maintained by the project team, and work should be planned and documented to provide the foundation for the project execution phase.



**Figure 2.1 Graphical representation and definition of Alignment**

The final stage of any successful alignment process is the acceptance and commitment of the entire team to the overall project objectives. Alignment cannot be achieved without the commitment of team members and the endorsement of the team sponsors. The arrows in Figure 2.1 are adjusted to form a uniform flow representing the evolution toward commitment to the overall project objectives. A project's objectives should meet the organization's mission and business requirements. They are formed in the early stages of project scope development and have a critical impact on the ultimate success of the project. In effect, the objective statement should be one of the first elements of the project scope of work to be developed, as it provides a course of direction for succeeding tasks.

Perhaps an appropriate analogy of a misaligned project would be that of driving a car with the front end out of alignment. Three unfortunate consequences generally occur: the ride is uncomfortable for the passengers, the tires wear out quickly, and the car drifts off the road. The same may be said of a project team that is out of alignment. The participants are in a constant struggle to maintain their viewpoints, and no one is entirely satisfied with the project's outcome (Construction Industry Institute, 1997).

#### ***2.7.1.1 Critical alignment issues***

Ten critical issues positively influence alignment when properly addressed or can cause difficulty in aligning the team to the task at hand. The Construction Industry Institute (1996) summarized some key issues that impose a critical impact on teams, they include:

***1) Stakeholders are appropriately represented on the pre-project planning team:***

The pre-project planning team should include representatives from all significant project stakeholders so that their priorities and expertise are included in the project planning process to achieve optimum results. At a minimum, the team needs to include representatives from the business management group, operations group, construction, and often the general public, in addition to project management and design personnel (Construction Industry Institute, 1997). It is often beneficial to structure a core team of five to seven individuals and to bring in representatives from additional key areas as needed. The exact size and makeup of the core team should be tailored to the specific requirements of the project in question. For instance, on small projects there may be no established team, and



the project manager would use expertise from within the organization or consultants as needed.

- 2) ***Project leadership is defined, effective, and accountable:*** The organization should be committed to developing and supporting effective team leadership because it will positively influence team members' commitment to the project's objectives. The leadership should be technically proficient and knowledgeable of the pre-project planning process. It should also have defined responsibilities, be accountable for results, and remain focused. Ideally, project leadership is established early in pre-project planning and maintains continuity through facility commissioning.
- 3) ***The priorities among cost, schedule, and required project features are clear:*** Clearly stated priorities among project cost, schedule, and quality features will assist all team members in making more uniform and correct decisions regarding the project and its objectives. Identifying these priorities in advance saves time by allowing more empowered decision-making by team members
- 4) ***Communication within the team and with stakeholders is open and effective.*** Establishing open and effective communications between all members of the preproject planning team is essential. This involves breaking down barriers to communication and utilizing advanced technologies to improve communication. Periodic communication with stakeholders outside the preproject planning team will ensure timely input and their alignment with the project direction. This can be accomplished through team meetings, newsletters, e-mail, video conferencing,



town hall meetings, and computerized information management systems (Construction Industry Institute, 1997).

- 5) ***Team meetings are timely and productive:*** Team leadership should conduct frequent and productive project meetings both to inform the team and to obtain input from team members. Team leadership should ensure that the team follows good meeting practices by providing an agenda, developing meeting minutes, assigning meeting roles, evaluating the meetings, and so forth. Meeting schedules should be set based on the size, pace, and complexity of the project. Too frequent meetings do not allow work to be accomplished in the interim. Too much time between meetings can damage alignment
- 6) ***The team culture fosters trust, honesty, and shared values:*** Team leadership should develop a culture of trust and honesty so that team members can maintain open, synergistic relationships. This culture is influenced by the organizational cultures that interact with it; however, the team should make sure that trust and honesty are fostered in its activities. This can be accomplished through kickoff meetings, establishing the importance of trust in the team's performance, developing long-term working relationships over a number of projects, and providing accurate information (Construction Industry Institute, 1997).
- 7) ***The pre-project planning process includes sufficient funding, schedule, and scope to meet objectives:*** It is important to establish and follow a prescribed pre-project planning process. A comprehensive pre-project planning process includes a team charter that outlines team member's roles and responsibilities, budget, schedule, and objectives of the team. The pre-project planning process should be

given adequate funding and time. Lack of funding is often cited as one of the most significant barriers to gaining alignment and in performing thorough pre-project planning.

- 8) ***The reward and recognition system is designed to promote the achievement of project objectives:*** Management should develop and implement a reward and recognition system for team members and outside contractors that supports the overall project objectives. Conflicting reward structures for different team members may cause decisions regarding project objectives and planning to be in direct opposition, resulting in less than optimal outcomes.
- 9) ***Teamwork and team-building programs are effective:*** Proper alignment requires that a group of diverse individuals from different functional groups be able to work together as a cohesive team. It is important that teamwork is developed through both formal and informal team-building programs focused on the project activities.
- 10) ***Planning tools:*** (e.g., checklists, simulations, work flow diagrams) are effectively used. Proper use of tools by the entire team to develop and manage project organization, scope, schedule, estimates, and work processes fosters alignment during pre-project planning. The greatest value in using these tools is that they foster open communication and acceptance of the approved project scope, estimates, schedule, and work processes. Examples of such tools include work process diagrams, scope definition checklists, scheduling techniques, and risk analysis techniques.

Immediately following the formation and alignment of the project team, and still early in pre-project planning, the project team should review site and technology options and make critical decisions. Many organizations call this phase conceptual planning. It is important that key decision makers understand and commit to a rigorous analysis of alternatives and to the chosen alternative decisions .4

The types of issues that need to be defined and documented early in pre-project planning for building projects are outlined below. Properly addressing these issues will ensure that the project team understands the project's requirements and can begin detailed project scope development. Many of these issues require input from project sponsors as well as operations and maintenance personnel. It is critical to document these issues to provide a sound basis for developing the project scope of work.

The lists given below and in succeeding sections are in order of highest to lowest importance (Construction Industry Institute, 1999). Many of these issues are strategic in nature and are required to develop the project scope, whereas others are investigated and developed at the conceptual level in order to compare alternatives. It should be noted that to investigate several alternatives at a detailed level requires significant cost. The first two categories, business or mission need and ownership philosophy, are prerequisites to developing viable alternatives. Many times this process is iterative in nature; if no viable alternatives are possible; these first two categories may need to be revisited.

- ***Business or mission need.*** These issues should be resolved to ensure that the project requirements are well understood and that the project will meet the strategic intent of the organization:

- ❖ Building use
- ❖ Business justification
- ❖ Business plan
- ❖ Economic analysis
- ❖ Facility requirements
- ❖ Future expansion/alteration considerations
- ❖ Site selection considerations
- ❖ Project objectives statement
- ***Ownership philosophies:*** The long-term requirements for sustained operations in the facility should be well understood and include:
  - ❖ Reliability philosophy
  - ❖ Maintenance philosophy
  - ❖ Operating philosophy
  - ❖ Design philosophy (includes sustainability)
- ***Project requirements:*** The overall project requirements need to be understood and documented, including:
  - ❖ Value-analysis process
  - ❖ Project design criteria
  - ❖ Evaluation of existing facilities
  - ❖ Scope of work overview
  - ❖ Project schedule
  - ❖ Project cost estimate

## **2.8 Project Scope Definition**

The project manager and team should ensure that they develop the “right work product” during pre-project planning. Once the team is aligned toward the right project and has selected alternatives to meet the strategic requirements of the organization, the team should identify, address, and document the appropriate scope definition elements to

ensure that the project has a good design basis. Scope definition is an important aspect that must be improved during pre-project planning.

Scope definition is “the process by which projects are defined and prepared for executions” (Gibson & Dumont, 1996). The scope outlines the content of the project and how it will be prepared. It also explains the problems that a client may encounter and states how they will be solved (Burke, 1993). Scope definition occurs early on the project while changes in the scope occur throughout the project life cycle. This creates a need for scope control on projects. Lack of scope ranks high as a problematic area and frequent contributor to cost and schedule overruns (Smith and Tucker 1984) as cited by Sherif and Price (1999). Scope definition was also found to be the most important variable affecting the quality of design and project success (Gibson & Dumont, 1996).

Basing the scope of work for design on a well- developed project scope of work will ensure a smooth transition from pre-project planning to detailed design and construction (Gibson Jr & Pappas, 2003).

Many times definition of the project scope involves the use of outside consultants or architect- engineers. A well-developed project scope of work roughly corresponds to a 15- to 25-percent complete design effort (Sherif & Price, 1999). Major tasks include developing the technical requirements; performing risk management activities; developing the project control baseline, including cost estimates; and documenting this information to form a good basis for detailed design activities (Gibson Jr & Pappas, 2003).



Project scope definition activities can generally be categorized into the following four major technical areas: *extensive site evaluation*; *good flow design* (space planning for buildings); *documenting design parameters, including code, regulatory, and user preferences*; and *identifying equipment requirements in detail*. A partial list of the issues that should be defined prior to development of a scope of work for the detailed design of building projects (Construction Industry Institute, 1999) includes the following:

- i. ***Extensive site evaluation.*** Uncertainty about the conditions and characteristics of the site and existing facilities can have a devastating impact on the project in the detailed design phase. Issues that should be explored and documented include:
  - ❖ Site layout
  - ❖ Site surveys
  - ❖ Civil/geotechnical information
  - ❖ Governing regulatory requirements
  - ❖ Environmental assessment
  - ❖ Utility sources with supply conditions
  - ❖ Special water and waste treatment requirements
  - ❖ Security requirements
- ii. ***Flow design:*** Understanding how people and functions relate to one another is essential for facility functionality and as a basis for detailed design. These relationships should consider building uses as well as horizontal and vertical circulation. Requirements that should be addressed and documented include:
  - ❖ Program statement
  - ❖ Building finishes
  - ❖ Room data sheets
  - ❖ Furnishings, equipment, and built-ins
  - ❖ Building summary space list
  - ❖ Overall adjacency diagrams



- ❖ Stacking diagrams
  - ❖ Growth and phased development
  - ❖ Circulation and open-space requirements
  - ❖ Functional relationship diagrams/room by room
- iii. **Design parameters.** The boundaries for the designer should be developed to ensure that the needs and intent of the building user(s) are met. Among the issues to develop and document are:
- ❖ Civil/site design
  - ❖ Architectural design
  - ❖ Structural design
  - ❖ Mechanical design
  - ❖ Electrical design
  - ❖ Building life safety requirements, including security
  - ❖ Sustainable design
  - ❖ Constructability analysis
- iv. **Equipment requirements.** Non-core equipment requirements should be investigated and documented. These equipment systems may include telecommunications, laboratory, food service, and so on. The team needs to investigate and document:
- ❖ An equipment list
  - ❖ Equipment location drawings
  - ❖ Equipment utility requirements

### 2.8.1 Key issues about project scope

- a. **Perception about project scope:** Many organizations think that a project scope is adequately developed once general requirements are defined and a preferred alternative is chosen (Gibson Jr & Pappas, 2003). This is not true. *To adequately develop a project scope, real design activities by architects, engineers, and*

*consultants should be performed to translate project requirements into a design basis.* In effect, the project scope provides a bridge between the operational and organizational needs that a facility will meet and the technical aspects of project execution.

- b. **Approach to Project Design:** The project manager and team should choose the “right approach” to project design and construction execution. During preproject planning, the team should investigate and choose the right execution approach to ensure a good basis for successfully managing the project during design and construction, if it is decided to proceed with the project. This approach should address the acquisition strategy for design, consulting, and construction services and should ensure that the owner organization has controls in place to manage the project tasks through commissioning and occupancy. These issues are often part of the standard operating procedures of the organization, but it is critical that the process and details of execution be adapted to the project at hand.
- c. **Execution issues:** The types of execution issues that need to be defined prior to the development of a scope of work for design are outlined below. It should be noted that failure to address design and construction execution issues during pre-project planning can severely impact the cost and particularly the schedule performance of a project (Construction Industry Institute, 1999).
- *Procurement.* The strategy and control mechanisms for the acquisition of critical equipment and materials should be developed and documented, including:
    - a) Identify long lead/critical equipment and materials

- b) Procurement procedures and plans
- *Project control.* Systems and processes should be in place to guard against potential problems that will occur during project execution, including:
  - a) Project cost control
  - b) Project schedule control
  - c) Risk management
- *Project execution plan.* A plan should be in place to ensure that execution will proceed smoothly once the design and construction phases begin, including:
  - a) Project organization
  - b) Owner approval requirements
  - c) Project delivery method
  - d) Design/construction plan and approach

**Note**

At some point in the development of an execution approach, the scope of work for design is developed. This document depends on the level of project definition and should address the contractual obligations for project delivery as well as specific process requirements of the contractor and owner organization. The scope of work for design can be modified to include significant project scope development activities and process steps if needed.

Overall, processes to ensure that the project will transition smoothly into the execution phase should be developed during the pre-project planning phase. Without an effective execution approach, the project will flounder and management involvement will usually be required to assist the project.

## **2.9 Pre-project Planning Tools**

In the 1960s and 1970s many project management tools and techniques focused on the implementation phase of the project life cycle (Sherif & Price, 1999). By the 80s the emphasis started to shift to focus more on the initial front end of the project which has the greatest opportunity to add value (Burke 1999) as cited by Sherif and Price (1999),. Many project planning tools are available to help organize and execute project planning. Project planning tools allow teams to focus on the project and align their efforts toward the same objectives. Some of the tools that can help improve alignment are: risk analysis, quality control techniques, and scope definition checklists. In particular, the tools discussed in this paper have a significant effect on team alignment and scope definition.

### **2.9.1 Alignment thermometer**

In 1997 a tool called the Alignment Thermometer was developed in order to allow a project team to assess its level of alignment during the pre-project planning process (Construction Industry Institute, 1997). It is used to determine whether the team is focusing on the issues and processes that have a critical impact on team alignment. It

provides a quick measure of team disagreement and assesses in identifying potential areas of disagreement.

### **2.9.1.2 Project Definition Rating Index**

Scope definition is an important aspect that must be improved during pre-project planning. Scope definition is “the process by which projects is defined and prepared for execution” (Gibson & Dumont, 1996). The scope outlines the content of the project and how it will be prepared. It also explains the problems that a client may encounter and states how they will be solved (Burke, 1993). Scope definition occurs early on the project while changes in the scope occur throughout the project life cycle. This creates a need for scope control on projects. Lack of scope ranks high as a problematic area and frequent contributor to cost and schedule overruns. Scope definition was also found to be the most important variable affecting the quality of design and project success (Gibson & Dumont, 1996).

PDRI is a tool designed to solve the problems of poor scope definition. It comprises 70 scope definition elements for evaluating the completion of scope during the pre-project planning phase. It is intended to serve as a best practices tool that provides numerous benefits to project team that includes: a checklist for work planning; highlight the risk elements; monitor pre-project planning progress; help in communication of requirements between participants; and a benchmarking basis (Gibson & Dumont, 1996). PDRI is a risk management tool that can help a pre-project planning team assess and measure project scope definition risk elements and then develop mitigation plans. A risk



management analysis is most effective when performed prior to “locking in” facility budgets and committing funds to detailed design and construction. The PDRI is adaptable to small project scope development. Experience has shown that it provides numerous benefits, including a:

- checklist that a project team can use to determine the necessary steps to follow in defining the project scope;
- list of standardized project scope definition terminology throughout the construction industry;
- standard for rating the completeness of the project scope definition to facilitate risk assessment, prediction of escalation, evaluation of the potential for disputes, etc.;
- means to monitor progress at various stages during the pre-project planning effort and to focus efforts on high-risk areas that need definition;
- tool that aids in communication between owners and design contractors by highlighting poorly defined areas in a scope definition package;
- means for project team participants to reconcile differences by providing a common basis for project evaluation;
- training tool for organizations and individuals throughout the industry; and
- Benchmarking tool for organizations to use in evaluating the completion of project scope definition versus the probability of success on future projects.



## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Research Design**

Research design is the strategy or plan to solve a research problem. The plan below was adapted to for the study. The aim of the study was to examine pre-project planning processes in Ghanaian construction industry and identify factors and impacts affecting the planning process. After combing through series of literature alongside discussion with various stakeholders, research questions were formulated to come up with the purpose for the study. Based on the type of research questions, a questionnaire was adopted as the best tool to collect data for the study. The questionnaires were designed to answer the research questions.

#### **3.2 Data Collection**

In collecting data for the study, a questionnaire was developed to assess the perception of clients, consultants and contractors on the relative importance of the factors affecting pre-project planning and their impacts. The questionnaire was divided into three parts. The first part, section “A” requested the background information of the respondents and also examined the pre-project planning practice in the Ghanaian construction industry.

The second part of the questionnaire, Section “B” was developed to achieve the first objective (identify factors affecting pre-project planning in the Ghanaian construction industry) of the study. In identifying these factors, an extensive literature study was done coupled with discussion with various stakeholders in the industry. In all, 14 factors were

identified. In this section respondents were requested to rank on a scale of 1-5, their level of agreement each of the factors identified where 1= strongly disagree, 2= disagree, 3 = neutral, 4 = agree and 5= strongly disagree.

The third part of the questionnaire focused on the impacts of the ill-pre-project planning in Ghanaian construction industry. After combing through series of literature, 10 possible impacts were identified. Similar to the second part, respondents were asked to highlight the importance of each of the possible impacts identified. A five-point Likert scale (where **1** = unimportant, **2**= of little importance, **3** = moderately important, **4** = important, **5** = very important) was adopted to rank the importance of each of the possible impacts identified.

### **3.3 Sampling Principle**

The selection criteria for the questionnaires were that respondents should have been involved in or is still involved in pre-project planning. Therefore project managers, design professionals (architects/engineers/Quantity surveyors), clients and some constructors who in one way or the other been involved in pre-project planning before were the obvious choice.

Before distributing the questionnaire, a small pilot study was conducted to using 5 consultants, 5 clients and 5 constructors. The basic purpose of the pilot study was to verify the completeness of the questionnaire in capturing the factors affecting pre-project planning and their possible impacts in the Ghanaian construction industry. All respondents agreed that the questionnaire was sufficient to capture the factors affecting

pre-project planning and their impacts. Therefore no modification was made to the factors and impacts identified.

### **3.4 Sampling Technique**

The sampling method used in this study was convenience and snowball sampling. This sampling comes under the class of non-probability sampling techniques. As the name implies, sample elements are identified by convenience (friends) and through referral networks. This method of sampling is preferred when it is difficult to get response from sample elements selected at random. The questionnaires were distributed through friends working in Government organisations (Highways, urban roads, Feeder roads, Architectural and Engineering Services limited, Ghana ports and Harbour Authority) who mostly undertake construction projects, developers, and consultancy and construction firms. Our friends in turn distributed to their friends. The sampling method used enabled us to get a number of questionnaires completed quickly and economically.

### **3.5 Population**

In all, 100 questionnaires were distributed to potential respondents in the Ghanaian construction industry within the Accra metropolis. 35 were distributed to clients, 35 sets to consultants and 30 sets to contractors

Of the 100 questionnaires, 80 sets (representing 80%) were returned and they were 28 Sets from clients (representing 35%), 30 sets from consultants (representing 37.5%) and 22 sets from constructors (representing 27.5%)

### 3.6 Data Analysis

Relative Importance Index (RII) method was used to determine the relative importance of each of the factors and impacts identified. The five-point scale ranged from 1(not important) to 5 (very important) was adopted and transformed to relative importance indices (RII) for each as follows:

$$RII = \frac{\sum W}{A * N}$$

Where

RII = Relative Importance Index

W = is the weighting given to each factor by respondents ranging from (1 to 5)

A = highest weight (i.e. 5 in this case)

N = Total no. of respondents

The RII value had a range from 0 to 1 (0 not inclusive), the higher the value of RII, more important was the factor or impact affecting the pre-project planning process.

The RII was used to rank the different factors affecting the pre-project planning process.

These rankings made it possible to cross-compare the relative importance of the factors as perceived by the three groups of respondents. (Clients, consultants and constructors).

The same procedure was adopted for ranking the impact. The indices (RII) were then used to determine the rank of each item (impact). These rankings also made it possible to cross-compare the relative importance of each item as perceived by the three groups or respondents.

## CHAPTER FOUR

### DISCUSSION AND ANALYSIS

This chapter presents the collated data, and analyses the data to address the specific objectives in Chapter One of the study. The major areas the chapter discusses include respondent's background; the stakeholder's involvement in pre-project planning process in the construction industry; the pre-project process, resource utilization and team productivity; the factors affecting pre-project planning (PPP) in the construction industry; and the impact of the factors affecting the pre-project planning process in the construction industry.

#### 4.1 Socio Demographic Characteristics of Respondents

This section of the study elaborates on the major socio demographic characteristics of the surveyed respondents. The section discusses the working experience of construction clients, consultants and contractors in the construction industry; and their involvement in pre-project planning processes in Accra. The result is presented in Table 4.1.

**Table 4.1: Socio Demographic Information of Respondents**

| <b>Demographics</b>                            | <b>Client</b>   | <b>Consultant</b> | <b>Contractor</b> | <b>Total</b>    |
|--|-----------------|-------------------|-------------------|-----------------|
| <b>Experience in the construction industry</b> |                 |                   |                   |                 |
| 1-5 years                                      | 3(60.0)         | 2(40.0)           | 0(0.0)            | <b>5(6.3)</b>   |
| 6-10 years                                     | 7(43.8)         | 5(31.3)           | 4(25.0)           | <b>16(20.0)</b> |
| 11-15 years                                    | 13(52.0)        | 6(24.0)           | 6(24.0)           | <b>25(31.3)</b> |
| 15+ years                                      | 5(14.7)         | 17(50.0)          | 12(35.3)          | <b>34(42.5)</b> |
| <b>Total</b>                                   | <b>28(35.0)</b> | <b>30(37.5)</b>   | <b>22(27.5)</b>   | <b>80</b>       |
| <b>Ever involved in pre-project planning</b>   |                 |                   |                   |                 |
| Yes  | 20(30.8)        | 25(38.5)          | 20(30.8)          | <b>65(81.3)</b> |
| No   | 8(53.3)         | 5(33.3)           | 2(13.3)           | <b>15(18.8)</b> |
| <b>Total</b>                                   | <b>28(35.0)</b> | <b>30(37.5)</b>   | <b>22(27.5)</b>   | <b>80</b>       |

Source: Field Survey, 2014



From Table 4.1, out of the total surveyed respondents of 80, the majority (42.5%) have working experience of 15 years or more in the construction industry in Ghana. The majority (50.0%) of the surveyed respondents with 15 years of working experience or more were consultants in the Greater Accra Region. Out of the total surveyed respondents with working experience of 11 to 15 years in the construction industry, the majority (52.0%) were construction clients in the Greater Accra Region. Furthermore, out of the total surveyed respondents with working experience of 6 to 10 years in the construction industry, the majority (43.8%) were clients in the Greater Accra Region.

Out of the total surveyed respondents of 80, the majority (81.3%) have ever been involved in pre-project planning in the construction of projects. Out of the surveyed respondents that have ever been involved in pre-project planning, the majority (38.5%) were consultants, whereas 30.8% were clients and 30.8% contractors in the Greater Accra Region. However, out of the total surveyed respondents who have never participated in any form of pre-project planning in the construction industry, the majority were clients in the Greater Accra Region.

#### **4.2 Stakeholder's Involvement in Pre-project Planning Process**

The construction industry involves a significant touch of team work. The team usually consists of design team (consultants), client and the builder. For a project to be successful (i.e. completed within time, cost and quality specified) the members must play their respective roles for it to be achieved. The contribution or involvement of the various parties in the construction industry in the Greater Accra Region are discussed and ranked



in this section of the study. Table 4.2 presents the result of the stakeholder's surveyed involvement in the pre-project planning process. The involvement of the stakeholder were ranked on the 'Likert-scale' of 1 to 4 as less involved, fairly involved, involved and highly involved. For each party, the RII was calculated by summing up the scores given to it by the respondents, and the relative importance index was calculated.

**Table 4.2: Stakeholders Involvement in the Pre-Project Planning Process**

| Stakeholders                                   | Frequency of Ranking |     |     |     | Weight | RII   | Rank |
|--|----------------------|-----|-----|-----|--------|-------|------|
|  | (1)                  | (2) | (3) | (4) |        |       |      |
| Design professionals (Architect or Engineers ) | 3                    | 7   | 14  | 56  | 283    | 0.708 | 1    |
| Client /client representative                  | 5                    | 7   | 14  | 54  | 277    | 0.693 | 2    |
| Planners                                       | 3                    | 12  | 32  | 33  | 255    | 0.638 | 3    |
| suppliers                                      | 7                    | 10  | 37  | 26  | 242    | 0.605 | 4    |
| Regulatory bodies                              | 12                   | 18  | 36  | 14  | 212    | 0.530 | 5    |
| Finance (bankers, insurers)                    | 23                   | 27  | 12  | 18  | 185    | 0.463 | 6    |
| Marketing                                      | 14                   | 45  | 20  | 3   | 176    | 0.440 | 7    |
| Facility end users                             | 28                   | 27  | 9   | 16  | 173    | 0.432 | 8    |
| External stakeholders(residents                | 34                   | 24  | 9   | 13  | 161    | 0.403 | 9    |

Source: Field Survey, 2014

From Table 4.2, the relative importance index calculated indicates that the surveyed respondents' ranks design professionals such as architects, engineers and quantity surveyors as the most involved stakeholders in the pre-project planning process they partook as shown by the highest RII of 0.708. The primary party responsible for pre-project planning is the owner or his representatives. In Ghana, most developers or clients/owners do not have the requisite knowledge or have little or no in-house staff to undertake the exercise. As a result, most facility owners employ design professionals to

undertake the exercise, hence design professional being ranked as the most involved stakeholder in pre-project planning. Clients/client representatives were also ranked as the second most involved stakeholders in the pre-project planning process as shown by the second highest RII of 0.693. The third and fourth most involved stakeholders in the pre-project planning process were found to be planners and suppliers as shown by their respective RII of 0.638 and 0.605. However, the least two ranked stakeholders in terms of their involvement in the pre-project planning process facility end users and external stakeholders as shown by their RII of 0.432 and 0.403 respectively. As in the industrial sector, pre-project planning in the building sector is a process that needs to have input from a wide variety of individuals and should have significant owner involvement (Cho et al., 1999) as cited by Gibson and Pappas (2003).

#### **4.3 Pre-Project Process, Resource Utilization and Team Productivity**

This section of the study discusses issues concerning the level of stakeholder representation on the pre-project planning process, level of satisfaction with team's productivity, the level of resourcing and motivating of the team of the PPP, the percentage of the project cost used to fund PPP and the level of satisfaction with team's productivity. The result of the section is presented by tabular analysis with the aid of frequencies and percentages as shown in Table 4.3.

**Table 4.3: Pre-Project Processes, Resource Utilization and Team Productivity**

|  | <b>Frequency</b> | <b>Percent</b> |
|--|------------------|----------------|
| <b>Level of stakeholder representation on the project team</b>   |                  |                |
| Less represented   | 8                | 10.0           |
| Fairly represented   | 42               | 52.5           |
| Very well represented  | 30               | 37.5           |
| <b>Level of satisfaction with team's productivity</b>  |                  |                |
| Less productive  | 6                | 7.5            |
| Moderately productive  | 41               | 51.3           |
| Very productive  | 33               | 41.2           |
| <b>Period with which the pre-project planning or feasibility studies phase elapse before the commencement of the detailed construction documents</b> |                  |                |
| 1-6 months   | 11               | 13.8           |
| 6-12 months  | 52               | 65.0           |
| 1-3 years  | 9                | 11.3           |
| 3+ years   | 8                | 10.0           |
| <b>was allotted time to undertake pre-project planning process sufficient</b>  |                  |                |
| Yes  | 60               | 75.0           |
| No   | 20               | 25.0           |
| <b>Is the pre-project planning team properly resourced to undertake the process</b>  |                  |                |
| Yes  | 38               | 47.5           |
| No   | 42               | 52.5           |
| <b>level of satisfaction with the resources given by the client to carry out the process</b>   |                  |                |
| Under resourced  | 12               | 15.0           |
| Moderately resourced   | 46               | 57.5           |
| Adequately resourced   | 22               | 27.5           |
| <b>Level of motivation of the project team by client to undertake the PPP</b>  |                  |                |
| Less motivated   | 17               | 21.2           |
| Moderately motivated   | 36               | 45.0           |
| Very well motivated  | 27               | 33.8           |
| <b>How Level of motivation affect PPP teams productivity</b>   |                  |                |
| Yes  | 73               | 91.2           |
| No   | 7                | 8.8            |
| <b>Percentage of project cost used to fund the PPP</b>   |                  |                |
| Less than 1%   | 14               | 17.5           |
| 1-8%   | 57               | 71.3           |
| 8.1%-16%   | 5                | 6.3            |
| 16+%   | 4                | 5.0            |
| Not funded   | 0                | 0.0            |

|   |    |      |
|---|----|------|
| <b>level of project scope definition prior to the design of the detailed construction documents</b>   |    |      |
| N Complete definition   | 10 | 12.5 |
| Minor deficiencies  | 60 | 75.0 |
| Some deficiencies   | 8  | 10.0 |
| Major deficiencies  | 2  | 2.5  |
| Incomplete or poor definition   | 0  | 0.0  |
| <b>How the original scope of the work set prior to the detailed design of the construction document and construction matches with the original intent</b> |    |      |
| Very different  | 7  | 8.8  |
| Fairly matches  | 43 | 53.8 |
| Closely matches   | 30 | 37.4 |

Source: Field Survey, 2014

From Table 4.3, out of the total surveyed respondents of 80, the majority (52.5%) were of the opinion that stakeholder's were fairly represented on the project team during the pre-project planning process phase. Research has shown that stakeholder identification and team alignment are critical to project success (Gibson Jr & Pappas, 2003). A typical pre-project planning team is comprised of individuals representing a wide variety of functional groups with diverse priorities, requirements, and expectations. These individuals may be as varied as building managers, maintenance supervisors, construction managers, technical representatives, future tenants, scientists, military officers, or cabinet officials (Construction Industry Institute, 1995); and agreement among members is essential for any team to focus on the same objectives. Since majority of respondents are of the opinion that stakeholders are fairly represented, there is that possibility that the project scope might not be well defined during the pre-project planning phase.

The majority (51.3%) of the surveyed respondents further agreed that the team involved in the pre-project planning process phase were moderately productive, whereas 41.2% believed they were very productive.

The majority (65.0%) of the surveyed respondents were of the opinion that the period with which the pre-project planning or feasibility studies phase elapses before the commencement of the detailed construction documents is 6 to 12 months. The time allotted to undertake the feasibility studies or the pre-project planning process is deemed sufficient by the majority (75.0%) of the surveyed respondents of the study.

The pre-project planning process team is believed not to be properly resourced to undertake the process by the majority (52.5%) of the surveyed respondents of the study.

The majority (57.5%) of the surveyed respondents were of the opinion that the resources given by the clients to carry out the pre-project planning process was moderate whereas 27.5% of the respondents were of the opinion that the amount of resources given by the client was adequate. This means that more than half of the survey's respondents were of the view that pre-project planning teams are not adequately resourced to undertake the process.

The pre-project process team is believed by the majority (45.0%) of the surveyed respondents to be very moderately motivated to undertake the pre-project planning. The level of the pre-project process team's motivation is believed by the majority (91.2) of the surveyed respondents of the study to affect the team's productivity. Most employees



need motivation to feel good about their jobs and perform optimally. Some employees are money motivated while others find recognition and rewards personally motivating. Motivation levels within the workplace have a direct impact on employee productivity. Workers who are motivated and excited about their jobs carry out their responsibilities to the best of their ability and production numbers increase as a result.

This presupposes that if the project team is well motivated, there is the possibility for them to achieve a higher productivity during the pre-project planning process. The percentage of the project cost allotted to the completion and funding of the pre-project planning process was believed by the majority (71.3%) of the surveyed respondents to be between 1% and 8%, whereas 17.5% were of the opinion that is less than 1%. The Construction Industry Institute (2000) in their report indicates that the mean percentage of total project cost spent on pre-project planning activities for all of the building projects in CII's database was 2.4 percent, which indicates a significant return on the investment of planning resources compared to total savings in budget, change orders, and time.

The majority (75.0%) of the surveyed respondents of the study were of the opinion that the project scope definition prior to the design of the detailed construction documents was having some minor deficiencies. A well-developed project scope of work roughly corresponds to a 15- to 25-percent complete design effort (Sherif & Price, 1999). Inadequate project scope definition inevitably results in the need for changes, which in turn interrupt project sequencing and rhythm, cause rework, increase project time and cost, and lower the productivity as well as the morale of the work force (O'Connor and



Vickroy, 1986) as cited by Gibson and Pappas (2003). The majorities (71.3%) of the surveyed respondents of the study were of the opinion that the original scope of the work set prior to the detailed design of the construction document and construction closely matches with the original intent.

#### **4.4 Factors Affecting Pre-Project Planning (PPP)**

This section of the study assesses the factors affecting the pre-project planning process phase in the construction industry in Ghana. To achieve this objective, the respondents were presented with several influential factors of the pre-project planning process identified in literature to indicate their level of agreement to them as factors affecting the pre-project planning process in the Greater Accra Region by choosing from ‘Strongly Disagree’ [1] to ‘Strongly Agree’ [5]. For each factor affecting the pre-project planning process, the RII was calculated by summing up the scores given to it by the respondents, and the relative importance index was calculated and by extension their rank. The result of the frequency responses of the surveyed respondents and the weight, RII and ranks of the factors are presented in Table 4.4.

**Table 4.4: Factors Affecting the Pre-Project Planning Process**

| Factors affecting pre-project planning  | level of Agreement |     |     |     |     | weight | RII   | Rank |
|---|--------------------|-----|-----|-----|-----|--------|-------|------|
|   | (1)                | (2) | (3) | (4) | (5) |        |       |      |
| Relevant Stakeholder representation   | 0                  | 0   | 0   | 15  | 65  | 385    | 0.963 | 1    |
| Funding   | 0                  | 0   | 5   | 18  | 57  | 372    | 0.930 | 2    |
| Time  | 0                  | 2   | 12  | 21  | 45  | 349    | 0.873 | 3    |
| Rewards and recognitions  | 0                  | 8   | 9   | 20  | 43  | 338    | 0.845 | 4    |
| Project team leadership   | 0                  | 11  | 10  | 18  | 41  | 329    | 0.823 | 5    |
| Political insensitivity   | 0                  | 13  | 9   | 17  | 41  | 326    | 0.815 | 6    |
| Effective and open Communication within the team and with stakeholders                      | 0                  | 13  | 12  | 16  | 39  | 321    | 0.803 | 7    |
| Lack of consensus regarding project goals   | 0                  | 15  | 12  | 16  | 37  | 315    | 0.788 | 8    |
| Timely productive team meetings   | 3                  | 12  | 12  | 15  | 37  | 308    | 0.770 | 9    |
| authorizing the project execution before pre-project planning is completed                  | 5                  | 15  | 11  | 13  | 36  | 300    | 0.750 | 10   |
| Lack of a clear process for pre-project planning  | 7                  | 17  | 9   | 11  | 36  | 292    | 0.730 | 11   |
| Lack of personnel to undertake the process  | 9                  | 17  | 9   | 9   | 36  | 286    | 0.715 | 12   |
| Planning tools (e.g., checklists, simulations and work flow diagrams) are effectively used. | 10                 | 19  | 7   | 9   | 35  | 280    | 0.700 | 13   |
| Roles and responsibilities of team members  | 14                 | 22  | 5   | 8   | 31  | 260    | 0.650 | 14   |

Rank: [1=strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree]

Source: Field Survey, 2014

From Table 4.4, a critical observation of the ranked measures reveals the following results in the descending order of rank: Relevant stakeholder representation was ranked first with a RII of 0.963, funding of pre-project planning process was ranked second with a RII of 0.930, time duration was ranked third with a RII of 0.873, reward and recognition was ranked fourth with a RII of 0.845, project team leadership was ranked fifth with a RII of 0.823, political insensitivity was ranked six with a RII of 0.815, effective and open Communication within the team and with stakeholders was ranked seventh with a RII of 0.803, lack of consensus regarding project goals was ranked eighth with a RII of 0.788, timely productive team meetings was ranked ninth with a RII of 0.770, the authorization of the project execution before pre-project planning is completed

was ranked tenth with a RII of 0.750, lack of a clear process for pre-project planning was ranked eleventh with a RII of 0.730, and lack of personnel to undertake the pre-project planning process was ranked twelfth with a RII of 0.715. A closer look at the RII of these measures gives the indication that the mentioned factors are most important in the pre-project planning process phase. Research indicates that stakeholder identification and team alignment are critical to project success (Gibson Jr & Pappas, 2003) and hence the need for relevant stakeholder representation. A typical pre-project planning team comprises of individuals representing a wide variety of functional groups with diverse priorities, requirements, and expectations including building managers, maintenance supervisors, construction managers, technical representatives, future tenants, scientists, military officers, or cabinet officials (Construction Industry Institute, 1995).

Other identified factors were considered to be moderately important with a RII below 0.700. The factor rated moderately important was the roles and responsibilities of team members ranked fourteenth with a RII of 0.650. However, The Construction Industry Institute (1995) suggests that a well representation and appropriate definition of roles and responsibilities of team members influences the success of construction projects.

#### **4.5 Impact of Factors Affecting Pre-Project Planning**

This section of the study assesses the impact of the factors affecting pre-project planning process in the construction industry in Ghana. To achieve this objective, the respondents were presented with 10 possible impacts of pre-project planning process identified in literature to indicate their level of agreement to them by choosing from ‘strongly

disagree' [1] to 'strongly agree' [5]. After the information for this section was collated, the relative importance index (RII) was used to identify the most important effects or impact of the factors affecting the pre-project planning process in Ghana. Table 4.5 therefore presents the frequencies of the respondents, weight, RII and by extension the ranks of the possible impact.

**Table 4.5: Impact of Factors Affecting the Pre-Project Planning Process**

| Possible Impact             | Level Of Importance |     |     |     |     | Weight | RII   | Rank |
|-----------------------------|---------------------|-----|-----|-----|-----|--------|-------|------|
|                             | (1)                 | (2) | (3) | (4) | (5) |        |       |      |
| Project cost                | 0                   | 0   | 0   | 6   | 74  | 394    | 0.985 | 1    |
| Project completion time     | 0                   | 0   | 0   | 10  | 70  | 390    | 0.975 | 2    |
| Excessive change orders     | 0                   | 0   | 0   | 15  | 65  | 385    | 0.963 | 3    |
| Quality of work             | 0                   | 0   | 2   | 13  | 65  | 383    | 0.958 | 4    |
| Demoralization of parties   | 0                   | 0   | 6   | 11  | 63  | 377    | 0.943 | 5    |
| Project profitability       | 0                   | 0   | 8   | 9   | 63  | 375    | 0.938 | 6    |
| conflict among stakeholders | 0                   | 6   | 6   | 8   | 60  | 362    | 0.905 | 7    |
| coordination Issues         | 0                   | 7   | 7   | 6   | 60  | 359    | 0.898 | 8    |
| conflict with third parties | 1                   | 10  | 5   | 7   | 57  | 349    | 0.873 | 9    |
| Environmental issues        | 3                   | 13  | 5   | 9   | 50  | 330    | 0.825 | 10   |

Rank: [1=Unimportant, 2=Little Important, 3=Moderately Important, 4=Important, 5=Very Important]; Source: Field Survey, 2014

From Table 4.5, a critical observation of the ranked measures reveals the following results in terms of the impact of the factors affecting the pre-project planning process in the descending order of rank. From the study, project cost was ranked first with a RII of 0.985; project completion time was ranked second with a RII of 0.975; excessive change order was ranked third with a RII of 0.963; quality of work was ranked fourth with a RII of 0.958; demoralization of parties was ranked fifth with a RII of 0.943; project

profitability was ranked sixth with a RII of 0.938; conflict among stakeholders was ranked seventh with a RII of 0.905; coordination issues among stakeholders was ranked eighth with a RII of 0.898; conflict with third parties was ranked ninth with a RII of 0.873; and finally, environmental issues was ranked tenth with a RII of 0.825 as major important of the factors affecting the pre-project planning process in Ghana. These factors are deemed or concluded as most important impacts of factors affecting pre-project planning process because their relative importance indexes (RII) were higher than 0.700. In consistency with the findings of this study, research has demonstrated that achieving project objectives in terms of time, cost and quality is closely related to the efforts spent during the pre-project planning phase (Gibson & Hamilton, 1994). This view is also expressed by Sullivan et al. (1997) as cited by Sherif and Price (1999) who emphasized that more time and effort devoted at this phase will increase the chance of a project being successful. Furthermore, Gibson and Dumont (1996) as cited by (Sherif & Price, 1999) revealed that the ability to influence overall project cost is greatest at the beginning of the project where expenditures are relatively low.



## **CHAPTER FIVE**

### **SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATION**

This chapter mainly focused on key finding of the research problem analysis, measures to be taken in order to improve the sector and conclusion of the study. The recommendations constitute principally managerial level policies.

#### **5.1 Summary of Finding**

This research was set to find answers to the following: 1) What factors account for ineffective pre-project planning processes in the Ghanaian industry, and 2) what impacts do these factors have on the Ghanaian construction industry. Rigorous field works was conducted and below are the main findings:

##### **5.1.1 Resource utilization and team productivity in the pre-project process**

From the study the major three stakeholders in the construction industry involved in the pre-project planning process phase were design professionals (Architect or Engineers or cost estimators), planners and client representatives. The stakeholders very well represented on the project team to handle the pre-project process. The teams work in the pre-project process was deemed very productive. The pre-project planning process phase often elapses in 6 to 12 months before the commencement of the detailed construction documents, and time is often allotted to undertake process sufficiently. The pre-project planning team is often properly resourced and motivated to undertake the pre-project process which often influences their productivity. The percentage of project cost used to

fund the pre-project planning process is about 1% to 8%. The level of the project scope definition prior to the design of the detailed construction documents is predominantly minor deficiencies.

### **5.1.2 Factors Affecting the Pre-Project Planning Process**

The study revealed several factors affecting the pre-project planning process phase including relevant stakeholder representation, funding, time, rewards and recognitions, project team leadership, political insensitivity, effective and open communication within the team and with stakeholders, lack of consensus regarding project goals, timely productive team meetings, authorizing the project execution before pre-project planning is completed, lack of a clear process for pre-project planning, lack of personnel to undertake the process in that order of their importance or magnitude.

### **5.1.3 Impact of Factors Affecting Pre-Project Planning Process**

The study revealed several impacts of the factors affecting the pre-project planning process including Project cost, Project completion time, Excessive change orders, Quality of work, Demoralization of parties, Project profitability, conflict among stakeholders, coordination Issues, conflict with third parties, and Environmental issues in that order of rank or magnitude or importance.

## 5.2 Conclusion

Host of challenges confront the design and the execution stage of construction projects as result of ill-pre-project planning. In Ghana Projects are often rushed without sufficient budgetary allocation and appropriate assessment at the pre-project planning phase. The majority of client/owners in Ghana rarely assess the functional and technical requirements of construction projects carefully to ensure effective design and construction process and hence the need for pre-project planning. From the study, it was concluded that the pre-project planning process phase is affected by factors including relevant stakeholder representation; funding, time, rewards and recognitions project team leadership, political insensitivity, effective and open communication within the team and with stakeholders, lack of consensus regarding project goals, and timely productive team meetings. These identified pre-project planning factors were found to impact the process in several areas including project cost, project completion time, excessive change orders, and quality of work, demoralization of parties, project profitability, and conflict among stakeholders, coordination issues, conflict with third parties, and environmental issues. Based on these conclusions, several policy and managerial recommendations have been made in the section below:

## 5.3 Recommendation

Based on the findings of the study, the pre-project planning phase can be made effective and efficient by tackling several factors that affect the pre-project planning phase and hence the numerous recommendations made below:

### **5.3.1 There is the need for relevant Stakeholder representation**

Based on the finding that relevant stakeholder representation in the pre-project planning process in the construction industry is the most highly ranked factor affecting the pre-project planning process, there is therefore the need for fair representation of all relevant stakeholders needed for effective and successful construction project.

### **5.3.2 Ensure adequate and available source of finance**

Based on the ranking of funding as the second most important factor affecting the pre-project planning process, there is the need for adequate and available funds for the pre-project planning process. Proper funding could possible ensure effective organisations of meetings and proper assessment of technical and environmental issues.

### **5.3.3 Sufficient time for Pre-project Planning**

Based on the ranking of time as the third most important factor affecting the pre-project planning process, there is the need for sufficient for the project considerations in the pre-planning phase. Adequate time is often needed for thorough feasibility studies and project analysis. The detailed briefing on the functional and technical requirements of construction projects needs careful planning and considerations and assessment to ensure appropriate and effective design and construction process.

(kagioglou et al., 1999)

#### **5.3.4 Better Project team leadership**

Project team leadership and effective communication with the team and with stakeholders were found to affect the pre-project planning process. To enhance the pre-project planning process and hence higher productivity and quality construction project, there is the need for better pre-project team leadership and effective communication with the team and with stakeholders.

#### **5.4 Limitations and Areas for Further Studies**

The current study was limited to providing insight into the pre-project planning process phase. Therefore, any further study could be widened to capture other stages or phases in the project construction process. Furthermore, the current study was limited to a small sample size of 80 which limits the generalizability of the study. Therefore further studies in this area could enhance the validity, reliability and generalizability of the study by increasing the sample size.



## REFERENCES

- American Society of civil Engineers, 2012. *Quality in construction Projects, A Guide for Owners, Designers and Constructors*. American Society Of Civil Engineers.
- Burke, R., 1993. *Project Management planning Control*. New York: Wiley.
- construction Industry Institute, 1994. Pre-project planning:why and how. In *construction Industry institute(1994) conference.*, 1994. Construction Industry Insitute.
- Construction Industry Institute, 1995. *Pre-project planning handbook, special*. 392nd ed. Austin, Texas, United states Of America: Construction Industry Institute.
- Construction Industry Institute, 1996. *Project definition rating index - Industrial projects*. Austin, Texas, United states Of America: Construction Industry Insitute. Implementation resource.
- Construction Industry Institute, 1997. *Alignment during Preproject planning, key to project success*. Austin, Texas, United tates Of America: Construtio Insutry Instite.
- Construction Industry Institute, 1999. *Project definition rating Index - building Projects*. Austin, Texas, united States Of America: Construction Industry Instite. Implementation resource155-2.
- Construction Industry Institute, 2000. *Benchmarking and metrics*. Austin, Texas, United States Of America: Construction Industry Insitute.
- Farzin, M. & Sareh, S., n.d. *identification of relationship between pre-project planning and project success criteria in civil section of Iranian offshore Oil and Gas*. University ov calgary. unpublished masters thesis.

Gibson , G. & Hamilton, M., 1994. *Analysis of preproject planning and sucess variables of capital facility projects*. source document 105. Austin: University of Texas, Austin Construction Industry Institute.

Gibson Jr, G.E. & Pappas, m.P., 2003. *starting smart: key practices for developing scope of work for facility projects*. [Online] washington D.c: national academic press Available at: [www.nap.edu/catalog/10870.html](http://www.nap.edu/catalog/10870.html) [Accessed july 2014].

Gibson, G. & Dumont, P., 1996. *Project definition rating Index*. Research. Austin: Construction Industry Institute Construction Industry Institute.

Griffith, A.F. & Gibson Jr., G.E., 2001. Alignment During Preproject planning. *journal of management in Engineering*, 17(2).

Mintzberg, H., 1981. Organisation Design: fashion or Fit. *Organisation Design: fashion or Fit*, january.

Sherif, M.A. & Price, A.D.F., 1999. A framework for Pre-project Planning. In Huges, W., ed. *15th Annual ARCOM conference*. Liverpool, 1999. Association of researchers In Construction management.

The Business Roundtable. 1997. *The Business Stake in Effective Project Systems*. White Paper. Washington D.C.: The Business Roundtable

Cho, C., J. Furman, and G. Gibson. 1999. Development of the Project Definition Rating Index (PDRI) for Building Projects. Research Report 155-11. Austin, TX: Construction Industry Institute.

Smith, M.A. and Tucker, R.L. (1994) *An assessment of the potential problems occurring in the engineering phase of an industrial project*. The University of Texas at Austin, Austin, Texas

Barrie, D.S and Paulson, B.C. (1992) *Professional project management*. London:  
McGraw Hill.

Kagioglou, M, Cooper, R, Aoud, G, 1999 *Performance management in construction and  
conceptual framework*. University of Safford, Safford

KNUST



## APPENDIX A

### **QUESTIONNAIRES**

*Pre-project Planning (feasibility studies) is the process of developing sufficient strategic information for owners to address risk and decide to commit resources to maximize the chance for a successful project” (Construction Industry Institute, 1995). It includes all activities from initiation of a project to the start of detailed design. These activities include organizing the pre-project planning team, evaluating and selecting alternatives, defining the scope of the project, and making a decision on whether to proceed with the project.*

*The purpose of these questionnaires is to elicit the views of respondents on the factors affecting pre-project planning and their possible impacts in the Ghanaian construction industry.*

**NOTE:** *These questionnaires are to be answered by project managers, Project QS, Project Architect, constructors and any other person who has been involved in project planning before.*

*Kindly please take your time to answer the questions below.*

### **SECTION A**

#### **Pre-project planning practice in the Ghanaian industry**

**Please circle/check the right option**

- i. Which of the categories of stakeholders do you belong to in the construction industry in Ghana?
- A. Client/client project coordinator    B. Consultant (Architect/Engineer/QS)    C. Contractor    D. Others, state.....

ii. How many years of Experience do you have in the Construction Industry in Ghana?

A. 1 - 5years    B. 6 - 10years    C. 11 - 15years    D. More than 15years

iii. Have you been involved in pre-project planning before?

Yes (    )    No (    )

*If yes, answer the following questions*

iv. On the pre-project planning process that you were involved in, was an official team/committee set up by the client headed by the project manager to undertake the feasibility study or pre-project planning process?

Yes (    )    No (    )

v. Indicate which of the following professionals were involved in the process.  
(check all that apply)

- (    ) **client/client representative**
- (    ) **design professionals (Architect/Engineers/cost estimators)**
- (    ) **Facility end users**
- (    ) **Planners**
- (    ) **marketing**
- (    ) **Finance (bankers, insurers)**
- (    ) **Regulatory bodies**
- (    ) **external stakeholders (MMDA's, local authorities, residents)**
- (    ) **suppliers**
- (    ) **specify if others.....**



- vi. On the pre-project planning that you were involved in, indicate the level of stakeholder representation on the project team during the pre-project planning process? (please check one)

**Less represented ( )    fairly represented ( )    very well represented ( )**

- vii. On the pre-project planning that you were involved in, indicate your level of satisfaction with the team's meetings and productivity

**Less productive ( )    moderately productive ( )    very productive ( )**

- viii. How long did the pre-project planning or feasibility studies phase elapse before the commencement of the detailed construction documents?

**A. 1- 6 months    B. 6-12 months    C. 1-3 years    D. more than 3 years.**

- ix. Was the time allotted to undertake the feasibility studies/pre-project planning process sufficient? **Yes ( )    No ( )**

- x. Was the pre-project planning team properly resourced (money, time, relevant planning tools) by the client to undertake the process?

**Yes ( )    No ( )**

- xi. If yes, indicate your level of satisfaction with the resources given by the client to carry out the process?

**Under resourced ( )    moderately resourced ( )    adequately resourced ( )**

xii. How well was the project team motivated by the client to undertake the pre-project planning (PPP)?

**Less motivated ( )    moderately motivated ( )    very well motivated ( )**

xiii. Did the level of motivation affect the PPP team's productivity?

**Yes ( )    No ( )**

xiv. On the pre-project planning that you were involved in, what percentage of the project cost was used to fund the pre-project planning process

**A. less than 1%    B. 1-8 %    C. 8 -16.5%    D. more than 16.5%    E. Not funded**

xv. On the pre-project planning that you were involved in, indicate the level of project scope definition prior to the design of the detailed construction documents. Please. Indicate one option.

**( ) complete definition**

**( ) Minor deficiencies**

**( ) Some deficiencies**

**( ) Major Deficiencies**

**( ) Incomplete/poor definition**

xvi. On the project which you were a member of the Pre-project team, based on the original scope of work for the facility set prior to the detailed design/development of the construction document and construction, rate how the facility matches with the original intent.(please check one )

( ) **very Different**      ( ) **fairly matches**      ( ) **closely matches**

xvii. If the facility was very different from the original intent, please specify what caused the changes? .....



## SECTION B

### **Factors affecting pre-project planning (PPP)**

*From your experience in pre-project planning/feasibility studies/construction, which of the following are the important factors affecting pre-project planning in the Ghanaian construction industry. Please rank (by checking √) on the scale of 1-5, your level of agreement with these factors as outlined below. Where **1=strongly disagree**, **2 = disagree**, **3 = neutral**, **4 = agree**, **5 = strongly agree**.*

|    | <b>Factors affecting pre-project planning</b>                              | <b>level of Agreement</b> |   |   |   |   |
|----|--|---------------------------|---|---|---|---|
|    |  | 1                         | 2 | 3 | 4 | 5 |
| 1  | lack of a clear process for pre-project planning                           |                           |   |   |   |   |
| 2  | Relevant Stakeholder representation  |                           |   |   |   |   |
| 3  | Lack of personnel to undertake the process                                 |                           |   |   |   |   |
| 4  | Funding  |                           |   |   |   |   |
| 5  | Time   |                           |   |   |   |   |
| 6  | Project team leadership  |                           |   |   |   |   |
| 7  | Roles and responsibilities of team members                                 |                           |   |   |   |   |
| 8  | Effective and open Communication within the team and with stakeholders     |                           |   |   |   |   |
| 9  | Rewards and recognitions   |                           |   |   |   |   |
| 10 | lack of consensus regarding project goals                                  |                           |   |   |   |   |
| 11 | Timely productive team meetings  |                           |   |   |   |   |
| 12 | authorizing the project execution before pre-project planning is completed |                           |   |   |   |   |
| 13 | Political insensitivity  |                           |   |   |   |   |
| 14 | Planning tools   |                           |   |   |   |   |

## SECTION C

Impact of factors affecting pre-project planning

*The following are the possible impacts of ill-pre-project planning in the Ghanaian construction industry. Please rank (by checking The Following √) on the scale of 1-5, the importance of each. Where 1=Unimportant, 2 = of little importance, 3 = moderately important, 4 = important, 5 = very important.*

If you have any other factors apart from the ones below, indicate in the empty spaces provided and rank its importance.

|                    | POSSIBLE IMPACT             | LEVEL OF IMPORTANCE |                                |                                |                  |                          |
|--------------------|-----------------------------|---------------------|--------------------------------|--------------------------------|------------------|--------------------------|
|                    |                             | Unimportant<br>(1)  | Of little<br>importance<br>(2) | moderately<br>important<br>(3) | important<br>(4) | very<br>important<br>(5) |
| 1                  | Project cost                |                     |                                |                                |                  |                          |
| 2                  | Project completion time     |                     |                                |                                |                  |                          |
| 3                  | Project profitability       |                     |                                |                                |                  |                          |
| 4                  | Quality of work             |                     |                                |                                |                  |                          |
| 5                  | Stakeholder conflict        |                     |                                |                                |                  |                          |
| 6                  | coordination Issues         |                     |                                |                                |                  |                          |
| 7                  | Demoralization of parties   |                     |                                |                                |                  |                          |
| 8                  | conflict with third parties |                     |                                |                                |                  |                          |
| 9                  | Excessive change orders     |                     |                                |                                |                  |                          |
| 10                 | Environmental issues        |                     |                                |                                |                  |                          |
| <b>TOTAL SCORE</b> |                             |                     |                                |                                |                  |                          |

**THANK YOU FOR YOUR TIME AND CONTRIBUTION.**