

17

AN INVESTIGATION INTO THE ROLE OF PLANNING IN MANAGING DELAYS IN CONSTRUCTION PROJECTS

BY

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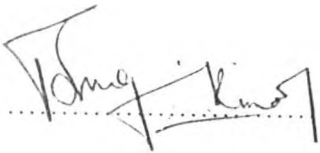
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DECLARATION

I, Samuel Mugo Kimani, hereby declare that this research project is my original work and has not been presented for a degree in any other University.

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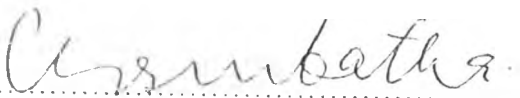
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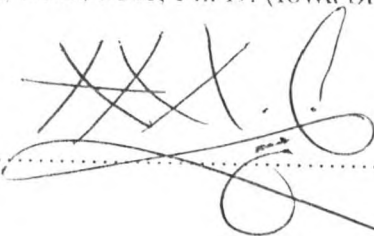
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DEDICATION

To all players in the construction industry who appreciate the value of planning, and to God the Master Planner.

ABSTRACT

In the construction industry the success of a construction project can be measured using the criteria of time, quality and cost. Among these, time is the most challenging and indeed construction projects have continued to experience the problem of delays.

This study investigates the role of planning in managing the delays in projects. In construction, poor planning leads to delays and planning has a direct effect on the time performance. The management function of planning, as it relates to construction, is discussed and the relationship of planning parameters to the causes of delays studied. The study involved a survey of 33 delayed construction projects in Kenya. Data on planning parameters was collected and analysed to establish the relationship between level of planning and the causes of delay. Planning in this study is examined from the Contractor's perspective, Consultant's perspective and Client's perspective.

The study establishes the key planning dimensions as design plans, adequate finance planning and the planning for the construction processes. The planning currently done by the construction industry players was found to be inadequate and is one of the causes of delay. The study recommends that the key planning dimensions be observed more seriously to help limit the problem of delays. There is need for more qualified planners in the construction industry and the responsibility of planning and time performance be undertaken by the project manager.

TABLE OF CONTENTS

	Page
Title	(i)
Declaration	(ii)
Acknowledgement	(iii)
Dedication	(iv)
Abstract	(v)
Table of Contents	(vi)
List of Figures	(ix)
List of Tables	(x)
List of Appendices	(xi)
Chapter I: INTRODUCTION	
1.1 Background	1
1.2 Problem statement	2
1.3 Objectives of the study	5
1.4 The research question	5
1.5 Significance of the study	6
1.6 Scope of the study	6
1.7 Study assumptions	7
1.8 Definition of terms	7
1.9 Outline of the study	8

Chapter II: LITERATURE REVIEW

2.1	Introduction	10
2.2	Planning definition	10
2.3	Issues in construction planning	18
2.4	Delays	26
2.5	Variations	27
2.6	Planning career	27
2.7	Current planning process in Kenya	28
2.8	Summary	35

Chapter III: METHODOLOGY

3.1	Introduction	36
3.2	Population, sample and sampling technique	36
3.3	Variables in the study	38
3.4	Data collection	44
3.5	Data analysis	44

Chapter IV: ANALYSIS OF DATA AND RESULTS

4.1	Introduction	45
4.2	The projects investigated	45
4.3	Descriptive analysis	50
4.4	Planning parameters and delay	60

Chapter V: CONCLUSIONS AND RECOMMENDATIONS

5.1	Conclusions	66
5.2	Recommendations	68
5.3	Areas for further research	69
REFERENCES		71
APPENDICES		74

LIST OF FIGURES

Figure 2.1: The overall planning process	11
Figure 2.2: Traditional procurement (Idealised)	30
Figure 2.3: Traditional procurement (Actual)	30
Figure 4.4 Pie chart: Representation of the causes of delay	64

LIST OF TABLES

Table 4.2a: Planning performance by the project type	47
Table 4.2b: Planning performance by the Client category	48
Table 4.3a Summary of findings - Data from Consultant firms	51
Table 4.3b Summary of findings - Data from Construction firms	51
Table 4.3c Summary of findings - Data from Clients	52
Table 4.4a: Analysis of Delay causes: - Sample from Consultants	61
Table 4.4b: Analysis of Delay causes: - Sample from Contractors	62
Table 4.4c: Analysis of Delay causes: - Sample from Clients	63
Table 5.1: Summary of planning parameters	67

LIST OF APPENDICES

Appendix 1: Letter of introduction to firms	74
Appendix 2: Questionnaire	75

Chapter I

INTRODUCTION

1.1 Background

Construction time is of great importance to the investor of a construction project and to all the parties involved in the construction activity. This study investigates the quality and level of preparation and control of projects in Kenya. The main objective of this study is to highlight the role of planning in minimizing delays among construction projects.

Time and cost overruns are very prevalent in construction projects and causes of these overruns have been studied in previous researches such as Mbatha (1986), Wachira (1996), Baradyana (1996), Bromilow (1969), Hughes (1989), Mbeche (1996), Kivaa (2000) and Radujkovic (1999). Planning as a management tool can be used to minimize delays and poor planning among clients, contractors and consultants explains the existing delay problems among construction projects in Kenya.

In a construction project, if the estimated time required for completion is fairly accurate and the control process implemented to ensure the project remains on schedule, then delay should not occur. Planning in a project consist of the initial time estimate and the control process plus the associated resource plans. Existence of delays in construction projects suggests lack of adequate planning.

1.2 Problem Statement

Delay in construction is the hindrance to smooth progress of works resulting in late completion as compared to the completion time initially envisaged. Poor planning or lack of it leads to delays and therefore planning has a direct effect on time performance. It is in this regard that planning is considered an important parameter when solving the problem of delays in construction.

Most construction projects are organised in such a way that before commencement of the work on site, designs are prepared and cost and time duration estimated. With the parameters of quality, cost and time having been well estimated and specified at the initial project planning phase and proper project controls put in place, then the project should be completed within acceptable time period and within cost and quality allowables. Previous researches on delays have determined that this is not the case in most construction projects, hence there exists a problem either in the initial plans or in the control of the plans during execution phase.

Previous researches by Mbatha (1986), Wachira (1996), Baradyana (1996), Bromilow (1969), Hughes (1989), Mbeche (1996), Kivaa (2000) and Radujkovic (1999) observed major causes of project delays as: (a) Unsolved financing of the project (b) design changes during execution (c) unrealistic plan and short time for execution (d) materials, plant or labour shortages and (e) climate – inclement weather.

In Kenya, the traditional construction industry's organisation consists of the client, contractor and the consultant and each of these key players develops his or her own plan. The client would have the overall project outline plan that gives the time duration for the different work phases. The client would know with a fairly good level of accuracy, the time and resources required for the pre-contract stage. The consultants would prepare the plan for the design and tender phases while the contractor would prepare the plan for the construction phase.

To analyse the above dominant causes of delay given the fragmented nature of organisation of the construction industry, one would have to look at planning from the client's perspective, contractor's perspective and consultant's perspective. Also since these different plans have to be made to work together, there is need for someone to merge all the plans in order to achieve successful construction project.

In Kenya, the exercise of time estimation is carried out by the contractor at the tender stage or by consultant during the design stage. The level of planning done in order to estimate correct time duration is in doubt as revealed in the causes of delay mentioned above. For instance the legal and other requirements for the construction process are clearly defined by law and local authority regulations. (Agreement and Schedule of Conditions for Building Contract, 1996) Time is required to obtain the necessary approvals from municipal authority and relevant government bodies. Experienced planner therefore needs to allow sufficient time for the bureaucratic processes involved.

The client is responsible for financing the project and sufficient plans are to be made to avoid problems of partial financing. Contractors expected cashflows are to be fairly accurate to assist the client arrange the required finances on time. In the construction industry, work is performed in contracts where the client and the contractor enter into contract agreements. The contract specifies the contract time period and the payment terms applicable. It is not uncommon to find a client entering into such a contract agreement, whereas the full project financing has not been arranged and confirmed. (Radujkovic, 1999). It is this lack of finance planning that often leads to delayed payments to contractors hence frustrating work progress.

Time required for undertaking individual work tasks is based on the productivity of the resources used in the work. Realistic productions are to be used and some reasonable allowance made. The process of computing the time for doing work is made easier and more accurate by using computer programmes but still realistic plans

and production estimates are to be used. Productivity data on labour, plant and materials is to be used by the planner to realise accurate plans. Work is to be organised professionally and resources planned. Shortages of resources of materials, plant or labour signify poor or inadequate plans. Planning for construction project should provide for timely and cost effective delivery of resources on site and to required quantities and quality.

Design changes during project execution is caused either by: (a) decision to start project before total technical documentation is finished and accepted (b) additional demands for functional changes (c) inaccuracy, incompleteness or late update documentation. (Radujkovic, 1999). All these scenarios, if taken care of in the plan, would minimize delays. Similarly, lack of consideration to these factors leads to design changes while construction work is in progress resulting to delay.

Construction activity is often affected by weather. Unless the inclement weather is totally unexpected at the planning stage, the effects of weather should be allowed in the time estimate and should not be a cause of delay. Problems of starting work in unfavourable weather conditions or not considering weather in the plans often lead to delays.

There is a cost associated with the preparation of necessary plan but the cost incurred by failure to plan is much greater. Some of the planning requires getting the necessary information and to ensure no surprises at the project execution phase. With experience and theoretical knowledge, sufficient planning can be achieved in construction projects.

1.3 Objectives of the study

The objectives of this study were:

- i) to highlight key planning parameters to be observed in construction projects as a minimum requirement for managing delays in construction projects.
- ii) to establish the level and adequacy of planning and controls currently done by the clients, contractors and consultants and
- iii) to investigate the reasons why the task of project planning is not undertaken by a separate individual / organization and establish whether the role should be undertaken by the project manager and under what circumstances.

1.4 The research question

The research question in this study is:

Is inadequate planning currently done for construction projects the cause of delays?

The causes of delay in construction projects are related to lack of adequate preparation. The planning in the construction project can be considered in phases of design stage and pre-contract stage. At the construction stage the control function is used to ensure that the project is executed within the initial plan.

The number of players involved in construction and the number of unknown information details complicates the planning aspects. For this reason there is need to make deliberate effort to prepare a formal plan where all important planning aspects are taken care of and time schedule prepared which combines all the different plans.

1.5 Significance of the study

- The study is significant as it proposes the management function of planning as an important method of managing delays in construction projects. In traditional methods of administering construction projects too many planning aspects are left to chance and planning done informally. If projects are well planned they will be completed on time and this will reduce costs, save money and minimize conflicts among players in the industry. This study endeavours to highlight the role of planning in construction management and proposes a culture of well planned projects as an effort to minimise delays.
- The study seeks to establish reasons why construction industry players do not undertake adequate planning and suggest remedial action. By using the highlighted key planning parameters, the players in construction industry will be able to plan better and the planning requirements can be enforced through the contract conditions.
- The study highlights the role of the project manager as the person responsible for planning as he is the overall responsible for the completion of the project within time and cost and he is in a position to integrate individual plans from the other parties.
- The study provides insight to practical actions required to control cost and time overruns and also provide further facts for the necessity of change to the traditional procurement method.

1.6 Scope of the study

The scope of this study is limited to completed construction projects that experienced delays. This is because the study aimed at analysing the causes of the delay and investigating the role of management function of planning to eliminate or reduce delays in construction projects.

This study investigated only the main causes of delays established from previous researches. This included delays due to design, financial and contract planning parameters. Although these delay causes may not be exhaustive, they comprise the major reasons for delays in most construction projects and are deemed sufficient for the study.

1.7 Study assumptions

- 1) Data obtained is accurate and reliable and therefore meaningful recommendations can be made on analysis of such data.
- 2) The study assumes that the findings from previous researches on the major causes of delay are fairly accurate and that other causes of delay not established or not identified as major causes have little significance in the planning of construction projects.

1.8 Definition of terms

Following is the working definitions of terms used in the study:

- *Delay* – the delay referred to in this study is the physical time above the initial contract period, that is the delay / time overrun during the construction phase.
- *Planning* – this is the management function that involves setting of goals, selecting the most optimal and deciding how best to achieve them.
- *Design changes* – this refers to any variation to the initial design made during the construction phase and which may cause delay.
- *Design time* – the time allowed to undertake design work to sufficient detail to enable construction work proceed uninterrupted.
- *Buildability* – this is synonymous to constructability and refers to the goal of producing the best construction product by making the best possible use of resources.

- *Pre-contract planning* – this refers to the initial plans made prior to entering into a contract agreement between parties involved in construction. It involves setting out overall construction programme and milestones.
- *Planning process* – this refers to the planning activity where the planner uses available data on resources to determine time duration for activities in construction.
- *Planning skill and tools* - this is the knowledge / expertise of the individual undertaking planning using the required tools to achieve good management of construction time.
- *Time control* – this is the act of tracking the project time schedule to ensure that works are done within the initial planned time programme.
- *Finance planning* – in this study finance planning refers to plans made by the client to ensure that all due payments for services provided are made as required to avoid disruption of works.

1.9 Outline of the study

The study is organized in five chapters, chapter one discusses the problem of delays in construction projects and the inadequacy of traditional procurement method in managing time and cost overruns. The key element of planning is identified as important in managing the delays in construction projects and the problem of lack of inadequate planning described. The objectives, hypothesis and scope of the study are stated.

Chapter two defines planning in construction project perspective and identifies issues in construction industry in Kenya and abroad. The management function of planning is discussed and important factors identified that require attention in project planning to manage delays.

Chapter three describes the methodology employed in conducting the study. This includes discussion on the target population, sampling technique, data collection methods and measurement criteria for the variables and data analysis procedures. Chapter four presents the data and its analysis while chapter five contains the conclusions and recommendations and suggestions on areas that need further research.

Chapter II

LITERATURE REVIEW

2.1 Introduction

The purpose of this study is to establish the level and adequacy of planning and controls currently done by clients, contractors and consultants in the construction industry. The study also aimed at highlighting key planning parameters to be observed in construction projects as a minimum requirement for managing delays.

The chapter on literature review covers the definition of planning in the construction project and highlights information on contributions that have been made by other scholars in the subject. The review identifies the problems or issues addressed by the previous works and a critical analysis made to show how these studies relate to the objectives of the study.

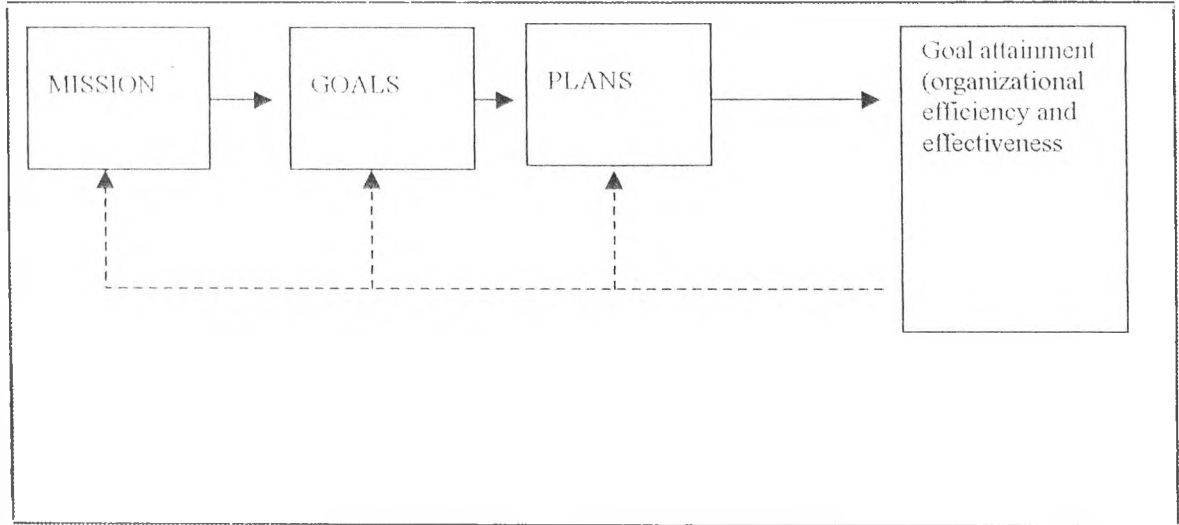
2.2 Planning definition

Planning is the management function that involves setting goals, prioritizing these goals and deciding how best to achieve them. An organisation without planning is like a sailboat minus its ruder. Planning provides a basis for the other major functions of management: organising, leading and controlling by charting the course and providing steering mechanism. (Kathryn & David, 1991). The planning function encompasses both goals and plans. Whereas a goal is a future end result that an organisation wants to achieve, a plan is the road map used for attempting to achieve the set goals.

The overall planning process is summarised in Figure 2.1 below and the planning process essentially builds on the mission of the organisation. The mission is the organisation's purpose or fundamental reason for existence. The success of a project is built on the hope

that the setting of goals and developing of plans leads to goal attainment and ultimately to organisational efficiency and effectiveness.

Figure 2.1 The overall planning process



Source: Kathryn & David, 1991

Construction planning is fundamental and challenging activity in the management and execution of construction projects. It involves the choice of technology, the definition of work tasks, the estimation of required resources and durations for individual tasks, and the identification of any interactions among the different work tasks. A good construction plan is the basis for developing the budget and the schedule for work. In construction planning, it may also be necessary to make organisational decisions about the relationships between project participants and even the organisations to include in a project. Poor planning in construction may be evident in budget and time overruns and strained relationships among the project participants.

A planner in construction begins with a result, that is a facility design and must synthesise the steps required to yield this result. Essential aspects of construction planning include generation of required activities, analysis of the implications of these

activities and choice among the various alternative means of performing activities. Construction planners also face the challenge of choosing the best among numerous alternative plans and the planner must be able to imagine the final facility as described in the plans and specifications.

In developing a construction plan, the planner may adopt primary emphasis on either cost control or schedule control. In cost or expense oriented plans, a distinction is made between costs incurred directly in the performance of an activity and indirectly for the accomplishment of the project. Scheduling of work activities over time is critical and is emphasized in the planning process. In this case the planner ensures that the proper precedences among activities are maintained and that efficient scheduling of the available resources is adhered to. Traditional scheduling procedures emphasize the maintenance of task precedences resulting in critical path scheduling procedures. Most complex projects require consideration of both cost and scheduling over time, so that planning, monitoring and record keeping consider both the dimensions and integration of schedule and budget as critical.

Construction planning is not an activity which is restricted to the period after the award of a contract for construction. Planning is an essential activity during the facility design. Also, if problems arise during construction, re-planning is required. This aspect makes construction planning and controlling inseparable. This aspect of planning and controlling makes the position of qualified planner necessary for a successful construction project.

Today's construction industry is probably more competitive than ever before. The construction process requires the converting of architectural concepts, structural designs, engineering drawings and specifications into real structures involving a complex inter-relationship between good business management and modern construction technology. (Planning Services, 2003)

The modern approach by management to construction has evolved from the ancient art of building, in which a single master builder designed, constructed and controlled all aspects

of the project. This often took relatively long time to accomplish. Unfortunately, through fragmentation, evolution specialisation and the commercial need for speed, the single master builder option has generally disappeared and a team approach evolved. The total project team now includes the contractor and his subcontractors, the owner, the designer, the owner's technical staff, and peripheral groups of consultants and government inspectors. With all these building professionals and organisations involved, each with their own vested interests, co-ordination becomes a challenge. (Planning Services, 2003)

Most of the causes of delay in construction projects may be mainly the consequences of the fragmentation of the process itself. Perhaps the solution to the delay and cost overruns in construction lies in the ability to integrate the construction process by co-ordination of the different phases and people involved. Although not much research exists in this area in Kenya, experience and observations indicate that planning provide a means in which this task can be implemented and monitored in a cost effective way.

Various researches have worked on establishing accurate ways of estimating construction time (Kivaa, 2000). The determination of the construction time is in effect setting a goal and this is an important exercise as the control aspect of planning will be ineffective if the time set is inaccurate. With the goals established, plans are developed and monitoring process carried out through the use of Gantt charts, Bills of Quantities, cash flows etc. However more research is required in order to turn goals and plans into an efficient and effective construction management system.

2.2.1 Linking goals and plans

Goals and plans are closely related and though goals may be established, they will have little meaning unless careful consideration is given to how the goals will ultimately be achieved. While goals are the desired ends, plans are the means that will be used to bring about the desired ends. Developing of plans is of importance when one considers that

there may be more than one means of reaching a particular goal (Kathryn & David, 1991).

In the construction industry, the goal of having a constructed facility completed in a given time, within specified cost and quality requires planning. There are strategic, tactical and operational plans and the type of planning required differs according to the management level in the organisation. Strategic plans are detailed action plans mapped out to reach strategic goals. Strategic plans address such issues as how to allocate resources, and actions to be taken to create a unified organisation. Tactical plans are the means charted to support implementation of the strategic plan and achievement of tactical goals. Tactical plans are more specific and concrete than strategic plans and consider intermediate time frame. In developing tactical plans, a number of possibilities may be considered before setting a particular plan. The plan is of course subject to change should things not progress as expected. Operational plans are means devised to support implementation of tactical plans and achievement of operational goals. Operational plans consider relatively short time frame, such as requirements for a few weeks or days (Kathryn & David, 1991)

Plans can be categorized according to the extent to which they will be used on a recurring or outgoing basis. There are two types of plans: single use plans and standing plans. Single use plans are aimed at achieving specific goals that once achieved, will most likely not recur in the future. There are two major types of single use plans: the programmes and projects. A programme is a comprehensive plan that coordinates a complex set of activities related to a major nonrecurring goal. Programmes usually include six basic steps of dividing what is to be done into major parts; determining the relationships among the parts and developing a sequence; deciding who will take responsibility for each part; determining how each part will be completed and what resources will be necessary; estimating the time required for completion of each part; and developing a schedule for implementing each step. Programmes frequently have their own budgets. (Kathryn & David, 1991)

A project is a plan that coordinates a set of limited scope activities that do not need to be divided into several major projects in order to reach a major non recurring goal.

A standing plan is the one that provides ongoing guidance for performing recurring activities. There are three main types of standing plans namely; policies, procedures and rules. A policy is a general guide that specifies the broad parameters within which the organisation members are expected to operate in pursuit of an organisation's goal. Policies do not specify the actions to be taken but spells out important constraints.

A procedure is a prescribed series of steps to be taken under certain recurring circumstances. Procedures provide detailed step by step instructions as to what should be done. As such, they do not allow much flexibility or deviation. (Kathryn & David, 1991). In the construction industry, procedures are commonly used in method statements for various items. For a given work item, especially complex work items, work method statements are necessary in order to have prior plans of how to undertake the activity in a correct and coordinated manner. This in effect promotes efficiency in time, costs and enhances safety in work places.

A rule is a statement that spells out specific actions to be taken or not to be taken in a given situation. In construction, rules are mostly used in control of quality, time and cost and are mostly spelled out in specifications, drawings and conditions of contract. In order to achieve the required labour output, a construction site can, for example, have rules of working times.

2.2.2 Choice of technology and construction method

In the initial project concept stage, appropriate alternative facility designs are developed and similarly choices of appropriate technology and methods of construction should be well structured as these are critical ingredients in the success of a project. For example, a decision whether to pump or transport concrete in buckets will directly affect the cost and duration of tasks involved in building construction. The exact implications of different

methods depend upon numerous considerations such as working or access space and available resources. This information is best provided by contractors who have the experience and it may therefore be important to have some involvement of contractors during the design stage to help assist in the choice of technology and construction methods.

2.2.3 Defining work tasks

At the same time that the choice of technology and general method are considered, a parallel step in the planning process is to define the various work tasks that must be accomplished. These work tasks represent the necessary framework to permit scheduling of construction activities, along with estimating resources required by the individual work tasks, and any necessary precedences or required sequence among tasks. The terms tasks or activities when used in construction plans refer to specific defined items of work. Scheduling involves determination of appropriate set of activity start time, resource allocations and completion times that will result in timely and efficient completion of the project.

Construction planning is the necessary for-runner to scheduling. In this type of planning, defining work tasks, technology and construction method is typically done either simultaneously or in a series of iterations. There are several computer programmes available for the scheduling process itself. However, the task of defining activities, determining their relationships and estimating activity durations require skill, judgement and experience of the construction planner.

2.2.4 The role of the planning process

The overall planning process of the mission, goals and plans can play a vital role in making the construction activity more efficient and promote innovation. The mission which stems out primarily from the highest levels of the organisation can be spelled out

in project mission statements, which can highlight the target dates and budgets for a project. The mission can address general areas, which encourage innovation and motivate construction players towards observing time schedules.

The goals component of the planning process can support construction activity by spelling achievable time periods for construction projects. Various research work has been done on how accurate time estimates for construction can be realized (Kivaa, 2000). Time set using realistic and achievable productions of both labour and plant encourages *efficient use of resources*.

Goals set can be realized by establishing plans. Plans can also be used to help achieve goals that have been set and require innovative ways to be realized. Often a client in the construction industry suggests the time when the constructed facility is required and the contractor has to innovatively plan to meet the set time.

2.2.5 Potential obstacles of planning

Several potential obstacles threaten the ability of organisations to develop effective plans. A rapid change of environment makes planning more difficult because plans must be altered frequently. Variations in construction are often the result of changes in clients' requirements. When looked at critically, the changes introduced by clients during construction could be avoided if functional details are evaluated and finalised prior to commencement of the site works. What is generally believed to be unforeseen detail or additional details can actually be established and allowed for in the initial plans and designs. The other parameters that often lead to delay are really not change in environment but a lack of planning in the initial stage. For example, a delay caused by non-timely delivery of a certain construction material may be due to lack of proper procurement procedures since the particular material may be readily available in the market. If a particular material that causes delay is not readily available in the market the preparation of plans allows extra time for the manufacture or importation of the material.

Another obstacle to effective planning is perhaps a misconstrued attitude among some managers that planning is unnecessary. This is common when managers have at least a general idea in their thinking about future directions and means of reaching organisational goals. As quoted by Kathryn & David (1991), Steve Bostic argues that plans must be on paper. *"I want people to buy into the plan, so it isn't just my plan anymore. It becomes theirs as well. That way, I know everybody is following the same road map when we go out into the real world"*. For construction activity which involves people with various and different technical and cultural backgrounds, it is important to have plans and construction programmes with sufficient detail to ensure that all parties are working towards a similar goal.

The day to day work pressures on managers that may take managerial attention away from planning even when they believe planning is beneficial, and this may lead to inadequate planning by the managers. In the construction industry where the project manager has a lot of other responsibilities, it is beneficial to have a specific individual to do the planning and scheduling. Care must however be taken as effective planning can sometimes be thwarted if staff specialists are allowed to dominate the planning process leading to low involvement by managers who must ultimately implement the plans. Yet another barrier to effective planning is poor preparation on line managers in terms of their planning knowledge and skills. It is of great importance that persons doing planning have site experience as this enhances the ability to create meaningful and logical sequences in the plans.

2.3 Issues in construction planning

The subject of time and cost overruns has drawn the attention of several scholars who have endeavored to study the problem from various perspectives such as Talukhaba (1988), Kivaa (2000). Some of the issues studied and which have a relation to this study are discussed and parallels or variations described.

2.3.1 Methods of estimating time

Kivaa (2000) describes the two time estimating methods as: (i) Non-Mathematical method: In this method, estimators use their own intuition based on skill and past experience (ii) Mathematical method: In this method the estimator uses the mathematical formulae in predicting the construction period. Mbatha (1986) notes that contractors relate the project scope to the expected expenditure per week to come up with the number of weeks required to complete the works.

The Ministry of Roads and Public Works has some guidelines of estimating contract periods based on experience in past public projects. The guidelines attempt to match the contract period with the contract value and based on the finances set by the treasury for the project.

As observed by Bromilow (1969) and Mbatha (1986), the use of non mathematical methods for project time estimates often produces unreasonably expectations and gives time targets that are hardly ever met in executing the works. This probably explains the time and cost overruns in projects as observed by Kaka and Price (1991), Mbatha (1986), Mbaya (1984) and Talukhaba (1988). There are many factors that influence construction time and the factors may not be interrelated and thus the need for experience and quantitative analysis of data (De La Gaza & Ibbs, 1991).

Mathematical method make use of mathematical formulae in predicting construction period. Researchers have previously developed mathematical formulae such as Bromilow (1969), De Leeuw (1988), Walker (1995) and Kivaa (2000). Though the mathematical model so developed give more accurate time estimates than the non-mathematical method, Chan and Kumaraswamy (1995) and Kaka and Price (1991) observed that their application needs the planning management tool to increase their effective use.

Various researchers, (Bennett 1985, Walker 1995 & Sidwell 1984) seem to suggest that construction time performance is determined by various factors which can be grouped into scope, complexity and environmental factors. The models so derived have important aspects and although most models confirm the relationship between time and cost of projects, the models may not give accurate time estimates, and even if the time estimate was correct, the management aspect needs to be emphasized in order to manage the time performance of the project. Walker's (1995) model on non-scope oriented factors may be more practical compared to other models (Kivaa, 2000), although it is observed that this model may not be considered usable for prediction at the pre-contract stage, it does attempt to explain better the variance between actual predicted and actual time performance.

In the setting of project time, the scope factors can be determined and provided for in the schedule. The construction project environment comprises many variables, which are dynamic and uncertain but predictable. The variables include: cultural, economical, political, social, physical, aesthetic, financial, legal, institutional and technological factors (Ahuja & Nandakumar 1985, Bennett 1985, Hughes 1989, Walker 1995).

Project environments interfere with the planned progress. The various environmental variables have different influence at various construction phases (Bennett, 1985). Bennett and Ormerod (1984) indicate that environmental interference contribute to up to 15% of variability in the construction period. Although the study was done in United Kingdom, this finding suggests that the influence of the environment can be modeled, to a certain degree. Though such a model can be established, the significant way to control the effect of environmental change is to employ the planning management tool. This would perhaps control the adverse effects of the changes of environment by highlighting the critical areas at the initial stages of the project and also act as a control mechanism during the construction phase.

With the advancement of technology and development of computer programmes such as Microsoft Project and Suretrack, accurate time schedules can be produced that consider the various work items and their interrelations. When the various work activities are listed in a sequence, time to complete each activity is allocated based on the resources available and their productivity. Productivity in this case may be defined as the work output over a given time duration. This is the critical aspect in generating an accurate time schedule as experience is required and correct data on productivity of plant, labour and material resources established.

2.3.2 Client effects on project performance

In a study on cost and time performance of construction projects, Talukhaba (1988) did an investigation on clients and their influence in the construction industry. It was concluded that conditions associated with different clients have an influence on time and cost performance of projects. However, the assumption that there is homogeneity in the process of project inception, design, construction and supervision and that pre-contract issues have no influence over project performance in terms of time and cost may be incorrect. These are directly determined by the client and indeed the pre-contract issues have a large effect to the project performance. Design and finance planning are mainly determined in the initial project stages by the client and his consultants. Since finance and design issues feature as the main causes of delay, this may imply that the client has significant role to play in delay management. For example, this study endeavours to determine whether delays as a result of financial problems in projects is due to poor financial planning by clients.

Time taken and cost incurred to complete a project are the most widely used measures of project success. Talukhaba (1988) indicated that seventy three percent of projects examined had time overruns as compared to thirty nine percent which had cost overruns. Sidwell (1984) and Harris (1986) observed that client involvement in the project had far reaching effects on satisfactory completion of a project. Harris (1986) concluded that

many clients do not clearly establish their construction requirements before approaching professionals in the construction industry.

Successful rationalization in the building industry requires examination of the design and construction process together and their development as an organic whole. The design and production should then be linked with contractual procedures and the whole process treated as one (Sidwell 1984 & Harris 1986). The view to have the construction process managed as one whole has been supported by many scholars. Collier (1974) notes that the increasing complexity of technology and the construction process have created a situation in which the design team and the contractor cannot be responsible for all the specialized work involved. Probably the need now exists to have a project manager to represent the client and to co-ordinate various tasks.

Mbaya (1984) also notes that poor performance of the construction process is due to lack of a fundamental framework of management organisation theory and this supports the views of Wai (1980), Sidwell (1984), Harris (1986) and Brooks (1986). The incorporation of management theory framework within the existing set up of the construction process is important if the proponents of the management theory are to succeed in the effort to use management to improve construction performance. Hence the study on planning in construction industry is important to establish the necessary process and to highlight to clients the required adjustments to traditional procurement processes.

Previous researchers have made effort to establish the causes of delays but there is need for more work in the area of application of management theory in solving the problem. As stated above, the management theory will only be effective if applied in the existing construction industry organisation. This research makes effort to incorporate the planning function of management in the construction industry framework to control delays and in extent cost overruns.

2.3.3 Project Planning and Control

Planning essentially entails formulating and prioritizing objectives, deciding on actions to be taken to achieve and what organisational position is assigned to each objective and who would be responsible for the actions needed (Harold, 1980). Planning and control are inseparable. Unplanned actions cannot be controlled because control involves keeping activities on course by correcting deviations from plans. Attempts to control without plans would be meaningless since there is no way for people to tell whether they are going where they want to go (the task of control) unless they know first where they want to go (the task of planning). Plans therefore provide the bases of the level of control required.

In construction, planning is applied to ensure that work is carried out with maximum economy and efficiency. The following have been suggested as common causes of uneconomic work (Lee, 1981):

- 1) Non-productive time caused by excessive travelling from job, waiting for instructions and materials, failure to gain access to site, inclement weather, etc.
- 2) Improper work methods resulting in more time being spent on the job than necessary and waste of material.
- 3) Inappropriate tendering procedures and contract arrangements in relation to type of work and prevailing market conditions.
- 4) Changes to the nature and scope of the work after commencement.
- 5) Lack of efficient system of recording and controlling.

Modern construction has become more complex and there is increasing need to control cost and time performance of construction projects. Due to scarcity of resources, clients have become more conscious of costs and time aspects, while contractors and consultant have little choice but to increase efficiency due to increased competition. It is only by proper planning that productivity of plant and labour can be realized and their efficient use and effective materials utilization achieved. During the tendering period the

productivity of the plant, labour and material must be considered in order to arrive at a realistic estimate upon which cost and time budgets are based. The budget allowance is then used to assess performance and control exercised.

The design and construction continuum must be seen as a production process from inception to completion and there must be a programme upon which the job is organized and control exercised (Foster, 1977). In the traditional procurement method, the contractor who is responsible for carrying out the work usually plays little or no role in the design of a project. Rarely do contractors contribute from their experiences on matters of construction, planning and nomination of subcontractors and choice of materials. In such circumstances the project does not benefit from the knowledge of the contractor in order for the project to be carried out efficiently, quickly and economically (Foster, 1977).

The pre-contract period is undoubtedly the most critical period in the life of a project. At this stage, critical planning decisions are made and it is here that contractors prepare their tender committing themselves to cost and time factors. It is not uncommon for the contractor to be requested to prepare the tender documents within the shortest time possible. In such an environment, unrealistic rates may be given in the Bills of Quantity due to human error, laxity or guesswork where if given time, accurate calculations would have been possible (Burgess & White, 1979).

The reasons why insufficient time is allowed for tendering range from lack of knowledge in what exactly entails in preparation of a tender to giving in to client's demand for the commencement of the works. Whatever the reason given for short tendering period, it is of paramount importance to provide sufficient time for tendering by the contractors.

Modern computer technology has developed programmes for planning both time and cost for construction projects. The starting point for project control is to prepare a production programme (Burgess & White, 1979). The programme shows what work will be done, when it will be done, the amount of labour, materials and plant needed. A technique

which has found particular application in construction is the critical path method (CPM). Writing on project planning and control, Antill & Woodhead (1970), Harris & McCaffer (1989) and Crooke & William (1998) acknowledge that the CPM is a powerful tool for the planning and management of all types of projects. The CPM presents a project plan by a schematic diagram or network that depicts the sequence and interrelation of all the components parts of the project, and the logical analysis and manipulation of this network in determining the best overall programme of separation.

The CPM network aids in estimating the time and cost of each activity. The control of time and cost is enhanced by observing the trend of actual progress, comparing the progress with the desired standard and taking corrective action. Success and effective use of CPM depends to a large extent on the accuracy with which future performance can be estimated (Antill & Woodhead, 1970). The accuracy of the estimates will depend on the nature and extent of work, work conditions, availability of labour, plant and materials and their prices, and also the skill and experience of the planner.

The correctness of the estimates is important as wrong estimates mean CPM cannot serve its useful purpose if the circumstances during the construction process change drastically. This also affects the usefulness of the CPM. But it is, however a powerful tool to control and monitor changes in the initial programme. CPM can only be used to control either time or cost at a particular moment. By changing one variable at a time the net result is evaluated and the best fit is applied. The CPM network is based on assumption that resources required are available to execute the plan. Often this is not the case and this is the greatest shortcoming of the CPM (Falukhaba, 1988).

There are other computer programmes developed for planning such as Microsoft Project, Suretrack and Time diagrams. All these are useful planning tools and their proper use enhances planning and control of project time schedules. For projects with less complicated inter-relationships of tasks or with few activities, a manual bar chart may suffice but these manual charts are quickly becoming obsolete planning tools.

2.4 Delays

In the construction industry, delays occur in many ways. There are delays caused by any of the parties involved in construction. For example, there are delays that emanate from the client as a result of delayed payments to the contractor and consultants. There are also delays caused by the design team due to failure to issue detailed design drawings at the required time. Contractors may also cause delays as a result of poor or lack of planning on materials, plant or labour resources.

Contract conditions applied in private and public projects often specify circumstances under which a contractor can be compensated for lost time by way of extending the contract time. If delay occurs due to one or more of the specified causes the contractor is awarded time extension. In such a situation the parties involved in the contract do not feel frustrated as the cause of delay is understood and often controlled. The causes of delay which cause frustrations and disputes in construction are the ones that emanate from lack or failure to do proper planning and are the subject of this study.

In the current contract conditions, perhaps efforts to avoid or control delays especially those that emanate from the client and the design team are not strongly emphasized. The clause on the liquidated damages mostly applies to the contractor and even here the penalties are rarely applied. Delays caused by the client or the design team need to be taken seriously and the contract conditions need to be reevaluated to strongly address causes of delay. This way all the parties to the contract will be more conscious of their actions and act more responsibly to avoid delays.

Delays in construction have a compounding nature where one delay leads to another and eventually resulting into a contract that goes beyond the contract period with costs sometimes escalating uncontrollably. For example, if the client delays payment to a contractor, this may mean critical works supposed to be done in a particular period are delayed and hence the effect of weather, for example, leads to further delays as a result.

2.5 Variations

Variations are alteration or modifications of the initial design, quality or quantity of the works as shown in the contract drawings and described in the Bills of Quantity, and include the addition, omission or substitution of any work. (Agreement and Schedule of Conditions for Building Contract, 1996)

Variation may arise in any of the following situations:

- i) When the client/architect needs or wishes to vary the design or specification.
- ii) When a discrepancy is discovered between any two or more of the contract documents, or with statutory requirements.
- iii) When an omission or error is discovered in the contract document.
- iv) Variation as a means to ease construction on site or improve buildability.

Investigations by Bromilow (1969) on the effects of variations to performance of projects found that variations are a source of time and cost overruns. Other works on variations include the committee of public accounts on public works department in Australia in 1971 which expressed the same sentiments and also noted that delays to contractors was as a result of variations and also a source of claims and disputes. Though variations may appear to be part and parcel of the construction process, there is need for thoroughness in design and planning to avoid changes later in the contract.

2.6 Planning career

The functions of control and planning in a construction firm are two fold: firstly to support the estimating department in providing tender programmes and method

statements and secondly to provide planning and co-coordinating services to site construction for tenders which turn in to contract.

In most companies, planners' skills are not fully utilized because of lack of a measured authority. For example, the estimator feels responsible for the tender while in the second situation, the site managers prefer to plan the work their work independently. This is compounded by distance and communication difficulties between the head office and the site. (Harris & McCaffer, 1989)

2.7 Current planning process in Kenya

It has been clear for some time that many clients have been unhappy with the service they receive from the construction industry. There are strong indications that relationships between participants in the construction process are strained by poorly planned and designed projects, lack of communication, mistrust, self interest and disputes, which often result in delays, disruption and extra cost. Continuous search for the solution to the problem of delay and cost overruns is therefore a priority in construction industry.

2.7.1 Time and money pressures

The management of time is a key prerequisite for a successful project. Time presents a big challenge in the construction industry. These problems arise because many projects are not adequately thought through and planned before starting on site, thereby causing frustration, delay and disruption, which are breeding grounds for claims and disputes. The reasons for these are; pressure from clients, budgets which have to be spent before the end of financial year or lack of money, slow process of consultation and approvals especially public sector projects and traditional method of design followed by short tendering period and award of contract to contractor. (Crooke & William, 1998)

The push pressures are to some extent counter balanced by pull-pressures of bureaucracy, e.g. tender advertising period, and time to comply with statutory requirements of health and safety planning.

2.7.2 Traditional Procurement

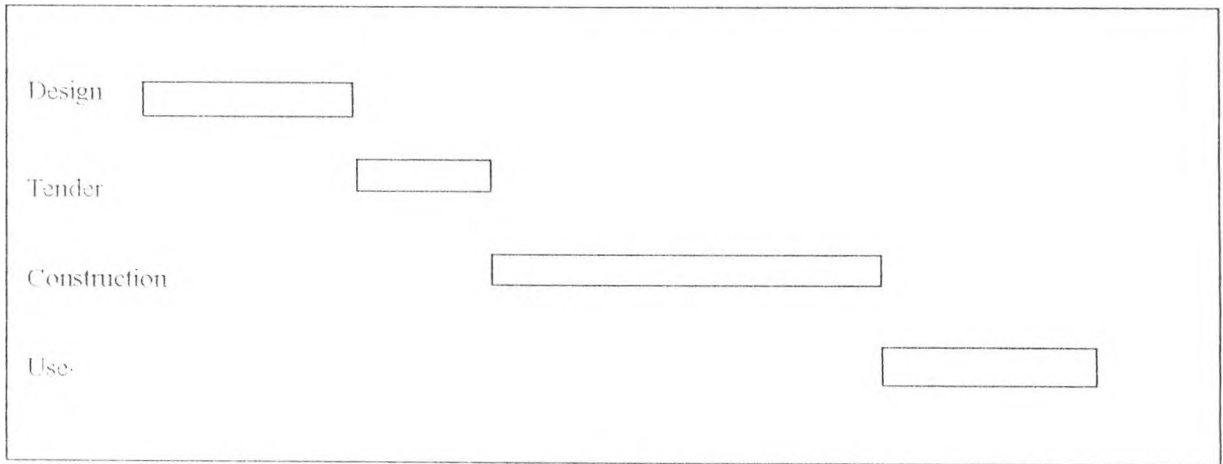
This is adopted where the client's design team is appointed to prepare a design before the choice of a contractor is considered. This can be considered to be a sequential or 'end-on' process where design and construction is separated by an intervening tendering period.

Traditional procurement has the advantage of price competition and ideally the procedure should work, provided that the following assumptions hold:

- The design is complete before the tender stage to ensure price certainty.
- The designer understands how construction will be undertaken to ensure buildability.
- The design does not change substantially during construction

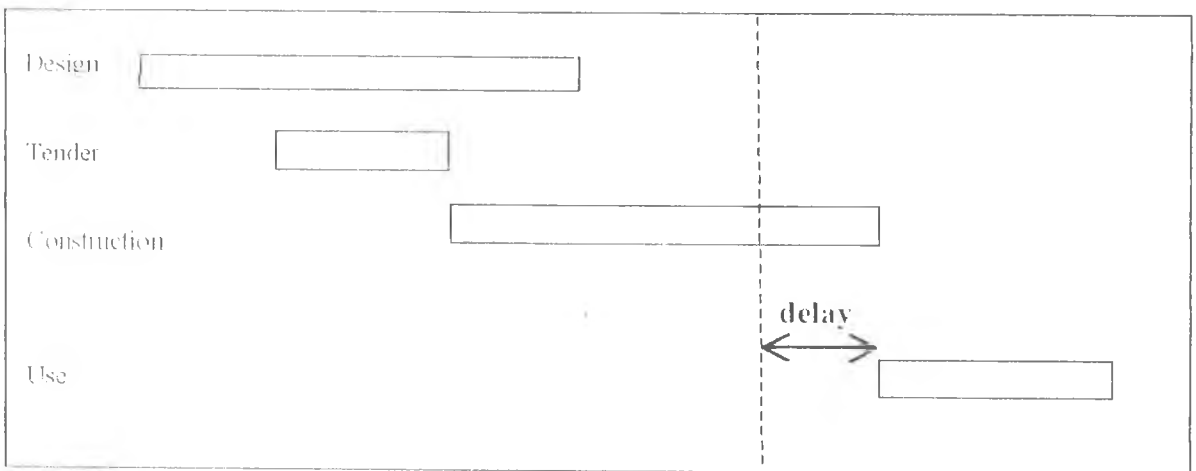
The idealized scenario is shown in Figure 2.2 below. The reality is somewhat different, however, as shown in Figure 2.3, designs are rarely complete before construction starts. With little or no contractor involvement in the design process, buildability may suffer, leading to insufficiency on site and delay and disruption when the design is changed or details awaited by the contractor. At its best traditional procurement is ideal for many clients, but all too frequently the end product is; time overrun, budget overspend, disputes, arbitration or litigation and in general terms a 'lose-lose' situation. (Crooke & William, 1998)

Figure 2.2 Traditional procurement (idealized)



Source: Crooke & William, 1998

Figure 2.3 Traditional procurement (actual)



Source: Crooke & William, 1998

2.7.3 The role of planning in construction contracts

Planning is an important part of the construction process without, which it is difficult to envisage the successful conclusion of any project. Without planning, effective control of time and money is impossible and this is true throughout all stages of the process from inception through to the design, tendering, construction and commissioning stages of a project.

2.7.3.1 Stages of planning

Planning usually starts with the client's team or organisation and can be considered to develop through four distinct and inter-related stages. (Crooke & William, 1998)

The stages are:

- | | | |
|--------------------------|---|------------|
| a) Project Planning | - | Client |
| b) Pre-tender Planning | } | Contractor |
| c) Pre-contract Planning | | |
| d) Contract planning | | |

Project planning is normally carried out by the client's agent / representative or project manager and this sets out broad framework for the project time scale including overall project duration, design and tendering periods, key dates for commencement and completion of construction and stages or phases handover dates.

Detailed aspects of planning by the contractor during the tender stage and prior to, and during construction, will take place within the parameters set by the client and or his advisers. In order to make planning more effective, it is usual to prepare a programme, with which to compare actual progress.

2.7.3.2 Financial plan and control

Control of the financial aspects of a project depends on sensible planning. During the design the overall budget is established with the aim of ensuring that the project cost is within client's external expenditure. From the budget, the cost plan is developed by a Quantity Surveyor who identifies how the budget will be spent. During construction phase of a project, financial planning is geared towards ensuring the most optimal use of available resources and managing the project cash flows. Bills of Quantities are normally used to arrive at the tender sum. The successful tenderer will analyse the priced bill and establish budgets or spend targets for each of the main construction activities such as; preliminaries, substructures, drainage, walling, roofing finishes etc. These budgets will then be monitored against the actual expenditure.

2.7.3.3 The contractors' programme

This is based on the start and completion dates specified or on specific completion period or contractors own period stipulated in contractors tender. Contractor prefers a programmes that are based on their own assessments because:

- The stipulated period is unrealistic
- Longer period may be acceptable to the client which then reduces the risk of liquidated or ascertained damages
- A shorter period is possible and will save money on Preliminaries.

The format of the contractor's programme is not prescribed in any of the standard forms of contract though this could be set down elsewhere in the contract documents. The programme is not usually a contract document though an important tool in the management of a project. One can stipulate that this can be a cause of delay. Lack of clear provisions in the contract documents regarding critical areas of project implementation, may be the major cause of apathy among contractors and consultants

when implementing a construction project. It is the tendency of many contractors and consultants to take the programme less seriously as its enforcement is not adequately provided for in the contract. The defaulting party in most cases finds an excuse or shifts blame to others and thus, the traditional procurement method does not encourage good time performance.

2.7.3.4 Contractual issues

Standard construction contracts provide that the contractor shall complete the work within a prescribed time period, which can be extended in certain circumstances. For instance, variations may be ordered that may cause delay or the contractor may be delayed due to lack of drawings, details or instructions. In standard building contract, the architect is only obliged to finish drawings and instructions "within" a reasonable time. This may be taken to be of the view that the architect / client is under no obligation to enable the contractor complete the project at an earlier date. The consequence is that a good number of consultants and clients do not take provision of all detailed drawings and specifications early as important and this is a cause of delay.

The failure by the contractor to observe the works programme may be termed as a breach of the contract but the clause on liquidated damages is rarely utilised to force the contractor to stick to the contract period. Though the contractor is required to proceed regularly and diligently, only in extreme cases of failure to progress as per intended programme leads to determination of the contract. Hence this means contractors have the some leeway of not following the programme, given that even the best laid plans rarely work out exactly. In civil engineering works the engineer has powers to monitor programmes and there is a tendency of civil works performing better time wise than buildings (Kivaa, 2000).

2.7.4 The planning process

The planning process in construction firms follows a similar pattern. The planning may be thought of in three distinct stages of pre-tender planning, pre-contract planning and contract planning. (Crooke & William, 1998)

The reasons for pre-tender planning include; to establish realistic contract periods upon which the tender may be based, to identify construction methods, to access method related items which may affect the bid price, to aid the build up of contract preliminaries and plant expenditure and to aid the tendering process.

Reasons for the pre-contract planning are; to provide a broad outline plan or strategy for the project, to comply with contract conditions to establish a construction sequence on which master programme may be based, to identify and schedule key project dates, to highlight key information requirements to enable the assessment of contract budgets and cumulative value forecasts and to schedule milestone dates with respect to key material and subcontractor requirements.

Contract planning aids to monitor the master programme on a monthly, weekly, daily basis and to optimize the review of resources and to keep the project under review and report on variances.

2.7.5 Programming techniques

The contractor is involved in programming at all stages of the planning process. At the tender stage, the pre-tender programme is developed into the contract master programme as more information becomes available. During the contract stage, short-term weekly and monthly programming procedures are implemented in order to keep the master programme under constant review.

The following points cover the basic thought process when preparing a programme using any of the recognized techniques e.g. bar chart, network analysis or precedence diagrams:

- Getting a feel and sizing the project
- Assessing key project dates
- Establishing the construction sequence
- Deciding which programming technique to use.

Some of the tools used for programming are bar charts, Critical Path Method (CPM), diagrams, line of balance, time chainage diagrams.

2.8 Summary

1. The mathematical and non-mathematical models developed are useful tools for time estimate for construction project. The time so estimated is only a goal setting exercise and there is need to develop a link between the goal and the plan in order to achieve effective time and cost control. There is therefore need to study the role of planning as a management tool to manage delays.

2. Previous studies have mainly considered scope factors in time prediction models. There is need for more studies in managerial environmental factors, which have a large influence in the construction period.

3. The management theory can be incorporated into construction process within the framework of the existing rules and regulations that have been developed over the years. The process of design, construction and the interlinking contractual procedures has to be evaluated in the context of management in order to improve performance.

Chapter III

METHODOLOGY

3.1 Introduction

This study is a survey that aims at

- Establishing the adequacy of the planning and controls currently undertaken by players in the construction industry.
- Highlight key planning parameters to be observed in construction projects as a minimum requirement for managing delays in construction projects.

3.2 Population, sample and sampling technique

The target population in the study is defined as delayed construction projects undertaken in Kenya for the past ten years. The required data was obtained from selected construction, consultant and clients organisation. Since no sampling frame exists for all of these organizations, the firms that provided data were selected using purposive sampling method (Mugenda & Mugenda, 1999). The sampling method was used because random sampling was impossible without a sampling frame for the target population. Also the information required was considered to be confidential by some interviewees and to have good response in the short research period, known data sources were targeted. This sampling method was also selected as the focus was in-depth information on the delayed projects rather than generalised data.

It was rather difficult to identify sufficient sample of delayed construction projects that are already completed. This is because the information on project time

performance and costing is confidential. Also not many participants in a project that had time and cost overruns would wish to give information regarding the project. The viable method used in this study was to select participants who then selected any two delayed projects in their experience and provided the required information. It should be emphasized here that the selected projects were the objects or units of interest in this study but the data on these projects were provided by proxy through the consultants, contractors and clients.

Three convenient groups were drawn to provide the data and comprised of the contractors, consultants and clients. In total 33 firms were selected. The distribution of the number of firms was equal for each of the consultants, contractors and clients. This was seen as necessary to give a fair distribution of different views for the three different participants of the construction process. Each of the players in the construction process generate their plans and hence to have a complete view of planning in construction the three key players were interviewed.

To increase the chances of having enough and reliable data, each selected organisation was requested to provide information for two completed projects. As the interviewee was free to select any two delayed projects, it was considered that the sample of the delayed projects was selected randomly within the contractor, client or consultant organisation. The sample size selected aimed at having at least 30 cases since lesser cases than this number would not provide enough data for meaningful analysis (Alreck & Settle, 1985). Based on the response rate from previous similar studies, a response rate of about 40% to 50% was envisaged and this would give about 30 projects.

The researcher prepared a list of 11 names for each of the contractors, consultants and clients. The names included prominent players who have been actively involved in the construction industry over the past 10 years. To facilitate in data collection the researcher identified key staff that had access to the required

information and the questionnaire was presented to them accompanied by an introduction letter.

The type of projects that the parties have been involved in were noted though not considered of much importance, based on findings from previous researches (Kivaa, 2000). Since most of the construction firms in Kenya are based in Nairobi or have offices here, the questionnaires were distributed to firms located in Nairobi. The data collected by questionnaires was for research purposes only and the names of firms that provided information was kept confidential.

3.3 Variables in the study

Based on the findings of the previous researches mentioned earlier, major causes of delay were studied. From the findings of literature review and from the researcher's experience, planning parameters required for each of the causes of delay were incorporated in the questionnaire. The variables used were:

- (i) Time allowed for design
- (ii) Changes in design
- (iii) Buildability
- (iv) Pre-contract planning
- (v) Tendering period and documents
- (vi) Planning skill and tools
- (vii) Time control
- (viii) Planning process
- (ix) Finance planning

The above parameters are discussed below and their relationship to the causes of delay explained. The correlation of the delay causes and inadequate planning can then be established.

3.3.1 Time allowed for design

Once a client has made the decision to undertake a construction project and has prepared a project brief, the brief is given to the designers first for preliminary design followed by a detailed design. The time provided to the design team can thus be defined as the time covering both preliminary design and detailed design time. Both the preliminary design and detailed design times are important as they determine whether the project will proceed or not. Indeed it is the designer that, to a large extent, determines the success or failure of a project.

The designers in construction industry consist of architects, structural and civil engineers and service engineers. In most building projects the design work commences with the architectural work then the structural and civil engineering works. All the designers require sufficient time to undertake the design to the required detail. Inadequate time for design results in a hurried work which can be inaccurate, uncoordinated to other designers work and ultimately costly and likely to cause delay. The effect of inadequate time for design was demonstrated in Figure 2.3 where tendering process starts before designs are complete which then leads to incomplete planning by contractors thus leading to delay in construction phase. If there is adequate design time which is effectively utilised, this could lead to minimal changes in design. Hence the design time is expected to be inversely related to design changes.

In this study, to be able to assess whether designers had adequate time, questions were asked regarding the sufficiency of the design time provided for the delayed project. To be able to get accurate answer to the question, related areas to design time such as completion of design prior to tender, number of design detail issued on site and stoppage of work due to lack of design detail were investigated.

From the response obtained, it can be determined whether the delayed project had sufficient time for design. The judgement is based on a 50% pass mark where if the indication is clear there was no adequate time allowed, the answer is deemed to be negative (N) and vice versa.

3.3.2 Changes in design

Changes in the design and or scope of the project after the project is approved and implementation has begun has been cited as one of the main reasons for time and cost overrun. The change in design can be defined as the variation to the initial design concept due to one or several reasons. The main reason given for design change include: change in functional use; unforeseen or additional detail; unexpected climatic conditions or to ease construction on site. The last of these reasons is mainly due to failure of the designer to consider the buildability on site. Though this aspect was included in the questionnaire and a large percentage of the respondents indicated that buildability is not seriously considered in design, its effect in time performance requires further investigations and is outside the scope of this study.

As observed in the literature review on the potential obstacles to planning, what is generally believed to be unforeseen detail or additional details can actually be established and allowed for in the initial design. Most of the causes of design changes that cause delay can be termed as poor planning or lack of it at the design stage. Hence the existence of design changes that cause delay can be directly attributed to inadequate planning.

Changes in design was measured as positive (Y) if the design change was significant and warranted extensions of time to the contractor. Similarly, the measure on design change was recorded as negative (N) if the design change was insignificant and did not cause any delay.

3.3.3 Tendering period and documents

Tendering period refers to the time when the contractor prepares a formal offer to execute the works in regard to cost and time parameters. The assessment on tender preparation is based on information supplied to the contractor by the client and mostly comprise of Bills of Quantities, specifications, drawings and the conditions of contract

In the traditional procurement method in Kenya, there does not exist a standard tendering period except in government projects which stipulates certain duration and often this is not followed. In most private owned projects, the tendering period is determined by the urgency of the project. In this case the client or the consultants specify the tender period.

The tendering period is critical in the life of a project because it is upon this period that the contractors bases their planning decisions committing themselves to undertake the project at a given price and within a stated period. In order for the contractor to arrive at a realistic and competitive time duration for a project, there is need for him to have adequate time to tender and the contractor must effectively use this time to take into consideration all significant issues that affect performance of the contract. If the time allowed for tendering is inadequate then one can conclude that the contractor is unlikely to plan adequately for the works and this will consequently lead to delay.

This study attempts to assess whether the time allowed for tendering was enough to complete the tender. Documents supplied to the tenderer were also investigated. The combined assessment to the response was noted as either positive (Y) or negative (N) based on a 50% pass mark.

3.3.4 Planning skills and tools

The availability of a specific individual to undertake planning and time scheduling for the project was measured by finding out if there were such persons engaged for the project. The skills for such planners were also investigated. This was by asking questions on training and experience of the planner. Although the actual capability of the planner is an important aspect, this was deemed to be beyond the scope of the study. The tools available for planning referred to in the study imply tools for time scheduling and include manual charts and computer programmes such as Microsoft Project and Suretrack.

Planning skills and tools are related to delay since lack or inadequate planning skills leads to poor or no time schedules. Consequently this leads to work being done in uncoordinated manner with time wasted due to conflicting activities and resources. The planning skills and tools are directly related to the time control variable as without plans no controls can be effected.

The response to the questions on the skills and tools were noted on a yes (Y) or no (N) basis. Observation was also made on who actually did the planning and reasons were sought on why planners were not involved for those projects that had no planner.

3.3.5 Time control

The aspect of time control in construction projects was measured by establishing whether there was a skilled person to track and control time plans. The variable was also measured by inquiring whether the critical path in the time schedule was

established and monitored. If the project had no skilled planner, reasons for this were sought.

The variables of time control and planning skills and tools are a measure of the planning aspects in a construction project. Lack of time control and appropriate planning skills and tools indicate inadequate planning and this is directly related to the delay. The responses to the questions on time control were recorded as yes (Y) for a positive response and no (N) for a negative response.

3.3.6 Planning Process

The Planning Process was measured by referring to the data used by the planner in the planning activity. The required information in the planning includes labour, plant and materials resources availability and productivity. Other information includes weather and geological data.

The response to the question on use or availability of such data was also gauged against another question on the delay due to the resources of plant, labour and materials. The planning process is completed by the control aspect and this was evaluated by measuring whether there was a planner to track and control the plans already made and further if critical path was established and monitored.

3.3.7 Finance planning

Finance planning was measured by investigation on key parameters that often cause delay in construction projects, which included: (a) budget and approvals, (b) cash flows and cash flow reports and (c) sufficiency of funds.

The adequacy of the above plans was measured on delayed payment to contractors, consultants or suppliers. In most cases the delay in payments is the result of lack of

funds or delay in finance approvals. Delay in payments is an indicator of lack of financial planning or inadequate financial planning.

3.4 Data collection

Data collection was done using questionnaires, where the researcher prepared the questionnaire and interviewed principals of the selected firms. Where appropriate, questionnaires were sent to the companies in advance to allow adequate time for the firms to provide the information. The data collection exercise was undertaken by the researcher in person. The procedure used was to deliver the questionnaire and discuss the requirements with the relevant officers in the selected organization or firm. Interviewees were allowed two to three weeks to complete the instrument after which the questionnaire was collected and an interview or clarification sought if required.

A sample of the questionnaire and the introduction letter used are enclosed in the Appendix 1 and Appendix 2.

3.5 Data analysis

Data was analysed using descriptive statistics, including percentages, graphs and pie-charts. A criteria of weighting the collected data was formulated and used in assessing the adequacy of planning.

Chapter IV

ANALYSIS OF DATA AND RESULTS

4.1 Introduction

The purpose of this study was to establish the level of planning currently undertaken by clients, contractors and consultants in selected projects and to establish the adequacy of these plans in enabling the completion of these projects within required time. This study also aimed at highlighting the key planning dimensions required to manage delays in construction and to investigate the skills and tools currently used in planning of projects.

The data collected was first analysed by overall description of the projects investigated in regard to the project type, client type and procurement method. Further descriptive analysis was done on the variables of the study. The data was analysed in three groups of Consulting firms, Contractors and Clients. The analysis by groups was done since each of the different categories of organisation has a different planning approach for the construction project. Lastly the causes of delay for the selected projects were investigated to establish their link with the planning parameters studied.

4.2 The projects investigated

The total number of the projects targeted was 66 out of which 33 projects were obtained and this represented a 50% response. The response from consulting firms was highest at 59.1% with 13 questionnaires completed out of the 22 that were issued. The consultants who gave the required information were quantity surveying firms, architectural firms and civil engineering consulting firms.

Construction firms had a response rate of 54.5% with 12 completed questionnaires out of 22 distributed. Clients organization presented a poorer response rate of 36.4% with 8 projects obtained out of the 22 project questionnaires sent.

4.2.1 Project type

The data received indicate that construction work is mainly categorized in three major types. These are building projects, civil engineering projects and the third category is a combination of both. This study comprised of: Building projects (48.5%), Civil engineering projects (27.3%) and combination of Civil and Building projects (24.2%).

It is noted that the planning aspects measured are not necessarily dependent on the type of project, though this may need to be investigated further with larger sample sizes. Table 4.2a below shows the level of planning for each of the project types, where the percentages in the table represent the outcome of the recorded responses from the questionnaire. For convenience, the outcomes were labeled success or failure, negative or positive, Yes or No. In the raw data this was recorded as N or Y. The measure N or Y for the variables was based on in-depth information provided on the questionnaire. The percentages in the table are based on the sample of 33 delayed projects.

Table 4.2a Planning performance by the project type

(% of "No" responses for n = 33)

Project type	Time allowed for Design	Design change	Build ability	Pre-contract Process	Tender document	Plan skills	Plan process	Time control	Finance plan
Building	25%	43.8%	93.8%	37.5%	0%	62.5%	75%	75%	43.8%
Civil	33.3%	33.3%	55.6%	55.6%	11.1%	55.6%	55.6%	55.6%	55.5%
Civil & Building	50%	25%	75%	0%	37.5%	87.5%	87.5%	75%	75%

Source: Own survey 2003

4.2.2 Project client

As noted by Talukhaba (1988), the clients in construction industry in Kenya consist of three main categories. These are private, government and parastatal clients. The type of client has considerable effect on performance of projects especially due to delayed payments to contractors. Table 4.2b below indicates the performances of the three categories of clients in regard to planning parameters.

Table 4.2b Planning performance by clients category

(% of "No " responses for n = 33)

Client type	Time allowed for Design	Design change	Build ability	Pre-contract Process	Tender document	Plan skills	Plan process	Time control	Final
Government	27.3%	63.6%	90.9%	45.5%	18.2%	81.8%	63.6%	81.8%	90.9%
Private	38.5%	15.5%	84.6%	38.5%	7.7%	53.8%	84.6%	53.8%	30.3%
Parastatal	33.3%	33.4%	77.8%	11.1%	11.1%	66.7%	66.7%	77.8%	44.4%

Source: Own survey 2003

It is observed that the performance in time allowed for design planning is similar in the three categories of clients. This is probably due to the reason that professionals undertake design and the conditions applicable are similar. Private clients have however a higher percentage of inadequate time allowed for planning at 38.5% compared to 27.3% for government projects. However government projects have a higher percentage of design changes that cause delay at 63.6% compared to 15.5% for private clients and 33.4% for parastatal clients. The high rate of design changes in government projects is perhaps due to lack of sufficient design detail. Lack of adequate buildability is eminent in all the three types of clients.

Parastatal clients have relatively better pre-contract planning with only 11.1% of the sample indicating that they did not have adequate pre-contract plans compared to 38.5% for private clients and 45.5% for government clients. In most of the delayed projects it was indicated that there was adequate time for tendering and tender documentation. This

can be deduced from the percentage of negative responses with only 7.7% for private projects, 11.1% for parastatal projects and 18.2% for government projects. Data on the planning processes and planning skills and tools indicate higher negative responses. This may imply that the tender time and documentation may not be well utilised. There is need for further research on the tendering procedures to evaluate the effectiveness of the tendering period and documentation and how this process can be enhanced to minimize delays in projects.

All the three client categories indicated inadequate planning skills and tools, planning processes and time control as indicated by the high negative responses. For example, government projects had 81.8% for planning skills and tools, 63.6% for planning process and 81.8% for time control. Similarly, finance planning was inadequate especially with government projects, which had 90.9% negative responses compared to 30.8% for private clients and 44.4% for parastatal clients. Poor finance planning for government projects can be attributed to the government policy, where project financing is pegged to annual financial budgets as opposed to the individual project financial requirement. This has a large negative impact on performance of projects and may be the cause of delays in government projects some of which have indeed been abandoned or significant escalation of time and costs noted.

4.2.3 Procurement method and contractor selection

The most common procurement method in Kenya today is the traditional method comprising over 85% of all the procurement methods. A few projects studied had project management, design and build or management contracting methods. The planning variables that were measured caused delay to the other procurement methods as well, hence these projects were included in the study. It is however noted that in cases where there was a project manager, the measured items had a positive result which may mean that project management enhanced planning. Also the overall delay occurring in these projects was smaller and the projects can not be termed as wayward. To be able to

conclude authoritatively that project management significantly improves project performance, there is need to undertake studies with large samples of projects.

The most common method of contractor selection was found to be selected tendering. If selection of contractors is done professionally it encourages competition and thus the level of efficiency of contractors is enhanced. The effect of the contractors procurement method to project performance is beyond the scope of this study.

4.3 Descriptive analysis

Having discussed in general the projects investigated, this section analyses each variable of the study with a view to establishing the trends and relationships between variables. Investigation was done in relation to the planning parameters as they relate to time and cost performance.

The data collected was grouped and analysed in three groups of: Consultant firms, Contractors and Clients. Table 4.3 below gives a summary of the data collected. The data is recorded according to the parameters under study with the measure of Yes (Y) or No (N) for each of the 33 projects. The data are grouped in three categories, e.g. information from consultants, contractors and clients.

Table 4.3a Summary of findings: (Data from Consultant firms, n = 13)

NUMBER OF	DESIGN PLANNING			CONTRACT PLANNING					FINANCE PLANNING
	TIME ALLOWED FOR DESIGN	CHANGES IN DESIGN	BUILD ABILITY	PRECONTRACT PLAN	TENDER PERIOD & DOCUMENTS	PLANNING SKILL & TOOLS	PLANNING PROCESS	TIME CONTROL	
N	6	2	11	5	0	8	13	9	8
Y	7	11	2	8	13	5	0	4	5
% N	46.2%	15.4%	84.6%	38.5%	0.0%	61.5%	100.0%	69.2%	61.5%

Source: Own survey 2003

Table 4.3b Summary of findings: (Data from Construction firms, n = 12)

NUMBER OF	DESIGN PLANNING			CONTRACT PLANNING					FINANCE PLANNING
	TIME ALLOWED FOR DESIGN	CHANGES IN DESIGN	BUILD ABILITY	PRECONTRACT PLAN	TENDER PERIOD & DOCUMENTS	PLANNING SKILL & TOOLS	PLANNING PROCESS	TIME CONTROL	
N	4	5	7	6	2	7	6	7	6
Y	8	7	5	6	10	5	6	5	6
% N	33.3%	41.7%	58.3%	50.0%	16.7%	58.3%	50.0%	58.3%	50.0%

Source: Own survey 2003

Table 4.3c Summary of findings: (Data from Clients, n = 8)

NUMBER OF	DESIGN PLANNING			CONTRACT PLANNING					FINANCE PLANNING
	TIME ALLOWED FOR DESIGN	CHANGES IN DESIGN	BUILD ABILITY	PRECONTRACT PLAN	TENDER PERIOD & DOCUMENTS	PLANNING SKILL & TOOLS	PLANNING PROCESS	TIME CONTROL	
N	1	5	8	0	2	7	5	7	4
Y	7	3	0	8	6	1	3	1	4
% N	12.5%	62.5%	100.0%	0.0%	25.0%	87.5%	62.5%	87.5%	50.0%

Average % of N for all the three groups of Consultants, Contractors and Clients

%	33.3%	36.4%	78.8%	33.3%	12.1%	66.7%	72.7%	69.7%	54.5%
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Source: Own survey 2003

4.3.1 Design planning

The variables in design planning, which were included in the study were the time allowed for the design and the changes in the design. These two variables were seen as important elements in design aspect of project planning and these variables had a significant contribution to the causes of delay and hence were deemed to affect projects' time and cost performance. As seen in Table 4.4, on average, design planning contributed to 38.6% of the delay based on data from the 33 delayed projects.

In the data for the sample of 13 delayed projects collected from the consulting firms, 46.2% indicated that they did not have adequate time allowed for design. In this sample, 84.6% of the projects experienced design changes and a similar percentage either did not take into consideration the buildability aspects in their design or if they did, deliberate efforts were not put in place to enhance buildability. The high percentage of design changes indicate that perhaps construction works commence before design is sufficiently completed or the changes are merely due to large number of variation orders. The reasons

for incomplete design work could be due to inadequate time allowed for design or lack of sufficient expertise or commitment in design work.

Variation orders issued during construction, if originating from the client, indicate that the client may not have fully concluded on the functional use of the facility. Since variation orders contribute more to the changes in design at construction stage, there is need to educate clients on the construction project they intend to undertake. It is probable that spending more time on planning and modeling prior to construction phase may help minimize the need for design changes later and this may considerably reduce time and cost overruns in projects. With the advancement in technology, cost of modeling of a construction project is lower than in the past and it may be worthwhile to invest in computer modeling to enhance clients' appreciation of the construction product.

Data obtained from contractors showed that in 33.3% of the projects the design team had inadequate time allowed for design. The sample from contractors also indicated that 58.3% of the projects had design changes and another 58.3% of the sample projects did not have buildability considerations deliberately incorporated into the design. It is possible that the contractor's representative interviewed may not have the full correct detail on the time allowed for design but the data is seen to indicate a similar trend compared to data from consultants. The sample of 12 delayed projects showed significant projects with design changes and lack of buildability considerations at 58%.

The data obtained from 8 client organisations indicate that 12.5% of the delayed projects had inadequate time allowed for design. 37.5% of the sample projects experienced design change and 100% of the projects did not have buildability considerations deliberately incorporated into the design. The data from clients indicate that the design time allowed was adequate with only 12.5% of the sample indicating negative response. This is probably because clients' understanding of sufficient time for design is different from that of the professionals. Perhaps for the same reason, a lesser percentage at 37.5% indicated as having design changes and a very high percentage of lack of buildability.

For all the projects, design changes were more than twice the number of projects with inadequate time for design. Taken literally, not having adequate time for planning will end up with double the negative side effect of design changes. This is assuming that the time available for design work is effectively utilized to mitigate all the causes of design changes.

Design work in construction industry is undertaken by designers who together form the design team. Being professionals the designers are supposed to undertake their duty with all due diligence. It is expected that if the designer is given adequate time and all the necessary design information made available, then minimal or no change in design should occur at the construction stage. Since it is the designer who understands what it entails to design in regard to the time required to complete the design and also the amount and level of information required, then the designer is supposed to manage the design function.

There is need however for a clients' representative with sufficient design knowledge to coordinate the various different designs and also to coordinate the design functionality as it relates to construction, that is, design constructability or buildability. The project coordinator would also manage the relationship between the design and cost elements of the project to ensure that cost budget is fully taken into consideration by the design team. In the traditional procurement method, the function of design coordination is not adequately addressed and this may explain the difficulty of completing most projects within the allocated time and cost.

As tabulated in Table 4.4, an analysis on the design changes indicate that most of the changes are in form of variations ordered by the client. The variation orders consist of about two thirds of the design changes while the design change accounts for the rest, including unforeseen design conditions. This shows that there is need to educate clients on the importance of finalizing design prior to commencement of actual site construction.

4.3.2 Contract planning

Contract planning refers to the planning done throughout the contract including planning prior to the client entering into a contract with the contractor through to the control of plans during the construction. The variables investigated in this study are described and analysed below.

4.3.2.1 Pre-contract planning

These are the plans prepared mostly by the client organization and they help set the overall project plan framework. Pre-contract planning was measured by asking questions on whether there was a special project team and who prepared the brief. A well planned project will have a master programme, which schedules time for preliminary design, detailed design, tendering period, construction and commissioning phases. In the master programme milestone, dates such as design approvals, tender closing date, contract award and start dates and project completion dates are determined.

From the data obtained from consultants, 38.5% of the projects did not have pre-contract plans. Based on data obtained from contractors, 50% of the delayed projects did not have pre-contract plans. Data obtained from client on projects indicated that there was pre-contract planning.

4.3.2.2 Tendering period and documents

In order for a contractor to adequately estimate cost and time parameters for a construction project, then there is need for sufficient time and the necessary documentation and information should be provided. The sample from consulting firms indicated that the tendering time and documents provided were adequate. The sample from contractors indicate that 16.7% of the delayed projects had insufficient time for

tendering, while the sample from the clients indicated that 25% of the projects did not have sufficient tendering time.

Although a small percentage of the projects studied indicated they did not have enough tendering period and documentation, there is need for more study in this area to investigate further the impact of the tendering period and documentation on contract performance. Accuracy of the data in this variable is also in doubt as the respondents may not have accurate data to indicate the actual tender receipt and closing dates.

Tendering period is related to the planning process in that for adequate contract planning to be undertaken by the contractor, sufficient time has to be allowed. Since the results from data on tendering period and documents do not show any relationship to the results from data on planning skill and planning process, then one can conclude that the tender period and documents is not effectively utilized. Planning skills and tools and the planning process do not seem to be adequately performed by contractors according to results obtained from this study.

4.3.2.3 Planning skills and tools

The sample from consulting firms had 8 out of 13 delayed projects (61.5%), which had inadequate planning skills and tools. Similarly, the sample from contractors had 58.3% of the delayed projects with inadequate planning skills and tools. The sample from clients had 87.1% of the projects with inadequate planning skills and tools.

Overall, two thirds of the projects studied did not have the necessary planning skills and tools. This is a significant number especially because that most of the projects studied were sizeable with contract sums of more than 20 million shillings. Without proper plans which have been prepared skillfully using correct tools, it is almost impossible to control the plans. This explains the direct relationship between the planning skills and the time control variables.

To reduce the prevalence of delays in construction, there is need to make deliberate effort to improve the planning skills and tools currently used by most players in the industry. For example, computer programmes such as Microsoft Project, if properly utilized, can greatly enhance the quality of planning. Microsoft Project enables the planner to develop plans based on the available resources and also links the various activities and enhances time control by generating the critical paths as well as highlighting milestone activities and dates.

4.3.2.4 Planning process

Data obtained on the planning process reveal that majority of the projects do not utilize the necessary information at the contract planning stage. The sample from the consultants indicated that all the delayed projects did not have good planning process. 50% of the delayed construction projects studied with the contractors did not have the necessary planning process. The sample from the clients indicated that 62.5% of the delayed projects did not have adequate planning process.

In total 72.7% of the sample of delayed projects had not used data on labour availability and productivity, plant resources, material supply, weather and geotechnical data. Data indicated that significant percentage of these projects experienced delay due to shortage or lack of resources.

A properly planned project consists of plans on materials, plant and labour. The plans on each of these resources consist of schedules drawn to detail, the requirements of quantity, dates when required, specifications, cost and suppliers. In traditional project procurement method the quantity of material can be obtained from the bills of quantities. The contractor is required to check the quantities in the bills of quantity and pay particular attention to specifications. The exercise of converting the bills of quantity items to accurate order quantities is not very simple given that the materials are required on site in quantities just enough for particular work sections to avoid wastage and to minimize

capital and storage costs. In preparing a good and accurate schedule of materials, modern computer programmes should be used. The computer based schedule of materials is useful in planning and it assists in controlling material costs in addition to providing other useful information, such as wastage reports.

Plant and labour plans consist of information on the number and type of plant required and categories of labour needed. To accurately determine the number of plant and labour requirements on a construction site, data on productivity of these resources is required. To ensure that the utilization of both plant and labour is efficient and effective, proper work plans have to be developed. With the construction programme developed and information on plant and labour productivity properly used, resource schedules can be prepared with good accuracy. Use of computer programmes makes the exercise easier.

4.3.2.5 Time control

The data obtained from consultants showed that 69.2% of the delayed projects did not have adequate time control. The percentages of delayed projects with no proper time control from the samples obtained from contractors and clients were 58.3% and 87.5% respectively. In total, 69.7% of the delayed projects studied had no time control measures and this supports the general belief by some industry players that one of the reasons for time overruns is failure to undertake a proper time control of the project.

For proper time control of the project, there is need for a skilled person to track and control time plans. The process involves establishing the critical path in the time schedule. The critical path so established is then monitored to ensure the programme is maintained to initial plans. Whenever there is time slippage, corrective measures are taken to avoid overall delay of the project. With computer planning programmes such as Microsoft Project, an analysis is done to determine the extra resources required to keep the programme on schedule. The programme crushing tool is then evaluated against the

delay cost and a decision made that best suits the project in regard to cost and time performance.

In this study, an investigation was done to find out whether there was a skilled person to monitor and control time in the construction project. Results show that 51.6 % of the projects had staff exclusively deployed to plan and control time. Out of the 16 projects which had planners, only 8 had trained planners while the rest had other professionals who were also responsible for time control.

The project that did not have qualified planners to plan and control time attributed the reason for the anomaly to lack of commitment by the management to control time and lack of appreciation of the importance of time planning and control. There are also relatively few trained planners in the market and often, time planning and scheduling are not taught as a separate disciplines in colleges.

4.3.3 Finance planning

Finance planning is one of the key aspects of planning that often determine the success of a project and failure or lack of proper finance planning often leads to financial problems in construction projects. Data from obtained from the consultants indicated that 61.5% of the delayed projects had no financial plans. The sample from the contractors and clients indicated that 50% of the delayed projects had no financial plans. Overall, out of the 33 sample projects studied, 18 projects or 54.5% had no financial plans adequately established or utilized.

Finance planning involves budget preparation by the client based on cost estimates produced by the consultants. It involves availing adequate funds as and when required for payment to contractors, consultants and other service providers. To aid in finance planning and control during project implementation stage, cash flows should be prepared

and updated on a regular basis. In this study, investigation was done to determine if this requirement was actually observed in construction projects.

Finance management which is done by individual contractor and consultant firms, although important for the performance of the companies, is seen as unlikely reason for delays in construction and is not included in this study. This is an area that requires further research especially with a view to establishing finance management of construction firms and how it affects performance.

4.4 Planning parameters and delay

To establish the relationship between the planning parameters and the causes of delay, this study investigated causes of delay of the projects. Results showed that the major causes of delay of the sample projects studied were design changes, inadequate finance planning and inadequate planning process. There were some insignificant causes of delay which were grouped together as other.

Table 4.4 below shows the analysis of the causes of delay. Since there were four major causes indicated by the data, the analysis was done by apportioning one point for each of the reasons. If only one reason was mentioned, then the weighing apportioned to this was 4 points. If two reasons for delay are mentioned, then the weighting apportioned to each reason is 2 points. If in total three reasons for delay are mentioned and two are from one category, then three points are allocated for the two reasons and one point for the single reason. The percentage is calculated by summing all the points for a particular delay cause and dividing by the maximum points for the four causes of delay and this is expressed as a percent.

Table 4.4a: Analysis of Delay causes: - Sample from Consultants

PROJECT No.	INITIAL CONTRACT DURATION (WKS)	FINAL CONTRACT DURATION (WKS)	REASON FOR THE DIFFERENCE	WEIGHTING OF CAUSES OF DELAY				
				DESIGN	FINANCE	PROCESS	OTHER	SUM CHECK
1	52	61	V.O./DESIGN	4				4
4	30	55	V.O./MATERIAL/LABOUR	1		3		4
5	96	208	FINANCE/FUNDING/MATERIAL		3	1		4
6	26	31	V.O./WEATHER	2			2	4
7	35	56	FINANCE		4			4
8	35	39	V.O.	4				4
11	26	296	FINANCE		4			4
12	208	416	FINANCE		4			4
13	65	91	V.O./MATERIAL	2		2		4
14	52	61	EQUIPMENT SUPPLY			4		4
18	57.2	67.1	V.O./DESIGN	4				4
19	86.4	187.2	FINANCE/MATERIAL		2	2		4
33	26	104	FINANCE		4			4
			TOTAL	17	21	12	2	52
			PERCENTAGE	32.7%	40.4%	23.1%	3.8%	100.0%

Source: Own survey 2003

Table 4.4b: Analysis of Delay causes: - Sample from Contractors

PROJECT No.	INITIAL CONTRACT DURATION (WKS)	FINAL CONTRACT DURATION (WKS)	REASON FOR THE DIFFERENCE	WEIGHTING OF CAUSES OF DELAY				
				DESIGN	FINANCE	PROCESS	OTHER	SUM CHECK
2	26	35	FINANCE		4			4
3	10	20	SITE ACCESS				4	4
20	38.5	61.6	FINANCE		4			4
21	78	95	GEOT. DESIGN	4				4
22	78	121	FINANCE		4			4
23	44	52	DESIGN CHANGE	4				4
24	160	320	FINANCE		4			4
25	52	61	V.O.	4				4
26	78	104	V.O.	4				4
27	52	74	DESIGN CHANGE	4				4
28	52	68	V.O./PILING	4				4
29	78	104	V.O./DESIGN	4				4
			TOTAL	28	16	0	4	48
			PERCENTAGE	58.3%	33.3%	0.0%	8.3%	100.0%

Source: Own survey 2003

Table 4.4c: Analysis of Delay causes: - Sample from Clients

PROJECT No.	INITIAL CONTRACT DURATION (WKS)	FINAL CONTRACT DURATION (WKS)	REASON FOR THE DIFFERENCE	WEIGHTING OF CAUSES OF DELAY				
				DESIGN	FINANCE	PROCESS	OTHER	SUM CHECK
9	8	20	PLANNING PROCESS			4		4
10	20	54	PLANNING PROCESS			4		4
15	24	208	FINANCE		4			4
16	36	136	FINANCE/V.O.	2	2			4
17	18	32	PLANNING/CONTROL			4		4
30	40	52	V.O./DESIGN	4				4
31	104	216	PLANNING/CONTROL			4		4
32	12	20	PLANNING/CONTROL			4		4
			TOTAL	6	6	20	0	32
			PERCENTAGE	18.8%	18.8%	62.5%	0.0%	100.0%

Average % of weighted cause of delay for all the three groups of Consultants, Contractors and Clients

DELAY CAUSE	DESIGN	FINANCE	PROCESS	OTHER	SUM CHECK
AVERAGE PERCENTAGE	38.6%	32.6%	24.2%	4.5%	100.0%

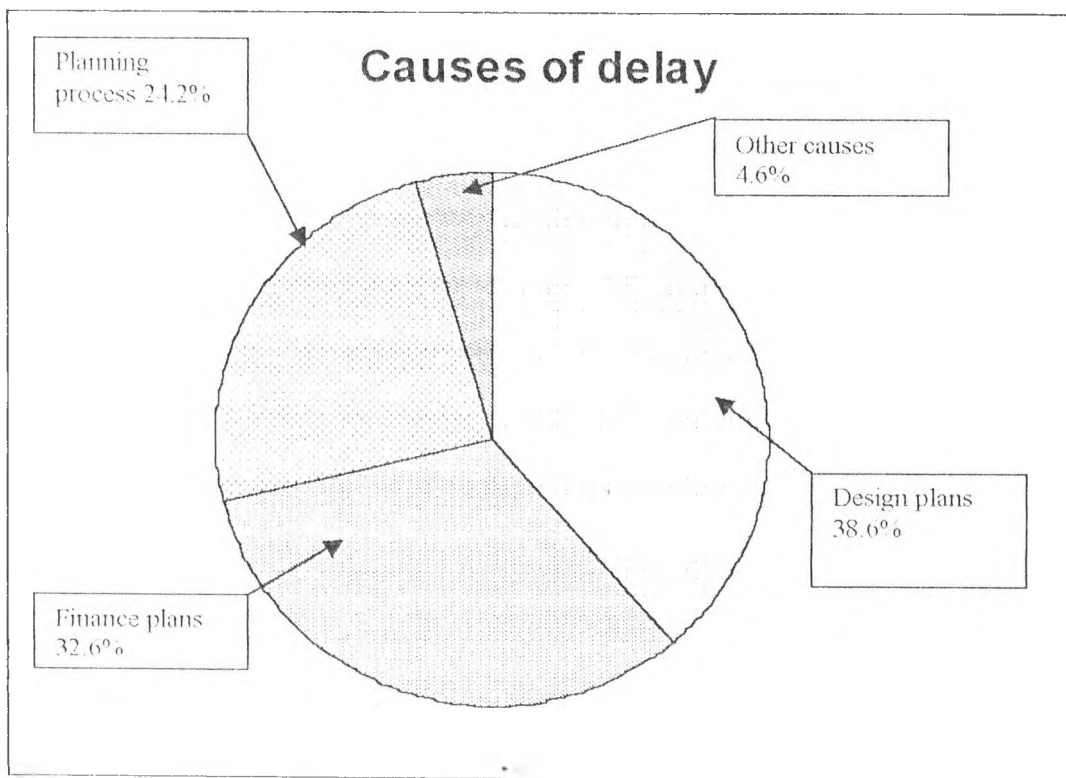
Source: Own survey 2003

The weighted units for the four causes of delay were expressed as a percentage and this was grouped for data from consultants, contractors and clients. Using data obtained from consultants, finance was recorded as having the highest contribution to delay at 40.4% followed by design at 32.7% and planning process at 23.1% while other delay factors contributed 3.8%. Based on data obtained from contractors, design was recorded as

having the highest contribution to delay at 58.3% followed by finance at 33.3% and other factors at 8.3%. Contractors did not record planning process as a cause of delay in the sampled project although 50% of the projects did not have proper planning process. Using data obtained from clients, planning process was recorded as having the highest contribution to delay at 62.5% while design and finance contributed 18.8% each.

Overall, the weighted units for each project were aggregated and the results indicated that design changes and inadequate finance planning contributed 38.6% and 32.6% respectively. Inadequate planning process accounted for 24.2% and 4.5% was attributed to other causes. The above results can be represented diagrammatically in a pie chart as shown below.

Figure 4.4: Pie chart: Representation of the causes of delay



Source: Own survey 2003

These results imply that if finance planning and design plan are adequately catered for in a project, delays could be reduced by approximately 70%.

It appears that there is a link between delays and lack of planning in construction projects. This observation may be supported by the fact that the reasons for delayed projects were either direct failure of planning or lack of adequate planning. From the planning parameters identified in the literature review, this study has found out that there is low level of planning undertaken by the consultants, contractors and clients. This fact is borne out by the data.

Since it was established in the study that there is low level of planning among participants in the construction industry and that there is a link between delay and planning, this therefore answers the research question that inadequate planning currently done for construction projects is the cause of delays.

From the study it is also clear that the construction process is quite fragmented especially with regard to the traditional procurement method. This is because each of the parties in construction projects develop their own plans at different stages of the construction. These different plans are then expected to harmoniously work together for the successful completion of the project. To make the plans from the various parties function adequately, there is need for one individual or organisation to take the responsibility to merging the different plans and to monitor and control the plans to ensure that the project is completed on time and within cost. The position of the project manager may assist in reducing delays in projects by improving the level and quality of planning in construction projects.

Chapter V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The purpose of this study was to establish the level of planning currently undertaken by clients, contractors and consultants in selected projects and to establish the adequacy of these plans in enabling the completion of these projects within required time. This study also aimed at highlighting the key planning dimensions required to manage delays in construction and to investigate the skills and tools currently used in planning of projects.

In summary, the results from the study show that the key planning parameters necessary for the successful completion of a construction project are:

- a) Design plans that minimize design changes during the construction stage.
- b) Adequate finance planning that limits the delays caused by lack of finance and associated finance problems.
- c) Correct planning processes that utilizes the right skills and planning tools.

The above planning parameters can be represented in the overall planning process of mission, goals and plans as shown in Table 5.1 below:

Table 5.1: Summary of planning parameter

MISSION	GOALS	PLANS
Complete project on time, within budget and quality parameters	Complete design to limit changes during construction	Adequate design time
		Design with necessary details and consider buildability
		Evaluate functional use
		Undertake all necessary surveys and tests as long as this is cost effective.
	Proper financial planning	Approved project budget
		Sufficient funds or proper plans prior to commencement
		Cashflows and updates and finance approval procedure
		Utilise qualified skills
	Correct planning process, skills and tools	Use proper planning tools
		Utilise resources information on availability and productions
		Make use of plans in controls during project implementation

Source: Own survey 2003

2. Planning currently done by construction industry players remains low-key and inadequate. Further indications on this fact are as follows:

a) Design planning: Only 33.3% of the projects studied indicated as having inadequate time for planning whereas 63.6% experienced design changes that caused delay. From this it can be concluded that design planning done is inadequate as there are significant projects that experienced delays as a result of design changes, whereas a good number of these had sufficient time for design planning.

- b) Planning skills and tools: Approximately 66.7% of the projects studied did not have the necessary planning skills and tools. Without proper plans the control function cannot be properly undertaken.
- c) Planning processes: 72.7% of the delayed projects studied did not have proper planning processes. This implies that majority of the construction firms undertake construction without proper consideration of the resources requirement.
- d) Finance planning: From the studied projects, 54.5% had no financial plans that were deemed necessary to progress the project to successful completion.

3. Given the current of organisation in a construction project and the traditional procurement, the role of planning is not undertaken by a separate individual or organisation. The reasons for this include the fragmented nature of the construction process, lack of willingness for the industry to adopt the project management method of procurement and also lack of trained planners.

4. To enable the contractors carry out sufficient planning and incorporate all the important factors of resources in the contract plans, there is need to review the tendering period allowed and to make the time sufficient.

5.2 Recommendations

1. It is recommended that the key planning parameters of design planning, finance planning and the planing process including skills and tools not only be incorporated in the contract conditions but be thoroughly observed to help limit the problem of in construction. This will encourage consideration of plans in the execution of projects. Further it is recommended that the contract clause on liquidated damages be reviewed to make it more applicable and this will act as an aid to the construction players in avoiding delays.

2. It is recommended that the responsibility of planning be undertaken by the project manager. This is because in a construction project there are various plans made by different parties throughout the construction phases. For the plans to be effectively inter-linked between the different parties and phases there is need for a particular individual to combine all the plans and develop the project plan. This plan can then be monitored and controlled as necessary to ensure the success of the project.

3. To be able to develop adequate project plans there is need to have qualified planners who are trained in planning for the construction industry as a career. The planners should have good general understanding of the construction process. The project planner is best suited to work in the project manager's office as the project manager controls the project programme and has the information from all the concerned parties.

4. For government funded projects, there is need to review the budgeting policy with a view to having adequate funding to complete a project without delays that are caused by lack of funds or payment approvals. It is recommended that the budget be set with proper cashflows and cost benefit analysis done to compare the benefits of having a completed project on time and the cost of finance. Project completion dates should be estimated with accuracy and computation of loss of revenue for delay known and communicated to the key players of the construction project in order to encourage seriousness in meeting the completion targets.

5.3 Areas for further Research

1. There are many factors that cause delay and cost overruns in construction. There is therefore a need for continued research in this area with emphasis on the main factors that cause delays. This research project has concentrated on planning aspect and its role in improving construction performance. There are several other factors inside and outside of the construction process that affect performance of projects and which need further

research. One such factor is the role of government financing policy on public projects. Closely related to this are the effects of politics in the performance of projects.

2. Tendering process is key to the performance of projects because it is the main process that leads to the selection of a contractor. To a great extent the performance of the contractor will determine the success of a project. There is therefore need to research on how effective the traditional tendering process is in terms of developing reliable time and cost plans for construction projects.

3. There is need to carry out more research on finance planning in construction projects and its effect on the performance of the project. Also, more research is necessary on the finance management of the construction firms and the effects of this in the performance of construction projects.

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APPENDIX 1

Letter of introduction to firms

University of Nairobi,
Department of B.E. & M
P.O. Box 30197
Nairobi.

05th August 2003

TO:.....
.....

Dear Sir,

Re: The role of planning in Managing Delays in Construction Projects

My name is Sam Kimani and I am conducting a research on investigating the role of planning in managing delays in construction projects for part fulfillment of a Masters degree in Construction Management at the University of Nairobi.

Time and cost overruns in construction projects is a common phenomenon and this is attributed to several factors. The research is based on the management function of planning and its possible role in managing delays in construction industry. The detrimental effects of time overruns to all parties in construction industry are enormous and any effort to manage delays is a worthwhile course.

Your firm has been selected out of the construction industry players in Kenya to provide information needed for this study. Please fill in the questionnaire on any two projects that your firm has participated over the past ten years and which experienced delays. Use separate questionnaire sheets for each project. I request that you fill the questionnaire at your convenient time and I shall collect it after two weeks.

Your assistance to facilitate this research is highly appreciated and information given shall be used for research purposes only and your identity will remain confidential. You are welcome to indicate if you are interested in getting a copy of the research findings.

Yours faithfully,

S. M. Kimani
B 50 P 8014 2001

Appendix 2

Questionnaire

A survey on the role of planning in controlling delays in construction

Name of Interviewee:.....

Designation:.....

Firm:.....

Date:.....

Please refer to any two completed projects in Kenya by your firm which experienced Delay and tick / fill in proved spaces as appropriate.
(Use a separate questionnaire for each project)

1.0 General

1.1. Name of Project:

1.2. Project Location:

1.3 Project Type:

- (a) Building []
- (b) Civil engineering []
- (c) Combination of building and Civil engineering []
- (d) Any other (state).....

1.4 The period of construction: From: (Month) (Year) to (Month) (Year)

1.5 Client Type

- (a) Government []
- (b) Parastatal []
- (c) Private []
- (d) Any other (state).....

1.6 What was the type of procurement method?

- (a) Traditional method (Consultants, contractors) []
- (b) Project Management []
- (c) Design & Build []
- (d) Managing Contractor []
- (e) Any other (state).....

2.0 Design

2.1. State the design team involved in the project

- (a) Architect []
- (b) Civil /structural engineer []
- (c) M&E engineer []
- (d) Quantity surveyor []
- (e) Project Manager []
- (f) Any other (*state*).....

2.2 a) Is the time allowed for design enough to complete the design

b) Was the design completed before tendering [Yes] [No]

c) How many detail drawings were issued to contractor on site [Yes][No]

e) Was there any work stoppage for lack of design detail [Yes] [No]

2.3 a) What significant design changes occurred during the construction period (*state*)

b) What was the cause of the design changes stated above

- (i) Clients change due to functional change []
- (ii) Unforeseen or additional detail []
- (iii) Unexpected geological conditions []
- (iv) To easy construction on site []
- (v) Any other(*State*).....

c) Did the design changes warrant extension of time to the contractor

2.4 a) Was the contractor involved in the design process [Yes] [No]

b) If yes what design input did the contractor provide.....

c) Was the construction process considered in design [Yes] [No]

d) Was there a requirement for the designer and the contractor to prepare method statements at design/tender [Yes] [No]

3.0 Planning

3.1 Pre-contract planning

- a) Was there a special project team set up? [Yes] [No]
- b) Who prepared the brief?
- c) Was the overall master program prepared? [Yes] [No]
- d) Was the plan formal (prepared in writing)? [Yes] [No]

3.2 What was the method of procurement?

- (a) Open tendering []
- (b) Selected tendering []
- (c) Negotiation []
- (d) Prequalification []
- e) any other (*state*)

3.3a) What was the time provided for tender period

- b) Was the tendering time allowed adequate to complete the tender
- c) Who determined the tendering period []
- i) the Quantity Surveyor []
- ii) the Architect []
- iii) the Engineer []
- iv) the Contractor []
- d) Was all the necessary tender documentation provided
- BOQ [] Specifications [] Drawings []
- Other(*state*).....

3.4 Pre-tender planning

- a) Who determined the contract period
- i) the client []
- ii) the architect []
- iii) the engineer []
- iv) the quantity surveyor []
- v) the contractor []
- vi) other (*state*).....

- b) Was the time provided for the project realistic [Yes] [No]

3.5 Skills for planning

- a) Was there a specific individual responsible for planing [Yes] [No]
- b) What is the skill of the individual undertaking planning

3.6 What tools were used in time planning

- i) manual charts []
- ii) computer program []
- a) Microsoft project []
- b) Suretrack []
- c) CPM []
- d) Line diagram []

iii) Other (*state*).....

3.7 In the planning process what data was used

- a) labour availability and productivity []
- b) plant resources and outputs []
- c) weather data []
- d) geotechnical data []
- e) materials supply and usage []
- f) any other (*state*).....

3.8 During construction period was work delayed due to lack or shortage of the following resources

- a) materials [Yes] [No]
- b) plant and equipment [Yes] [No]
- c) labour [Yes] [No]

3.9 a) Was there a skilled person to track and control time plans

- [Yes] [No]
- b) Was the critical path established and monitored [Yes] [No]
- c) If there was no skilled planner for the project, what was the reason
.....

4.0 Finances

4.1 Who was the financier for the project

- (a) Government []
- (b) Parastatal []
- (c) Private []
- (d) Any other (*state*).....

4.2a) Did the project have an approved budget [Yes] [No]

b) Were cashflows prepared and updated in all stages of the project [Yes] [No]

c) Was there sufficient funds for the project prior to commencement [Yes] [No]

d) Did the project experience delay in payments to: i) consultants [Yes][No]
ii) contractors [Yes][No]

e) What was the cause of delay in payment

- i) lack of funds []
- ii) delay in approvals []
- iii) other (*state*).....

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5.0 Contract Details

5.1 Contract sum:.....

(a) Initial contract sum:.....

(b) Final contract sum:.....

(c) Reasons for the difference in a and b:.....

.....

(d) Tender price for the lowest bidder:.....

(f) Tender price for the highest bidder:.....

5.2 Contract duration

(a) Initial contract duration:.....

(b) Final contract duration:.....

(c) Reasons for the difference above:.....

.....