Analyzing the project delay causes and how global construction companies are coping with it

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Analyzing the project delay causes and how global construction companies are coping with it

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A thesis submitted in partial fulfillment for the degree of Master of Business Administration in Project Management at the International University of Leadership.

DECLARATION

This thesis is my original work and has not been presented for a degree at any other University.

Name: _____ Date: _____

Hamza Hassab

DEDICATION

This dissertation is dedicated to my mother. Although she was my inspiration to pursue my MBA degree, she was unable to see my graduation. This is for her.

Thank you to my academic adviser who guided me in this process and the committee who kept me on track.

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Thank you**.**

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ABSTRACT

The construction industry is large and diverse, with a lot of companies and professional bodies. This makes it thought-provoking to develop a common vision and priorities. Activities in the industry always term as project and these projects must be procured and managed thus making the concept of procurement and project management inevitable in the construction industry.
The construction sector is characterized by time-consuming and depletion of the material as a result of its volatility and complexity caused by delays.
Delays can lead to many negative effects such as lawsuits between owners and contractors, increased costs, loss of productivity and revenue, and contract termination.
This study was aimed at empirically Analyse factors that cause delays
This paper will begin by briefly introducing the reader to the concept of project management in the context of the construction industry. The papers seek to find or Analyse the cause of project delay in the construction projects and the construction industry. The construction type referred to in this paper deals with all types of projects in the building and civil engineering industries or the public sector as generally called in some countries. To help focus efforts around research and innovation, this draft strategy has come out as a result of the literature review.

Keywords: Construction, industry, research, management, project

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

The importance of the main activities or distinct areas involve in construction projects can never be undermined as those activities or distinct areas each plays a great role in the generation of project values. Project procurement management is one of the distinct areas that require project manager attention and knowledge.

The rapid growth of the construction industry and the rise in sophisticated and complex construction projects need competent management. This calls for the need for well-qualified construction managers. Owners and executives no longer are former laborers who used to “swing a hammer” and now own their own companies.

These managers or to be managers need to have sound knowledge about procurement and related activities in the construction industry.

Many large construction companies today prefer people who combine industry work experience with a higher degree in Construction Management to handle a management position. The management skills were necessary to run highly sophisticated construction companies.

In the construction industry, procurement management can hardly ever be talked off without talking about project and project management. Project management (PM) theory and practice have transformed – from studying and understanding projects with tangible outcomes that are of finite-duration [such as the delivery of constructed infrastructure or information technology (IT) products] to radically reflecting upon whether some types of the project exist at all in any concrete or conceptual sense (Hodgson and Cicmil, 2006).

Project management has become a very common activity performed by most organizations or companies nowadays. The different activities involved in construction needs the attention of specialized professionals to those different areas or activities. The skills of these professionals need to be upgraded to meet up with the current needs of the job and the industry. There is a need for innovation in the industry. The successful and innovative construction industry is critical to every nation of the world as we look to provide a better-built environment for both current and future generations that are affordable and equally stand the test of time. Research and knowledge transfer is essential to help us find new and better ways of achieving such goals. The research will help the construction industry to improve its performance and transform itself towards a desired future state

1.2 Statement of the problem

The accomplishment of the Construction project is fundamentally influenced by the limit of the actualizing firms, plan varieties, nature of the agreement, and Stability of economic condition. Be that as it may, there is by all accounts no understanding among researchers and professionals with regards to the idea of the reasons for delays in the Construction Industry.

There also seems to be a lack of consensus as to the principal causes of delays in public construction projects. For instance. Other causes that have been highlighted include; poor organizational,

The increase in project delays in the construction industry is hurting the economy because it results in wastage of resources, enhanced costs of projects, and frustration among customers, yet construction is one of the principal sectors that can revitalize economic growth in Kenya. Investment in construction projects and related infrastructure and services have multiple direct and indirect effects. It triggers forward and backward linkages through additional investment in the manufacturing of building material, transport, and government, Unfortunately, delays in large construction projects particularly buildings will continue to plague the construction industry in the foreseeable future unless strategic measures are taken by the industry.

The government may lack sufficient mitigating measures to address the problem. Although much has been done in identifying the factors that influence projects to delay in large construction projects in Kenya, the industry still experiences delays, this is attributed to the fact that there is still a lack of information for the effective mitigation of delay. This study, therefore, seeks to contribute to these attempts by others in identifying further the causes of delay in large construction projects in Kenya and then come up with strategies to mitigate such delays.

1.3 Aim of the Study

The reason for this study is to evaluate the significant reasons for the delay in Large construction project extends regarding the effect on the parties involved. to limit the delays by improving the usefulness of the Management of the project within the construction industry.

1.1 Objectives of the Study

1.1.1 General Objective

The overall objective of this study is to see the causes of delays within the completion of huge construction projects and find solutions to the main problem.

1.1.2 Specific Objectives

The specific objective is of the study are:

i. to spot the causes of delays within the completion of enormous construction projects

iii. to investigate how finance causes delays within the completion of enormous construction projects.

iii. to investigate the influence of design variation on delays within the completion of enormous construction projects.

iv. To develop a method to mitigate delays within the completion of enormous construction projects.

1.2 Research Questions

The study focuses on answering the subsequent research questions:

i. What are the causes of delays within the completion of enormous construction projects?

ii. what's the effect of finance on delays within the completion of enormous construction projects?

iii. what's the influence of design variation on delays within the completion of enormous construction projects?

iv. What strategy is developed to mitigate delays within the completion of enormous construction projects?

1.3 Justification of the Study

This study will provide insights that reveal the factors influencing project delays to enable project delivery organizations to become more knowledgeable of the factors hence looking into ways in which can minimize project delay. With this, project delivery organizations shall maintain productivity and sustainability by identifying, acquiring, and adequately implementing measures that prevent delays in projects hence resulting in improved delivery.

The study sought to focus on the important factors for the delays in large construction projects. during this way, the study findings will contribute to the universe of data regarding the initiation, planning, execution, and termination of construction. this data is very important especially to the development industry which is continually trying to find better ways to finish projects on time, within costs, and agreed-upon performance parameters. An understanding of the key causes of delays will play a crucial role in the ways large projects are conceptualized, planned, and executed.

This study also will be important to the govt. within the formulation of industry policies and therefore the way these policies are implemented. An informed policy provides useful guidelines to the industry which minimizes project failures, reduces risks, and severally enables order within the industry. This study also will benefit other stakeholders such as;

Contractors: The results of this study are of great importance to somebody involved in project construction and implementation since it'll give them an insight into the factors that influence project delays.

Developers: The results of this study are of great importance to the owners of the project since it'll give them an insight into how effectively projects will be implemented and delivered without experiencing delays caused by the identified factors.

Scholars: The results of this study are of great importance to scholars since it shall provide insight into the factors influencing project delays in Kenya hence enable them to attain informed information on the identical.

This study also intends to spawn practical and theoretical further research questions which will become a useful study basis for future researchers. Study findings should be

considered as a contribution to the controversy about a way to improve the efficiency and effectiveness within the industry particularly regarding scheduling and price management.

1.4 Scope of the Study

The paper explores areas like the practice Project management within the construction industry; the knowledge the industry professionals have of project management and its methods of addressing various projects; the issues faced by industry professionals; and awareness of the structure or pattern that project management can provide to the industry. and therefore, the delay of the construction project. further examined are the changes happening to improve the industry standards; encouragement and support for methods like project management by the industry and various organizations; efforts made to boost efficiency and productivity; other factors like competition, transparency, and modernization, which demand changes within the industry; the difference in implementation of project management within the public and personal sectors; and therefore the future challenges for the industry.

1.5 Limitation of the Study

This study will have Limitation research in the field of the Construction industry, and it will focus on identifying the main reasons for the delay of the construction project.
This study will focus on the use of a project management tool for improving the Construction industry
This study will generate Data to get feedback on the industry.

1.6 Definition of terms

Construction Delay: Construction delays are considered as time lag in completion of activities from its specified time as per contract or can be defined as late completion or late start of activities to the baseline schedule, directly affecting specified cost.
As a result, there will be extensions of time required which will further result in fine, increased cost due to inflation, termination of the contract, court cases, etc. or combinations of above-stated factors, resulting in delay damages.

Delay: defined delay as the time overrun compared to completion date as specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. Majid & McCraft (2009) defined delays
as the time overrun beyond the contract date or the date that the critical activities have been delayed.

Contract Delays: define contract delays as delays that are caused by the inability of a contractor to proceed with the project diligently or efficiently due to lack of or as a result of inadequate resources needed to perform
work on a project.

Finance: Finance, related delays are said to be delays that are concerned with financial characteristics. Some of these characteristics include cash flow problems, financial constraints among others

Organization: Organizational factors that contribute to project delays are said to be factors that are a result of organizational activities, processes, and guidelines. Organizational related delay factors are said to be influenced mainly by the organization's operations hence the influence of factors coming from this on projects.

Concurrent delays: Delays caused by both parties in the contract.

CHAPTER TWO
LITERATURE REVIEW

Chapter overview

This chapter presents a review of the literature on causes and project delays. The chapter begins by discussing Project management Tools and techniques associated with the construction industry. project implementation, the factors causing a delay in construction projects, and finally some policy briefs regarding the management and implementation of a construction project.

Definition of Project Management

After World War II, the complexities of projects and a shrinking wartime labor supply demanded new organizational structures. Program Evaluation and Review Technique (PERT) charts and Critical Path Method (CPM) were introduced giving managers greater control over massively engineered and extremely complex projects.

These techniques spread to many industries as business leaders sought new management strategies and tools to handle their growth in a quickly changing and competitive world. This trend was enhanced by the availability and sophistication of advanced software packages, which are fully capable of addressing these techniques coupled with the ease to use interfaces. Thus, project management was taken up initially by large companies, later on by smaller firms, and now even the smallest ones are known to operate project management to a certain extent. There are many definitions of project management. However irrespective of the nature of the project or the type of project in question, it is defined as the management of the project from its initial conception to its ultimate completion and its maintenance. Nevertheless, in construction, the term is frequently used to refer to site or construction management rather than taking a holistic view of the project from the conceptual stage (preparation of the client brief) to its ultimate completion and maintenance (facilities management).

Walker (1984) provides a comprehensive definition of construction project management.

"*Construction Project Management* is the planning, control, and coordination of a project from conception to completion (including commissioning) on behalf of a client. It is concerned with the identification of the client's objectives in terms of utility, function, quality, time and cost, and the establishment of relationships between resources. The integration, monitoring and control of the contributions to the project and their output, and the evaluation and selection of

alternatives in pursuit of the client's satisfaction with the project outcome are fundamental aspects of Project Management."

The Code of Practice for Project Management for Construction and Development (Chartered Institute of Building 2003) describes the Project Management as an emergent professional discipline which separates the management functions of a project from the design and execution functions and defines Project Management as

> "the overall planning, coordination, and control of a project from inception to completion aimed at meeting a client's requirements to produce a functionally and financially viable project that will be completed on time within authorized cost and to the required quality standards."

The Project Management Institute (PMI 2000) defines Project Management as:

> "the application of knowledge, skills, tools, and techniques to project activities to meet project requirements."

The PMI definition stresses the achievements of predetermined project objectives, which normally refer to scope, quality, time, cost, and participant satisfaction, and directly link them to the project life cycle. A construction project goes through various stages along the path to completion. In a typical project, the status changes from that of an idea or concept, through to feasibility studies, execution, and completion.

According to the Royal Institute of British Architects (RIBA 2000), the project life cycle is divided into several stages each of which has assigned project management practices and project managers with defined responsibilities. In general, the following stages are defined: Inception, Feasibility studies, Schematic Design, Detail Design, Production Information, Bills of Quantities, Tendering, Project Planning, Construction, and Project Completion.

RIBA (2000) has well defined the roles of the different participants such as architects, engineers, surveyors, planners, project managers, contractors, and sub-contractors in each of the aforementioned stages. These roles are focused on **managing and coordinating the project information and the flow among the various participants** to satisfy the objectives of each stage.

> "The overall role of project management, in this scenario, is to harmonize the functions of **planning, communicating, monitoring, and control** to meet the project's overall objectives as defined by the **scope, time, cost, quality, and client satisfaction**."

Project management has three essential **requirements**: **thinking ahead,**

communicating

According to Peters (1981) half, the value of project planning is to provide the opportunity and motivation, simply to get people to *think ahead about the project* that they are undertaking. This process tends to reveal problems, which helps to find solutions at the early stages of a project.

Communication, on the other hand, deals with producing, issuing and transmitting reports/documents, and withholding occasional meetings among the project participants so that the proposed timing, method, and strategy are made available and understood. In essence, the collaboration of the various participants in a project is measured by how effectively the communication channels were managed.

Evaluation of the outcomes is critical to improving current practices. Communicating and feeding back information and messages to the project team is also essential to the achievement of the project goals by all the participants. Thus, the effectiveness of the project manager to communicate with, evaluate, and feedback to the rest of the project team during each stage of the life cycle determines how efficiently the project's goals will be achieved.

Traditional project management practices have evolved as the requirements for managing and controlling construction projects unfolded. Nonetheless, with the advances in management techniques and information and communication technology, traditional practices have proven to be insufficient in meeting the new project requirements.

Construction Projects are being designed by the diverse number of designers (which may well be placed at different geographical locations), procured and managed by new partnering strategies, materials are purchased and delivered through a strategic alliance with suppliers, etc.

The common point of all the Project Management definitions is to consider PM as

> "planning, coordination, and control of a project along the whole life cycle of the project to meet the client's requirements." This is the definition to be used in this research.

In general terms, the responsibilities of Project Management are to plan, coordinate, and control the overall project. Such duties can be performed through good communication and information management and must be studied in depth

2.1 Project Management Theory:

2.1.1 Life cycle of Project Management:

The Project Management Institute (PMI 2000) defines the Project Life cycle (PLC) as

"the steady progression of a project from its beginning to its completion".

The Life cycle of a project is divided into phases and then into stages. However, some phases of most projects involve iterations to a greater or lesser degree depending on the type of project.

At its most basic, it is generally accepted that a typical PLC consists of two broad periods each of two major phases (i.e. four in all). The first period involves conceptualizing and validating with a business case. Then planning and developing a project brief or charter. The second period involves implementation, i.e. detailed design and construction of the product followed by product transfer to the intended customer.

Many Project Management pieces of research (de Cos 1995, Gomez-Senet 1997) give different definitions to the Project Life cycle and describe different phases of the PLC. These phases are known by different names in different project environments but from the traditional view these phases are divided into:

- Phase 1: Conception of an idea. Sense of vision, the big picture.
- Phase 2: Development of the idea into a practical plan. Listening, analysis, alignment, planning, commitment.
- Phase 3: Plan execution. Production work, coordination, cooperation, testing.
- Phase 4: Project completion. Transfer of product and information, review, closure.

In general, the activities within each phase tend to be quite distinct, requiring different levels of management attention and different skill sets.

Depending on the size, complexity, risk, sensitivity and so on, these typical phases may be broken down into sub-phases, and a variety of different stages or iterations depending on the project and its type. These will be specific to the project and will depend on the overall accomplishment strategy.

If we focus on construction, projects are intricate, time-consuming undertakings. The total development of a project normally consists of several phases requiring a diverse range of specialized services. In progressing from initial planning to project completion, the typical job passes through successive and distinct stages that demand input from such disparate areas as financial organizations, governmental agencies, engineers, architects, lawyers, insurance and surety companies, contractors, material manufacturers and suppliers, builders, etc. During the construction

process itself, even a modest structure involves many skills, materials, and hundreds of different operations. The assembly process must follow a natural order of events that constitutes a complicated pattern of individual time requirements and restrictive sequential relationships among the structure's many segments.

Essentially, a project is conceived to meet market demands or needs in a timely fashion. As a general idea, typical Project Management researches give the following description of a construction project. When starting a project, various possibilities may be considered in the conceptual planning stage, and the technological and economic feasibility of each alternative is assessed and compared to select the best possible project. The financing schemes for the proposed alternatives must also be examined, and the project is programmed concerning the timing for its completion and available cash flows. Once the scope of the project is clearly defined, detailed engineering design provides the blueprint for construction, and the definitive cost estimate serves as the baseline for cost control. In the procurement and construction stage, the delivery of materials, and the erection of the project on-site must be carefully planned and controlled. After the construction is completed, there usually is a brief period of start-up or shake-down of the constructed facility when it is first occupied. Finally, the management of the facility is turned over to the owner for full occupancy until the facility lives out its useful life and is designated for demolition or conversion.

On this ground, the main stages for construction project management are:

- **Market Demands or Perceived Needs.** This stage aims to define project objectives and scope. Once an owner has identified the need for a new facility, the owner must define the requirements and delineate the budgetary constraints. It involves establishing broad project characteristics such as location, performance criteria, size, configuration, layout, equipment, services, and other owner requirements needed to establish the general aspects of the project.

- **Conceptual Planning and Feasibility Study**. Conceptual planning stops short of the detailed design, although a considerable amount of preliminary architectural or engineering work may be required. The definition of the work is the responsibility of the owner, although a design professional may be called in to provide technical assistance and advice.
  - **Design and Engineering**. The objectives of this stage are the Construction Plans and Specifications. This phase involves the architectural and engineering design of the entire project. It culminates in the preparation of final working drawings and specifications for the total construction program. In practice, design, procurement, and construction often overlap, procurement and construction beginning on certain segments as soon as the design is completed and drawings and specifications become available.

  - **Procurement and Construction**. Procurement refers to the ordering, expediting, and delivering key project equipment and materials, especially those that may involve long delivery

periods. This function may or may not be handled separately from the construction process itself. Construction is, of course, the process of physically erecting the project and putting the materials and equipment into place, and this involves providing the manpower, construction equipment, materials, supplies, supervision, and management which are necessary to accomplish the work.

- **Start-up of occupancy.** After the construction is completed, there usually is a brief period of start-up or shake-down of the constructed facility when it is first occupied. When the occupancy permit is issued and the facilities are accepted, then the occupancy is allowed.

- **Operation and maintenance.** Finally, the management of the facility is turned over to the owner for full occupancy. This stage is focused on the use of facilities and the maintenance of the whole building. In this stage, the possible renovations of the building are also included.

- **Disposal of the facility**. When the facility lives out its useful life and is designated for demolition or conversion. This stage refers to the demolition and possible recycling of the facilities and parts of the building.

2.1.1. Actors/roles of a Construction Project

Project Management theories define many different roles in a construction project, e.g. Building Owner, Design and Technology manager, Planning manager, Technical assistant, Contractor, Project manager, Supply manager, Site manager, Other services subcontractor, Mechanical services subcontractor, Fire services subcontractor, Transportation subcontractor, Electrical services subcontractor, etc. All these roles can be joined into only three categories of actors. Then each actor can develop as many roles as necessary:

- The **owner**, whether public or private, is the instigating party that gets the Project financed, designed, and built. Public owners are public bodies of some kind, and range from the federal government down through state, county, and municipal entities to a multiplicity of local boards, commissions, and authorities. Public projects are paid for by appropriations, bonds, or other forms of financing, and are built to perform defined public functions. Public owners must proceed following applicable statutes and administrative directives of advertising for bids, bidding procedures, contracts, and other matters relating to the design and construction process. Private owners may be individuals, partnerships, corporations, or various combinations thereof. Most private owners have the structure built for their use, business, habitation, or otherwise. However, some private owners do not intend to be the end-users of the constructed facility; rather, they plan to sell, lease, or rent the completed structure to others.

- The **Architect-Engineer**, also known as the design professional, is the party or firm that designs the project. Since such design is architectural or engineering in nature, or often a combination of both, the term ‘architect-engineer’ is used to refer to the design professional,

regardless of the applicable specialty or the relationship between the architect-engineer and the owner. The Architect-Engineer can occupy a variety of positions concerning the owner for whom the design is undertaken. Many public agencies and large corporate owners maintain their own in- house design capability. In such instances, the architect-engineer is the design arm of the owner. In the most common arrangement, the architect-engineer is a private and independent design firm that accomplishes the design under contract with the owner. Where the 'turnkey project arrangement' type of contract is used, the owner contracts with a single party for both design and construction. In such cases, the architect-engineer is a branch of the construction contractor.

- The **General Contractor** is the firm that is in prime contract with the owner for the construction of a project, either in its entirety or for some designated portion thereof. Under the single-contract system, the owner awards construction of the entire project to one prime contractor. In this situation, the contractor brings together all the elements and inputs of the construction process into a single, coordinated effort, and assumes full, centralized responsibility for the delivery of the finished job, constructed following the contract documents. The prime contractor is fully responsible to the owner for the performance of the subcontractors and that of other third parties to the construction contract. When separate contracts are used several independent contractors work on the project simultaneously, and each of them is responsible for a designated portion of the work. Each contractor is in contact with the owner and operates independently of the others. Hence, each of these contractors is a prime contractor. Responsibility for coordination of these contractors may be undertaken by the owner, the architect-engineer, a construction manager, or one of the prime contractors who is paid extra to perform certain overall job management duties.

2.1.1. Influences with contractual arrangements

The various contractual arrangements reflect fundamental differences in the allocation of responsibility to match the characteristics of different projects. Many actors take part in assuming different roles; therefore, contractual arrangements must be given strategic consideration.

An owner may have in- house capacities to handle the work in every stage of the entire process or may seek professional advice and services for the work in all stages. Understandably, most owners choose to handle some of the work in-house and to outsource professional services for other components of the work as needed. By examining the project life cycle from an owner's perspective, we can focus on the proper roles of various activities and participants in all stages, regardless of the contractual arrangements for different types of work.

The owner may choose to decompose the entire process into more or fewer stages based on the size and nature of the project, and thus obtain the most efficient result in implementation. Very often, the owner retains direct control of work in the planning and programming stages, but increasingly outside planners

and financial experts are used as consultants because of the complexities of projects (Hendrickson & Au 2003).

Taking into account the Spanish practice, the contractual arrangements can be broadly classified under three headings (Heredia 1998). Each method has its variations. No method is the best in all circumstances.

2.1.1.1. Traditional procurement arrangement

The **traditional procurement arrangement** involves three main participants: client, designer, and contractor. In this procurement protocol, the client has a direct contractual relationship with most of the participants.

For ordinary projects of moderate size and complexity, the client often employs a designer (an architectural/engineering firm) which prepares the detailed plans and specifications for the contractor (a general contractor). The designer also acts on behalf of the owner to oversee the project implementation during construction. The general contractor is responsible for the construction itself even though the work may be undertaken by many specialty subcontractors.

The client usually negotiates the services fees with the Architectural and Engineering (AE) firm. In addition to the responsibilities of designing the facility, the AE firm also exercises to some degree the supervision of the construction as stipulated by the owner.

Traditionally, the AE firm regards itself as design professionals representing the client who should not communicate with potential contractors to avoid collusion or conflict of interests. Field inspectors working for an AE firm usually follow through the implementation of a project after the design is completed and seldom have extensive input in the design itself. Because of the litigation climate in the last two decades, most AE firms only provide observers rather than inspectors in the field. Even the shop drawings of fabrication or construction schemes submitted by the contractors for approval are reviewed with a disclaimer of responsibility by the AE firms.

The client may select a general contractor either through competitive bidding or through negotiation. Public agencies are required to use the competitive bidding model, while private organizations may choose either mode of operation. In using competitive bidding, the owner is forced to use the designer-constructor sequence since detailed plans and specifications must be ready before inviting bidders to submit their bids. If the owner chooses to use a negotiated contract, it is free to use phased construction if it so desires.

The general contractor may choose to perform all or part of the construction work or act only as a manager by subcontracting all the construction to subcontractors. The general contractor may also select the subcontractors through competitive bidding or negotiated contracts.

Although the traditional procurement arrangement is still widely used because of the public perception of fairness in competitive bidding, many private owners recognize the disadvantages of using this approach when the project is large and complex and when market pressures require a shorter project duration than that which can be accomplished by using this traditional method.

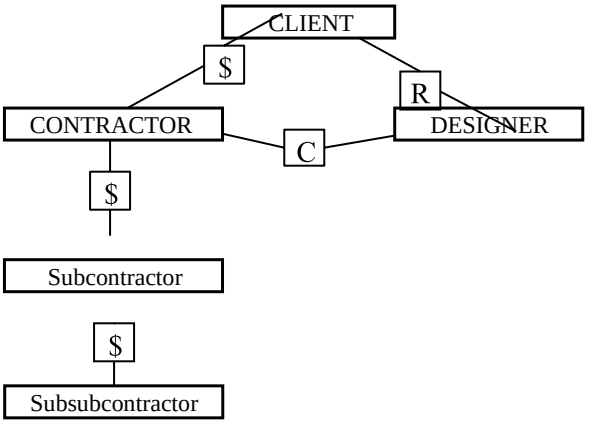

Figure 2. Traditional procurement arrangement

2.1.1.2. Turnkey project arrangement

Some clients wish to delegate all the responsibilities of design and construction to outside consultants in a turnkey project arrangement. A contractor agrees to provide the completed facility based on performance specifications set forth by the owner. The contractor may even assume the responsibility of operating the project if the owner so desires. For a turnkey operation to succeed, the client must be able to provide a set of unambiguous performance specifications to the contractor and must have complete confidence in the capability of the contractor to carry out the mission.

This approach is the direct opposite of the traditional procurement arrangement in which the owner wishes to retain the maximum amount of control for the design-construction process.

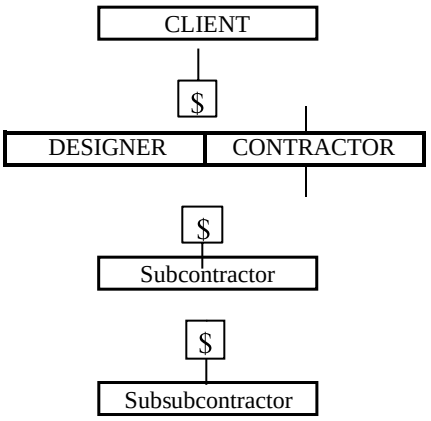

Figure 3. Turnkey project arrangement

2.1.1.3. Professional Construction Management arrangement

In the Professional Construction Management arrangement there is no main contractor interposed between the owner and the various specialist subcontractors. The construction manager becomes the principal consultant coordinating the entire procurement process.

Professional construction management refers to a project management team consisting of a professional construction manager and other participants who will carry out the tasks of project planning, design, and construction, in an integrated manner.

Contractual relationships among the team members are intended to minimize adversarial relationships and contribute to greater responsibility within the management group. A professional construction manager is a firm specialized in the practice of professional construction management which includes:

- Work with the owner and the AE firms from the beginning and make recommendations on design improvements, construction technology, schedules, and construction economy.

- Propose design and construction alternatives if appropriate, and analyze the effects of the alternatives on the project cost and schedule.

- Monitor subsequent development of the project so that these targets are not exceeded without the knowledge of the owner.

- Coordinate procurement of material and equipment, and the work of all construction contractors, and monthly payments to contractors, changes, claims, and inspection for conforming design requirements.

- Perform other project-related services as required by owners.

Professional construction management is usually used when a project is very large or complex.

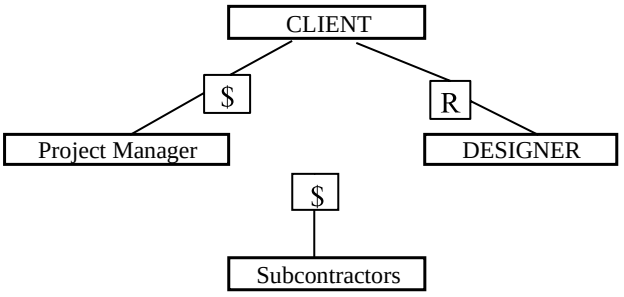

Figure 4. Professional Construction Management arrangement

$ means that there is a contractual relationship between the two participants R means that the relation between the parts is merely legally representative C means that the relation between the parts is merely to control

212. Major types of constructions

The construction industry is a conglomeration of quite diverse segments and products. In planning for various types of construction, the methods of procuring professional services, awarding construction contracts, and financing the constructed facility can be quite different. For discussion, the broad spectrum of constructed facilities may be classified into four major categories, each with its characteristics (Hendrickson & Au 2003).

2.1.2.1. Residential Housing Construction

Residential housing construction includes single-family houses, multi-family dwellings, and high-rise apartments. During the development and construction of such projects, the developers or sponsors who are familiar with the construction industry usually serve as surrogate owners and take charge, making necessary contractual agreements for design and construction, and arranging the financing and sale of the completed structures. Residential housing designs are usually performed by architects and engineers, and the construction executed by builders who hire subcontractors for structural, technical, electrical, and other specialty work. An exception to this pattern is for single-family houses which may be designed by the builders as well.

2.1.2.2. Institutional and Commercial Building Construction

Institutional and commercial building construction encompasses a great variety of project types and sizes, such as schools and universities, medical clinics and hospitals, recreational facilities and sports stadiums, retail chain stores and large shopping centers, warehouses and light manufacturing plants, and skyscrapers for offices and hotels. The owners of such buildings may or may not be familiar with construction industry practices, but they usually can select competent professional consultants and arrange the financing of the constructed facilities themselves. Specialty architects and engineers are often engaged in designing a specific type of building, while the builders or general contractors undertaking such projects may also be specialized in only that type of building.

2.1.2.3. Specialized Industrial Construction

Specialized industrial construction usually involves very large scale projects with a high degree of technological complexity, such as oil refineries, steel mills, chemical processing plants, and coal-fired or nuclear power plants. The owners usually are deeply involved in the development of a project and prefer to work with designers-builders so that the total time for the completion of the project can be shortened. They also want to pick a team of designers and builders with whom the owner has developed good working relations over the years.

2.1.2.4. Infrastructure and Heavy Construction

Infrastructure and heavy construction include projects such as highways, mass transit systems, tunnels, bridges, pipelines, drainage systems, and sewage treatment plants. Most of these projects are publicly owned and therefore financed either through bonds or taxes. This category of construction is characterized by a high degree of mechanization, which has gradually replaced some labor-intensive operations.

2.2. Functions of Project Management

Project management is a broad subject dealing with every aspect of managing an ongoing project. It includes: leading, communicating, negotiating, problem-solving, and influencing the organization (PMI 2000).
Numerous studies have shown that the data flow between the parties to a construction project is a major component of project management activity. Munday (1978) and Karlen (1982) confirm that managers involved in the construction activity spend nearly half of their working time on tasks devoted exclusively to the transmission of information. The work is made up of information processing and management. Bishop (1980) and Ball (1980) have also suggested that the construction industry is unduly fragmented and that this has hindered progress and innovation and has adversely affected the way the industry and its clients view itself and its service.

In a profound sense, the management of construction projects is about **managing project communication and information flow**. And managing project information is about managing the documentation generated in a particular project.

221. Project communication and information flow

Poor **communication** has long been a problem in Project Management. Part of the trouble is the way the industry is organized. The project team is made up of people from many different firms. Their contributions vary and a lot of information has to pass among them. This requires a well-organized network of communication. Even when this network exists, communication still breaks down at a personal level, because people fail to keep their messages simple; they pass on too much information or too little; the information they give is inaccurate or misleading (Fryer 2002).

On the receiving end, people are flooded with paperwork they haven't time to read, yet often they cannot get the information they want. Estimates may be wrong, drawings out-of-date, descriptions ambiguous. Meetings go on for too long and people stop listening.

The sheer number of parties that require coordination to bring a project to completion is a challenge. To do so, the industry has relied on traditional communication methods, typically time and labor-intensive that have resulted in higher costs and inefficiencies (Figure 5).

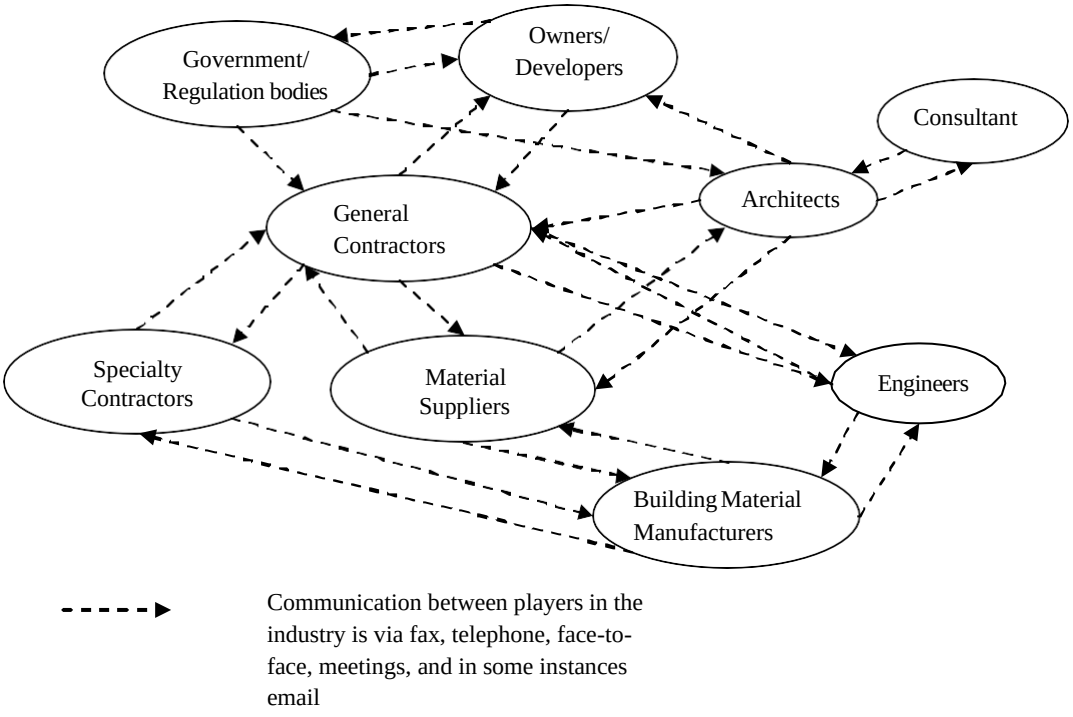

Figure 5. Traditional chaos in the communication and workflow of the AEC industry

Coordinating the numerous parties involved to take a project from initiation through construction is often a daunting experience. Owners, architects, engineers, general contractors, subcontractors, material suppliers, government, and regulatory bodies, have all traditionally communicated using methods such as fax, face-to-face meetings, e-mail, etc., to exchange ideas, provide progress updates, schedule labor, deliver documents and make supply requests.

The complex process required to turn around an RFI (Request For Information) illustrates some of these inefficiencies: today, an RFI is hand-written by a subcontractor, faxed to the general contractor, reviewed/rewritten, and faxed to the architect. The architect may fax it to a sub-consultant (electrical, structural, mechanical) for review, who in turn may fax it to a sub-sub- consultant (lighting, acoustical) for input. The response is formulated, documented, and sent back to the sub-consultant for review, and then faxed back to the architect. Assuming no further clarification is needed, the architect faxes the RFI back to the general contractor and the owner. Once approved by the owner, the RFI is faxed back to the subcontractor with action items. Finally, the general contractor needs to ensure that the response is received on the job site by foremen, staff, subcontractors, suppliers, project managers, and administrators, all in their respective office locations.
In the construction industry, there are typically 50 to 250 organizations involved in the execution of building contracts, (construction professionals, contractors, specialist contractors, suppliers, statutory authorities, health and safety, highways agencies, etc). Traditional paper-based administrative systems mean that for every document issued, there is a need to copy (sometimes in part, sometimes whole) and pass ‘down’ the supply chain sometimes for information, sometimes for comment and return and usually under some level of contractual obligation.

Bearing in mind the number of organizations in a typical project supply chain, two major problems can be inferred:

- the system is inherently challenging in terms of effective communication and
- the administrative burden is tedious and expensive.

Ineffective communication and poor administration lead to bad management.

Furthermore, AEC projects can generate enormous amounts of documentation. Over the life cycle of a project the main contractor receives a continuous stream of documents from the client, subcontractors, etc. and creates letters, reports, and so on.

The effective management of all the information needed for a construction project, from the conception stage to the construction and maintenance of the building, is a basic requirement for the success of the project. All the participants of construction projects know the impact caused on overall construction costs by delays, missing or contradictory information, mistakes, etc.

Information flows in construction are numerous, unstructured, and very complex. The amount of data flow is exhausting and requires volumes of documentation. It is a wonder how much valuable human effort, time, and resources have been spent in major construction projects for monitoring, tracking, and controlling data flows. Retrieving documentations from the racks and racks of project file stores is a daunting and time-consuming task. The disputes arising from improper documentation are numerous and they cannot be amicably or fairly resolved due to lack of substantial documentation or many missing links. The extent and sources of information overload of construction project managers vary throughout the stages of a project. The

construction stage has the highest probability of information overload, followed by the design stage. The main sources of information overload are the project participants contributing to the key expertise in each stage. In the design stage, the key contributors are architects and consultants, and in the construction stage, contractors and subcontractors. Architects' and consultants' contributions to information overload during the construction phase show a similar pattern through the project duration, as do those of contractors and subcontractors. The importance of proper information tracking and document control is paramount in the last phase of the construction, commissioning, and final account settlement.

It is clear from the above discussion that developing a full-fledged information system to encompass all types of construction projects, project organizations, and contracts of a construction company is a very difficult task. Information flow in a major construction project is even more complex in internationally executed projects due to the involvement of different entities from different countries, and project participants from different cultures, with diverse local regulations and requirements. The environment must be flexible to acknowledge the specifics of each construction project, as well as to support individual expertise and preferences and changing requirements. At the same time, additional functionality is needed to enable the participants to make efficient use of the environment. This apparent conflict between flexibility and efficiency can be resolved through the development of a common system with critical information flows and allowing the participants to adopt the additional functionalities when and where appropriate (Stouffs 2000).

Despite these complexities, it is possible to identify and substantiate the critical information flows and to select the essential and critical ones. Among the various systems developed for construction, on-site information flow processing application is not available (Dado & Tolman 1999). Hence, if we succeed in identifying the basic on-site information elements for most construction projects and develop an adaptable and scalable information system, it might enable us to optimize, improve, and better control over critical project information flows, ultimately resulting in better project performance.

Accordingly, construction project participants cannot perform effectively without an adequate, accurate, and timely flow of information. For this reason, each participant in the construction process has the responsibility for transmitting information and communication. Also, the nature, volume, direction, and timing of the flow of information vary considerably and, hence, this demands its effective coordination, control, and dissemination to ensure its proper utilization.

222. Production and use of project information

All construction information produced, utilized, and shared among project participants is intended to contribute to the success of a particular project. Under the traditional procurement method (where design and construction functions are separated), the main producers of construction information and stages of production may be summarized in Table 1 (Kwakye 1997).

Table 1. Production and use of project information

Information producer	Project phase	Form of information	Information user
Client	Conception	Brief	Architect
Architect	Feasibility	Report	Client
	Design	Drawings	Client, Quantity Surveyor, engineer, contractor
	Construction	Revised drawings	
	Commissioning	As-build drawings	Client
Engineer	Design	Drawings	Architect, Quantity Surveyor, contractors
	Construction	Revised drawings	
	Commissioning	Operating / Maintenance Manual	Client /Ultimate users
Quantity surveyor	Design	Cost estimates and Bills of quantities	Architect, client
	Construction	Cost Report. Final Account	Architect, client, contractor
Contractor	Construction	Progress report. Contractual claim	Architect, QS, client
	Commissioning	Maintenance manual	Architect, client
Material suppliers	Construction	Material availability and supply report	Contractor

Moreover, this table demonstrates that construction information is produced and utilized in all the design and production phases by the project participants.

Generally, information is whatever meaningful data; but, when talking about Project Management, information is limited to documentation and communication.

223. Intra and inter-organizational coordination

Construction activity, unless designed and constructed by the same company, is undertaken by specialist participants from several establishments organized into a temporary group over an agreed timescale.

In this sense, depending on the flow and access of the information three different kinds of information can be established:

- **Specific to a project:** Particular to that project and available only to those engaged in it. For example the client's brief, drawings, conditions of a contract, correspondence.

- **General:** Not particular to the project but applicable to any project, and available to everybody. For example Codes of practice, manufacturer's catalogs, building regulations, etc.

- **Specific to an organization or firm:** Available only to members of particular firms engaged in the project, but partially relevant to other projects. For example office standard details, cost and output records, manufacturing techniques, etc.

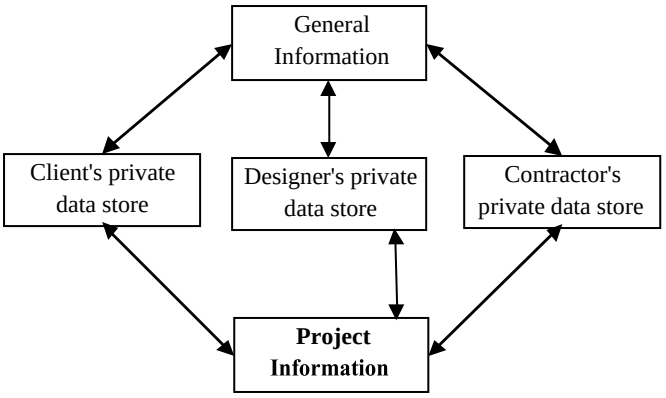

Figure 6. Interchange of different type of information between different actors

The flow between these three categories is the most challenging purpose. Experience of a particular project contributes to office standard details, research reports to project drawings, etc. Project information may become general information on completion of the project and be fed back to data stores. There is also interchange within a particular datastore: between client's brief and production drawings, between manufacturers catalogs and building regulations, and so on.

Accordingly, there is a need for coordination of information at intra- and inter-organizational levels to ensure the success of the project.

2.4.3.1. Intra-organizational coordination

To function effectively and remain in business, managers of companies must coordinate the activities of their personnel to the achievement of the common specific goal. Above all, there is also a need to exercise coordination of construction information to ensure that:

- Information flow is adequate, continuous, and uninterrupted.
- Information flow is simplified, improved, and controlled.
- Information is analyzed and communicated to the right personnel.
- Information is released at the appropriate time.

Furthermore, the production, coordination, and communication of construction project information should assume a proper place in the company to enable it to make an effective contribution to the economies of production. The neglect of intra-organizational information coordination could result in one or more of the following:

- Lack of ideas between construction projects and clients.
- Absence of feedback on completed construction projects and perpetuation of inherent defects and expensive mistakes from one project to another.
- Deficiency of knowledge of company policies and practices.
- Abortive work and/or duplication of efforts.
- Failure to communicate essential construction information to the right person at the right time.
- Conflict of construction information such as that shown on the architect's and engineer's drawings.

2.4.3.2. Inter-organizational coordination

The temporary organization structure formed for the execution of a particular construction project consists of specialist participants from different establishments and, therefore, demands the effective coordination of information to ensure that the efforts of all the participants are directed to the needs of the project. A lack of coordination in design, for example, results in one or more of the following:

- Discrepancies between architect's and engineer's drawings.
- Conflict of architect/engineer's drawings with those of services engineer.
- Conflict of services engineer's drawings with those of another services engineer.
- Architect/engineer is unaware of the level of details or construction information required by the site production staff.
- Improper channels for distribution of construction information.

Also, the following are the consequences of uncoordinated construction project information:

- Discrepancies between item descriptions in bills of quantities and details shown on architect/engineer's drawings.
- Inclusion of inappropriate and/or out-of-date information in the contract documentation.
- Contract documents that disagree with each other due to inconsistencies, ambiguities, and/or omissions.
- Late issue of information.
- Site management spends much of its time sorting out discrepancies and/or ambiguities in the contract documentation. This robs them of valuable time that could otherwise have been used more beneficially in supervision/monitoring the quality aspects of the works.
- Uncontrollable variations, delays, disputes, increased cost, claims, and consequential uncertainty of the final cost of the construction project.
- Completed product of poor quality with technical defects and the resultant increased occupancy cost.

2.1 Influences and Causes of Delay

Delay of projects often generates conflict and contract disputes within the delivery of building projects. If construction delay claims conflict is avoided or mitigated, there may be substantial financial savings on projects. the info was analyzed using structural modeling with a partial statistical procedure estimation approach. The results indicate that when the contractors received an unfavorable outcome from the contract administrator's decision on their claims for delay, the intensity of conflict was lower when there was pre-contract negotiation and pre-contract agreement regarding the foundations for quantifying and assessing the impact of anticipated delays than when there was none.

It was also discovered that the higher the level of pre-contract negotiation and pre-contract agreement on the rules for quantifying and assessing delays, the higher the contractors perceived the quality of the decision-making process for delay claims during the construction phase. Further, the upper the contractors perceived the standard of the decision-making process for delay claims, the lower the intensity of the conflict. At the time of getting in contracts, owners and their project management team have to pay more attention to pre-contract negotiation and agreement with their contractor to clarify and agree on the foundations for quantifying and assessing the impact of anticipated delay and disruption.

2.2 Organization

Construction project's success focuses on completion of within budget, time, and having met the specified specifications and requirements (scope). These three project constraints time, budget and scope are the most asked for management in any project. However, the three most stated project constraints are not enough to measure the success of a project with constraints like customer

satisfaction, laws, and regulations governing project delivery, stakeholders 'expectations also must be put into consideration when determining project success.

Reviewed literature also views project abandonment (partially or fully) as an impact on delayed projects. Project abandonment slaps organizations with huge debts to pay yet no returns are attained from the project. additionally, the research showed that projects with

good developed and maintained management processes enhances performance and eventually delivery

2.3 Finance

Project delay finance factors are factors influenced by the financial capabilities and flows of a project. Some of the finance-related factors affecting project delays include cash flow problems in organizations, lack of funding, and late release of project funds. identified finance and payments for work, poor project cost estimations, difficulty in accessing finances from credit facilities, and material price fluctuations because of the common finance factors influencing project delays. Cash flow is the hub around which everything else revolves. Lack of money flow affects adversely affect projects by not only delaying it but also reduces work morale thanks to delaying or non-payment of wages of workers, subcontractors, suppliers among others. The challenge with a lack of finances to projects is the identification of the way to eliminate or a minimum of reducing the occurrence of the identical. payment delays, contractor financial status, owner financial status, fluctuation in exchange rates, banks loan policies, inflation, the main factors contributing to financial distress in projects.

Project delays can be observed by several indicating factors. One significant factor is the owners' performance in making payments to creditors. Prolonged time taken or required in procurement and making payments is a strong indicator that a company is facing financial difficulties. due to the high lending rates on investment borrowing, contractors are not able to attain the required financial support they require to enable them to manage projects they are undertaking. This then leads to financial constraints hence delaying projects.

2.4 Management

Managers play a key leadership role in maximizing and delivering individual and organizational performance. Management capability is, therefore, a priority of all those organizations and countries that want to stay competitive. (Tamkin & Hillage (1997) a company can underperform about key

competition indicators if the managers are under qualified, have inadequate levels of coaching and development, or otherwise appeared to be less competent. In many organizations, indicators of management capabilities, therefore, include management

knowledge, skills, and aptitudes. Integrating the managerial knowledge of people, a company achieves its managerial capabilities. Integrating individual managerial knowledge, for instance, a constellation of individuals like a team can provide additional services just like the ones rendered by individual managers, because working with one another enables them to produce services that are uniquely valuable for the operations of the actual group with which they're associated Consequently, they become individually and collectively more valuable to the firm that's the services they will render are enhanced by their knowledge of their fellow workers of the methods of the organization, and also the best way of doing things within the measurement capability a selected set of circumstances within which they're working. in an exceedingly collective setting, managers are ready to complement and leverage each other's knowledge, both at the amount of the knowledge components and the amount of the knowledge domains. When the collective responsibility could be a more or less permanent one, managers are able to specialize and to create upon the competencies available within the firm (Van Den Bosch et al 2000, Sanchez and Heene 1996). Since knowledge and mental models are heterogeneous (Mahoney, 1995), The temporal constellations of various managers can also provide enormous benefits in this reconfiguring and reintegrating their managerial knowledge gives rise to new combinations and thus new managerial capabilities at the firm level. during this case, Van Den Bosch and Van Wijk (2000) suggest that for managerial capabilities, the duo asserts that both composition and also the durability of a managerial collectivity (e.g. a management team) determines the character of the managerial capabilities created and also the success of any managerial action.

This theory guides within the understanding of the research questions ii- and v- in chapter 1- on how financial management and labor management capability influence project delays. only a few firms have investment capabilities and even fewer have innovation and linkage capabilities straining their competitive ability.

2.5 Agency

Contract laws were influenced by the traditional Greek as a kind of devotion to agreements moreover as a basic category for canceling agreements (Elliot & Quinn, 2007). Agency theory was first developed by Jensen & Meckling (1976). Its framework is worried about the contractual relationships of stakeholders, managers, employees in a company.

Agency theory addresses incentive and knowledge problems inside and out of doors the firm (Shalhoub, 2002). Agency theory deals with problems caused by contractual conflicts. Occasionally, different subjective interests bring about conflicts of interest between contracting partners. These conflicts may lead to either of the contracting parties or both contracting parties to undertake an action that will be against the interest of the opposite contracting party. Agency theory deals with how these agency problems will be minimized (Padilla, 2002). per Wentges & Gossy (2008), agency theory describes the connection between one actor or group, the agent and another actor or group, the principal where the agent needs to fulfill certain obligations for the principal. the idea of the connection between the actor and therefore the principal is on a particular or implicit contract.

Contracts describe the relationships between any two parties seeking to involve or already involved in collaborative actions or assignments. Agency theory then helps in describing the connection between different contracting parties and therefore the factors which influence these relationships including laws and regulations, expertise, lack of fabric and equipment, legal issues, and contractual relationships. the foremost fundamental problem with the agency theory is that although it describes the connection between the contracting parties, it's not clear whether these relationships can always be sustainable enough to forestall project delays. This theory guides within the understanding of the second research question on how contract management influences project delays.

Theoretical Variables

the theoretical framework is an account of the phenomenon which avails the researcher the lens to view the world. Since this study is based on the client/employee relationship the agency theory of contract

management and various capability theories will apply. organizational structure is responsible for those delays that result into variations and failure to provide site information on time, the extension to time, escalation of costs due to inflation, delay in payments of interim certificates, delayed decision making, late site handovers, poor pre-project planning, bureaucracy, and inadequate planning.

slow decision making and executive bureaucracy in owner's organizations, poor risk management and supervision slow decision making and project management issues were identified as the most outstanding and common in most projects. organization delays are delays that are caused or influenced by the actions of the project delivering organization. They discuss the following organizational related delays poor risk management and supervision, slow decision-making processes, and work variations as the main organizational causes influencing project delays.

organizational related delays are delays originating from the actions of a client. Some of the factors causing organizational related delays include clients' understanding of the project constraints, the ability to effectively

brief the design team, the ability to contribute ideas to the design and construction processes, the ability to make authoritative decisions quickly and the stability of these decisions.

client-related delay factors approval of shop drawings, design changes, financial issues, and client-initiated variations as the most outstanding and common in most projects. some of the major organizational factors influencing project delays include project payments, delay to furnish and deliver the site to the contractor by the owner, change orders by the owner, late in revising and approving design documents by the owner, delay in approving shop drawings and sample materials, poor communication and coordination by the owner and other parties, slowness in the decision-making process by owner, financing, political interference, conflicts between joint-ownership of the project and unavailability of incentives for a contractor.

2.9.1 Variations

In this research we determine the factors contributing to variation orders, these include delay in acquisition of right of way which they argue is the most important cause of variation orders in construction projects. Others include differing site conditions, change of plans by clients, lack of coordination between overseas and local designers' variation in weather conditions, errors, and omissions in design, unavailability of materials change of schedules by clients, and conflict between contract documents. However, al does not discuss problems of contract management and or availability of human resources with the right mix of skills and experience

2.9.2 Contract Administration

A contract is said to be a legally enforceable promise made by parties between each other. It is binding and contains obligations for both parties. Contracts are said to be specified to meet certain legal requirements in which parties involved agree to give something of legal value. Contracts ensure meeting all the specific requirements. contractor's delays as those delays caused by the contractor's inability to proceed with the project diligently and efficiently as a result of the lack of materials and equipment and other contractor relationships. Contractor related delays can be beyond the control of the contractor. They further describe contractor related delays as those delays that are caused by a contractor's inability to proceed with the project diligently and efficiently as a result of inadequate labor provisions and insolvency of the contractor.

related delays as improper planning by contractor, inefficient site management, the inadequate experience of the contractor, financial problems of contractors, subcontractor issues, quality of contractor's
work, poor site management, sub-contractors, approaches used for construction and insufficient experience of the contractor, clashes in sub-contractor schedule, rework due to errors, deprived communication, and organization unsuccessful planning and scheduling of the project, improper implementation of construction methods, insufficient contractor's work, inadequate sub-contractors work. contract related factors play an important role in delaying any construction project. Slow decision making and

executive bureaucracy in owner's organizations, poor risk management and supervision slow decision making and project management issues are some of the main factors influencing project
delays.
the top five causes of project delays were erratic payment by clients, slow decision making and bureaucracy in client organizations, independent planning and

scheduling and rain. However specific managerial interventions for controlling the effect of rain on project management are not clear.
projects and established their relative importance.

the most important delay factors were preparation and approval of shop drawings, delays in contractor's progress, payment by owners, and design changes. From the view of the architects and engineers, cash problems, the relationships between subcontractors and the owner's slow decision making were the main causes of delay. The owners agreed that design errors, labor shortages, and inadequate laborers
were also important delay factors.

Chan & Kumaraswamy (1998) surveyed the causes of construction delays in Hong Kong as seen by clients, contractors, and consultants and examined the factors affecting productivity. The results of their research indicate that the five principals and common causes of delays are poor site management and supervision, unforeseen ground conditions, slow decision making involving all project teams, client-initiated variations, and necessary variation of the work. These causes were categorized into
the following groups: project-related factors: project characteristics, necessary variations, communication among the various parties, speed decision making involving all project teams, and ground conditions. Client-related factors influencing client characteristics, project financing, their variations and requirements, and interim payments to contractors. Design team-related factors including design team experience, project design complexity and mistakes, and delays in producing design documents. Contractor related factors including contractor experience in planning and controlling the project, site management and supervisions, degree of subcontracting, and their cash flow. Materials related factors including shortages, materials changes, procurement programming and proportion of off-site

prefabrication. Labor-related factors including labor shortages, low skill levels, weak motivation, and low productivity. Plant/equipment related factors including shortages, low efficiencies, breakdowns, and incorrect selections. External factors including waiting times for approval of drawings, test samples of materials, and environmental concerns and restrictions.

2.9.3 Technology

It is the application of knowledge for practical ends. On the other hand, technology provides the answer to the need for greater efficiency and quality in construction. First, there is a need to sort out the culture in the construction industry, followed by defining and improving processes of construction and the aspect of management of construction then apply technology as a tool to support these cultural and construction processes changes.

2.10.1 Damages Due to Delay

A contract might give that, within the event of a breach, the innocent party might get over the defaulting party a total expressed within the contract itself. This total is named liquidated damages. this kind of arrangement has the advantage of saving the time, trouble, and expense of judicial proceeding ought to a breach of contract occur. solely the in-agreement total is retrievable, even though the particular loss suffered greatly exceeds the total mounted by the contract. If damages square measure to be assessed by the contract itself, it is essential to estimate with preciseness the financial result of any doable breach in most cases compromising on quality

Construction schedule delay claims and disputes are one of the top five most common types of disputes in the construction industry. Yet, schedule delay claims have a propensity to be some of the least understood and most complex disputes in construction.

Delay claims typically relate to unanticipated project events and circumstances which extend the project and/or prevent work from being performed as originally planned. There are many causes for schedule delays on a construction project which include, but are not limited to, the following:

- Mismanagement and maladministration
- Site access restrictions
- Differing site conditions
- Permits and approvals

- Financial problems
- Defective plans and specifications
- Changes in the work
- Labor productivity issues
- Document review/approval
- Testing/inspections
- Inclement weather

o Force majeure events

2.11.1 Summary of the Literature Review

The literature review looked at the factors influencing project delays. This entailed organizational structures, contract administration, finances, project design variation, and the use of new technology on large construction projects. Reviewed literature generally agree on the factors influencing project delays. Research shows that organizational structures, contract management, finances, and technology influence project delays. This then has effects on project delivery such as time overruns, cost overruns, litigation, and contractual claims. The three project constraints sought for a project are time, budget and scope may not be enough to measure project success (Schwalbe,2008).

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This study is based on a questionnaire survey approach to providing a holistic overview of the most significant factors causing project delay in the construction industry. This approach was employed to collect a wide range of views from individuals, to have better generalizability of the research findings, to reach a wide population of respondents, Moreover, this approach fits with the quantitative research methodology that supports the statistical testing of the data to obtain meaningful interpretations that provide a better understanding of the survey topic. This survey is based on a conventional approach as shown in Figure 1. The first step was to identify the key delay causes reported in the literature. Before producing the final

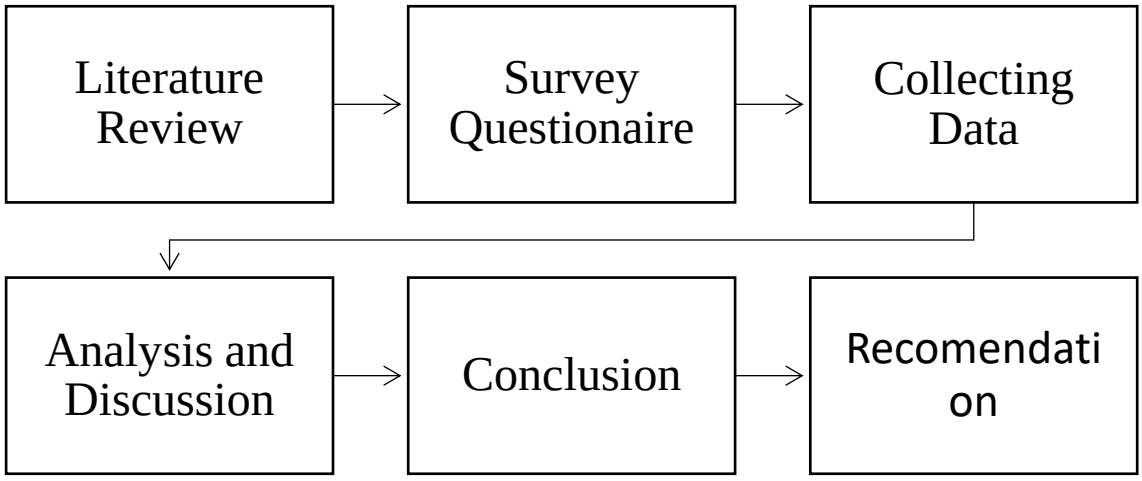

Table: Research Flow chart

3.2 Research Design

The design of a study defines the study type and sub-types. Research design is the framework that has been created to seek answers to research questions A descriptive cross-sectional study design was used. The study involves the collection of data at a single point in time in the target population. The collected data was useful in establishing causes of delay in large construction projects.

Apart from the variables under consideration, the study also collected information on demographic factors which were employed as the control
variables.

3.3 Descriptive Research

This is a study designed to depict the participants in an expected way. It is all about describing people who took part in the study. There are three ways the researcher could go about doing descriptive research on the project report: by observation, case study and survey which is defined as a brief interview or discussion with individuals about specific topic

3.4 Survey Method of Data Collection

the version of the questionnaire, semi-structured interviews with experts was carried out to ensure the relevance of the questionnaire and to verify the suitability of the causes of project delay reported in the literature. The questionnaire includes two main sections. The first section is designed to gather general information about the surveyed respondents. The second section, respondents were asked to give their perceptions of the relative importance of each project delay in the construction industry

This method is preferred because it allows for prudent comparison of the research findings. It was a descriptive survey that helped the researcher to determine the delay factors in the cause of the implementation of large construction projects. This requires primary data collection on quantitative data for comparison. It has been used in similar studies for finding causes of delays in projects.

3.5 Target Population

The study population was the stakeholders in the construction industry The respondents ranging from general managers, technical managers, area managers, department heads, project managers, construction managers, discipline managers and site managers who are expected to be in the construction industry with different years and type of experience, and have firsthand knowledge and can provide in-depth references and relate to the causes of delays... The project owners included customers and people responsible for financing or promoting construction projects These people were deemed influential in project delivery since they are the people with the road map to construction project success hence their ability to produce useful and variety information on delays. This is because they own adequate knowledge on project construction and their experiences in project performance are valuable hence their use as the target

.

3.6 Sample and Data Collection Procedures

The survey questionnaire was designed in a way that is easy to read and respond to. Open-ended questions were minimized, believing they can lead to large data which becomes difficult to process and analyze. It is important to consider the perspective and experience of professionals so. The survey questionnaire was directed to the random sampling of experts well integrated with the construction industry from clients, consultants to contracting companies; Most of which are integrated and experienced in the construction sector Questionnaire survey was directed to many through different modes of communication however sixty-one (61) numbers, of respondents were used in the analysis of this dissertation report.

3.6.1 Sample Procedure

the target population and this assist in the generalization of research findings when the study
design is descriptive. the absence of a fixed number of percentages of subjects that determine the size of an adequate sample. To them, the ideal sample is large enough to serve as an adequate representation of that population about which the study wishes to generalize and small enough to be selected economically in terms of subject availability, expenses in terms of time and money, and complexity of data analysis.
indicates that for a descriptive study, 10 percent of the entire population will be a good representative sample. The study, therefore, adopted stratified sampling in obtaining sample size from the actors in the construction industry.

3.6.2 Data Collection Procedure

The study used primary cross-sectional data obtained from actors in the construction industry sampled randomly. The data collection procedure is the process of gathering pieces of information that are necessary for the research process. In this study questionnaire was. Administered with distribution techniques has been used to ensure the spread of the questionnaire among the construction professionals. First, the questionnaire was sent by e-mail to public and private construction firms. Second, hardcopy questionnaires were handed out to several consulting agencies and contractors... To increase the return and response rates the surveyed participants were assured of their anonymity and confidentiality during the entire survey.

3.7 Test for Validity and Reliability

Test reliability refers to the degree to which a test is consistent and stable in measuring what it is intended to measure. Most simply put, a test is reliable if it is consistent within itself and across time.

Validity refers to the extent to which results obtained data analysis represents the phenomenon of understanding. In this study, data reliability was guaranteed by pre-testing the questionnaire with a selected sample. Contents of the validity helped the researcher to ascertain whether they included or represented all the content of the research in the study. Test-retest approach enabled the researcher to test consistency among different questionnaires

3.8 Data Analysis

is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data. According to Shamoo and Resnik (2003) various analytic procedures "provide a way of drawing inductive inferences from data and distinguishing the signal (the phenomenon of interest) from the noise (statistical fluctuations) present in the data".

While data analysis in qualitative research can include statistical procedures, many times analysis becomes an ongoing iterative process where data is continuously collected and analyzed almost simultaneously. Indeed, researchers generally analyze patterns in observations through the entire data collection phase (Savenye, Robinson, 2004). The form of the analysis is determined by the specific qualitative approach taken (field study, ethnography content analysis, oral history, biography, **unobtrusive** research) and the form of the data (field notes, documents, audiotape, videotape).

An essential component of ensuring data integrity is the accurate and appropriate analysis of research findings. Improper statistical analyses distort scientific findings, mislead casual

readers (Shepard, 2002), and may negatively impact the public perception of research. Integrity issues are just as relevant to the analysis of non-statistical data

3.8.1 Descriptive Statistics

Descriptive statistics area unit temporary descriptive coefficients that summarize a given information set, which may be either a Representation of the complete or a sample of a population. Descriptive statistics area unit Broken down into measures of central tendency and measures of variability (spread). Measures of central tendency embrace the mean, median, and mode, whereas measures of variability embrace the Standard deviation, variance, the minimum, and most variables

The study assessed the means, standard deviation, minimum and maximum of the determinants of delays in large construction projects. Specifically, project delay was used as a dependent variable and organizational structure, contract management, labor management, finance, and variations were used as the independent variables. The responses are presented followed by a brief interpretation guided by the research objectives and a discussion on research findings from the analysis of the data

CHAPTER FOUR

RESULTS AND

DISCUSSION.

4.1 Introduction

This chapter provides an analysis of the info collected from the respondents. The analysis has supported the objectives of the study wherever personal information of the respondents was analyzed likewise as statistics from the respondents to determine the factors within the investigation into the causes of delays in construction.

4.2 Response Rate of the Study

The form was sent to the key actors within the industry ranging from general managers, technical managers, area managers, department heads, project managers, construction managers, discipline managers and site managers who are expected to be in the construction industry

A questionnaire survey was directed to many through different modes of communication

List of Responses	Number of people responded	% of People Responded
Client/ Owners	20	31,3
Contractors	19	32.00
Engineering Consultants	24	36.8
Total	63	100

Table: Characteristics of respondents

4.2.1 Background of the Respondents

4.2.2 Gender of Respondents

From the results in figure 4.1 below it is evident that the majority of the respondents were of male gender (87%) while a minority were of female gender accounting for 13%. The nature of construction works dictates for masculinity with limited positions of administrative and clerical positions. This explains the disparity in the distribution of gender.

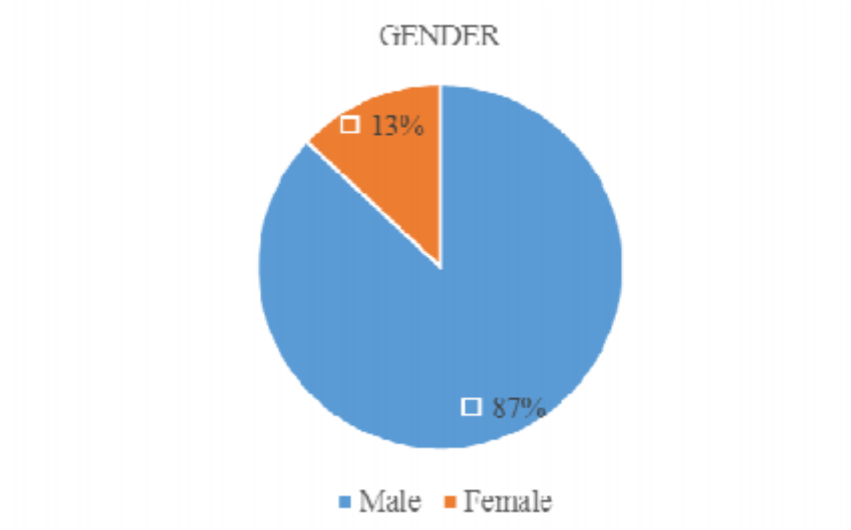

Table: Gender Respondent

4.2.3 Age of Respondents

This table shows that majority of respondents fall in the bracket of 19-29 years while only a small percentage (2%) falls in the category of age bracket from 60 above. This could be attributed to the dynamics of the construction industry that is now characterized by excess performance expectations which would only be achieved and coped by the young generation. This illustrates a generational change from old to young. However, since the majority of the players are young, they lack the required exposure thus contributing to the delays in construction projects.

Age	**Frequency**	**Percentage**
19- 39	50	83
40-59	10	15
60 and Above	3	2
Total	**63**	**100**

4.2.4 Highest Education Qualification

The respondents were asked to indicate the highest level of academic qualification achieved.

Education level	**Frequency**	**Percentage**
Primary	2	1.50
Secondary	5	3.50
College	7	8.00
University	49	87.00
Total	**63**	**100.00**

Table 4.3 illustrates the level of qualification

Table 4.3 shows that majority of respondents were university graduates, followed by college, secondary respectively. Only a small percentage of the respondents had only

completed primary education. This means that level of education in the construction industry is dynamically changing. This implies that the level of education has no direct relationship to the reduction of delay in large construction projects

4.2.5 Identification of Causes of Delay

Client	**Consultant**	**Contractor**
Contractors cash flow problems	Poor site supervision and management by the contractor	Inadequate and unclear details in drawings
skilled and unskilled labor	Contractors difficulties in financing the project	Contractors difficulties in financing the project
difficulties in financing the project	Cash flow problems	Mistakes, inconsistencies, and ambiguities in specifications and drawings
Delay in progress payments by the client	Inefficient quality control by the contractor during construction leading to rework due to errors	Change in scope of the project
Poor site supervision and management by the contractor	Tendering system of choosing the lowest bidder	Poor site supervision and management by the contractor
Labour strikes by the contractor workforce	Ineffective scheduling and planning of a project	Poor qualification of engineers staff assigned to the project
Changes in the scope of the project	Difficulties among the contractor and subcontractors with regards to payments	Delays in progress payments by the client
Inefficient quality control by the contractor during construction leading to rework due to errors	Delays in progress payments by the client	Delay to furnish and deliver the site to the contractor by the owner

Table causes of Delay

above the top causes of delay concerning the client's opinion are Contractor cash flow problems, manpower shortage, contractors' difficulties in financing the project, poor site supervision, and management by contractor and delay in progress payments by the client. This shows that the top five causes of delays are related to Contractor, labor, and client problem. From the consultant's viewpoint, the top five causes of delay are Poor site supervision and management by contractor, contractor's difficulties in financing the project, contractors cash flow problems, inefficient quality control by the contractor during construction, leading to rework due to errors and Tendering system of choosing lowest bidder. This indicates that the top five causes of delays are related to contractor and external causes of delay. It is also to be noted that three of these factors are similar to those asserted by the client. According to the contractor's perspective, the first five causes of delay are Inadequate and unclear details in the drawing, Contractor's difficulties in financing the project, mistakes, inconsistencies, and ambiguities in specification and drawing, poor qualification of engineer's staff assigned to the project and change in scope of the project. These causes are related to design, contractor, and client.

4.2.6 Frequency of Delay Causes

Frequency indices were calculated from the data collected and the significant causes of delay according to contractors, clients, and consultants are shown in table 4.6. From the contractor's point of view, the most significant frequent causes of delay are related to the client, contractor, and design.

Contractor	Client	Consultant
Delay in payments by the client	Poor site supervision and management by the contractor	Tendering system of choosing the lowest bidder
Conflicts with subcontractors schedule and implementation	difficulties in financing the project	Difficulties among the contractor and subcontractors with regards to payments
Slow decision making by the owner	Cash flow problems	Cash flow problems
Delay in subcontractors work	Inefficient scheduling and planning of the project	Ineffective scheduling and planning of the project by the contractor
Frequent change of subcontractors due to their inefficient work and poor screening of subcontractors	Inefficient quality control by the contractor	Poor site supervision and management by the contractor

Table 4.6 The most frequent causes of delay identified for the study

Table 4.6 shows that contractors are realizing the delay in progress payments by the client conflicts with subcontractor's planning scheduling and implementation of work, and slow decision-making by the owner's, delay in subcontractors work due to their inefficient work and bad screening of subcontractor's, unclear and insufficient drawing and changes within the scope of the project are the highest frequent causes of delay inputs of the client shows that the more frequent causes of delay are allied to the contractor and materials like poor site supervision and management by contractor, problems financing the project, cash flow problem, poor planning, and scheduling; poor quality control by the contractor leading to rework due to errors. Unlike the contractors and clients, the consultants point out that the most important frequent delay causes are related to external factors and contractors. The results also indicate that tendering system of choosing the lowest bidder, difficulties among the contractors and subcontractors concerning payments, contractors' cash flow problems, ineffective scheduling and planning of the project by the contractor, poor site supervision and management by contractor and lack of technical professionals in the contractors' organizations are the most frequent causes of delay. Mostly the lowest bidders are unqualified contractors with low capabilities and inadequate resources which directs to

low performance and causes a delay.

Evaluation of Causes of Delay

The total number of respondents was 63. The causes of project delay according to the respondents were delay in payment, slow decision making, bureaucracy in client organization, design changes, labor shortages, low skill levels, plant equipment related problems, environmental concerns and restrictions, management problems, material changes, and low design team experience.

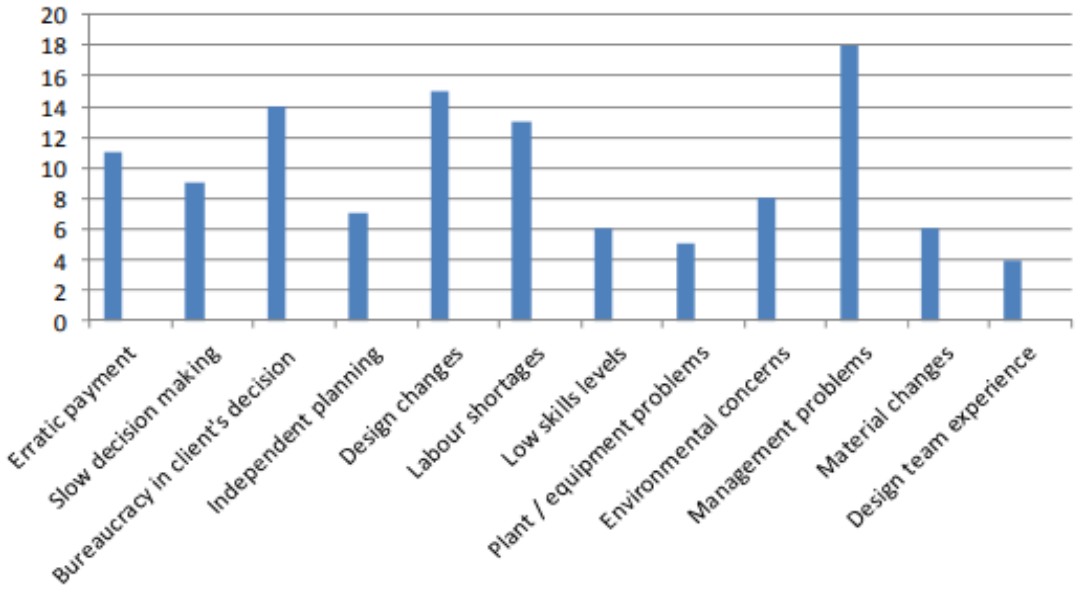

Figure 4.1 illustrates the frequency of each of the above factors.

4.3 Analysis of Major Categories of Causes of Delay

Below shows the frequency index and ranking of all the delay categories in construction projects. The ranking is made based on the Pareto rule assumes that the highest-ranked have the greatest influence. the result of materials related indicates the greatest source of delay for the three respondents of the survey and is ranked first, second, and third according to the client, consultant, and contractor respectively. This result is consistent with the outcome of the overall analysis as materials related category of delay is highly

ranked and is placed in the first position.

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Materials related category delay can be considered as an important source of delay for the stakeholders since it directly affects the performance of the project. If materials are not available as intended throughout construction project duration, the project will suffer from the problem of delay and cost overrun. Materials related delay causes have mixed responsible parties: clients, consultants, contractors, and governments. Since no single party is responsible for this category of delay causes, it, therefore, means that any effort to prevent or minimize delay has to be a joint endeavor and based upon teamwork. table 4.7 shows that contractor related sources of delay and client-related sources of delay are highly ranked by the respondents. The rank accorded by each category of respondents seems to differ due to the opposing views between the respondents and appears to resemble conflicting attitudes. On the other hand, both contractors and clients are not willing to admit or take responsibility for project delays. Predictably, contractors, and clients are more responsible for materials and contractor related categories of project delays. These points of view, blaming each other for delay causes are not very helpful for the project success, however, to reduce or eliminate delays teamwork is required. Overall causes of delay in construction projects are caused by various factors, some of which are within the consultant's responsibilities, some are owner's responsibilities and some are within the contractor's responsibilities.

	Client		**Consultant**		**Contractor**		**Overall**	
Categories (sources)	FI	Rank R	FI	Rank R	FI	Rank R	FI	Rank R
Design related	67.42	9	59.65	8	63.67	4	63.58	**7**
Project related	67.80	8	59.75	7	56.72	5	61.43	**9**
Client related	75.18	4	68.80	4	64.36	3	69.45	**3**
Contractor related	78.18	3	72.77	2	56.06	7	69.00	**4**
Consultant related	69.59	6	59.25	9	66.44	1	65.10	**5**
Material related	82.00	1	71.72	3	66.00	2	73.24	**1**
Equipment related	72.31	5	67.10	5	45.75	9	61.72	**8**
Labour related	79.66	2	75.61	1	56.07	6	70.45	**2**
External	66.83	7	66.35	6	56.03	8	63.74	**6**

Table 4.7 Frequency Index and rankings causes of delay

Based on the overall ranking, the top-causes of delay for the construction project are materials related as it has the first rank among all. Similarly, the labor-related cause of

the delay has been ranked in the second position and client-related the third position.

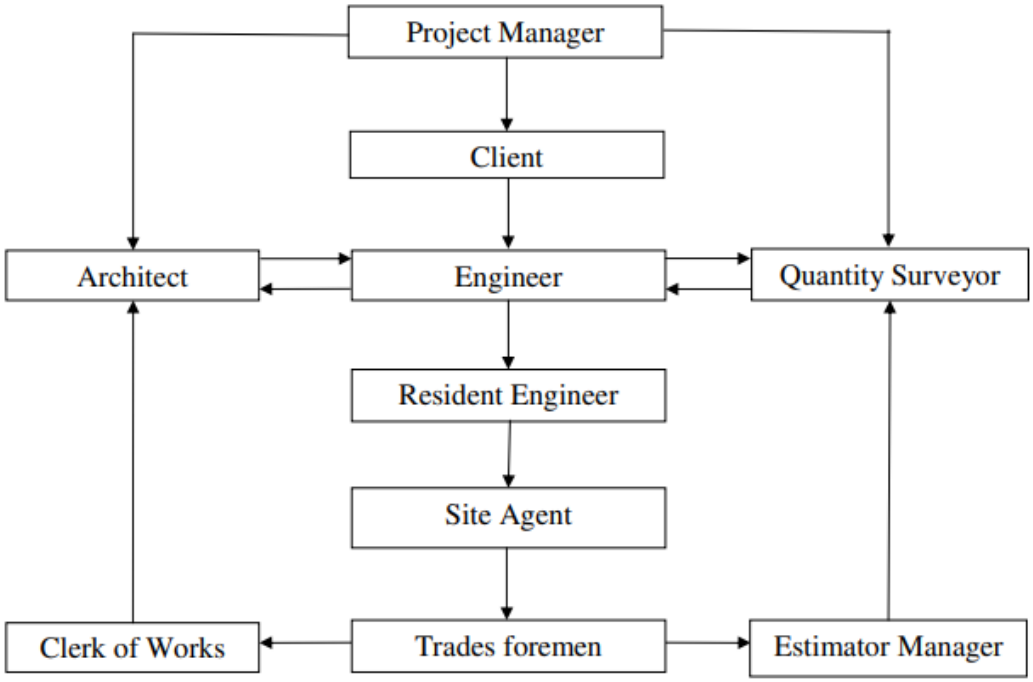
4.4 Strategies to Mitigate Delays as Solution to Project Delay

In construction contracts, proving who and what causes delay or disruption is a critical aspect of resolving and mitigating future delays. But waiting until after the losses have been incurred before addressing recovery by submitting a claim is the reactive strategy and often leads to the higher potential for loss among project stakeholders. The following strategies can help the project stakeholders remain aware of the potential for delay and disruption throughout the project planning and execution phases. The three significant factors thus; Materials availability, labor availability and clients' related factors would need strategically be addressed by the parties in the following ways:- To mitigate project delay as a result of the shortage of materials, there is need to have adequate research done on the availability of materials before the commencement of the works. The same applies to labor requirements and keeping of trained personnel in the process of execution of construction works is paramount. Independent and experienced project managers should be employed to deal with the client's retarded problems. This will assist in mitigating the problems that have emerged as the most significant in the analysis of causes of delays in large construction projects thus; slow decision making by clients, insufficient labor force, changes by clients, and consultants at the site. Regarding finance, to avoid delay in projects, the clients should have adequate financial resources before the commencement of construction works so that contactors are paid promptly. As for technology, contractors should ensure that they have the latest machinery and train their staff on how to use them efficiently, therefore, saving time in the execution of the projects. It is also important that the following points are taken into account in mitigating delays in construction projects-: The contractor should know the scope of the works, analyze the critical path of the project, establish risk triggers as an early warning system and develop contemporaneous documents to quantify delay and productivity loss.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Figure 4.4: Strategic delay Management Structure



5.1 Introduction

This chapter summarizes the findings of the study concerning the objectives, literature review, and key variables in our study. It later makes substantive conclusions based on explored determinants of large construction project delays and thereafter major recommendations are made. And also, suggestions are made for further areas of study.

5.2 Summary of the Study Findings

The study Analyze factors causing project delay in the construction project. The variables of interest include organizational structure, management, contract administration, finances, technology, and design variation, client-related causes, contractor related causes, and consultant related causes. The study findings showed that Organizational structure, management, and design variation insignificantly influence project delays in construction projects. On the other hand, contract administration, finances, and technology were found to be significant determinants of project delays in construction projects.

Project delays are a common problem not only with an immeasurable cost to society but also with debilitating effects to the contracting parties Project delays are a reoccurring problem and have negative impacts on project success in terms of time, cost, quality, and safety, Many scholars and practitioners have presented contradictory views on the causes of delays in construction projects. There is also a lack of consensus as to the principal causes of delays in construction projects. For instance, Aibinu et al (2002) argue that the main cause of delay is poor planning.

5.3 Conclusions

This study was designed to assess the perception of contractors and consultants regarding the key causes of delay causes in the construction industry. By conducting and analyzing a questionnaire survey, this study identified the key factors affecting the construction schedule and ranked them. The survey was based on causes of a delay from the analyzed field data, some factors have been established as being influential to delay in construction projects. This study, therefore, contributes to the existing literature on the delay of construction projects by highlighting the frequent and significant causes of project delays in construction projects Results indicated that the most important delay causes as perceived by the two parties are the delay of the progress payment, lack of training for employees, lack of waste management strategy, unrealistic contract duration imposed by clients, rework due to the construction errors, excessive subcontracting, delay in obtaining permits from governmental agencies, ineffective planning and scheduling, lack of collective planning and unskilled workforce. The findings showed that materials, labor, and client-related factors (bureaucracy in the client's organization), are significant in determining project delays in construction projects.

This research contributes to a better understanding of factors causing a delay in construction projects which represent a significant contribution in controlling and preventing the time overruns through identifying and minimizing the vital causes of delay. its findings could help construction stakeholders gets a better understanding of the main causes of projects delay affecting the efficient completion of construction projects

5.4 Recommendations

There are no straightforward solutions to the challenges of schedule delays in construction projects. There are, however, systematic steps that can be taken to minimize their causes. For the specific factors causing schedule delays in construction projects, the following recommendations are suggested:

The different project actors should review the payment clauses in the contract. A clear and transparent timeline and procedure should be explicitly stipulated in the agreement and the payment process should be actively supervised by the funding agencies. Also, it is recommended to prepare the payment schedule at the planning stage to ensure that companies are paid regularly.

There is an urgent need for improving the management skills of the construction staff. Training programs should be established to provide workers the required skills and techniques concerning scheduling, cost and time control, building information modeling technology, and risk analysis.

Adopting innovative waste management techniques such as lean construction. This philosophy may bring several benefits to the construction industry, especially in terms of waste minimization, deadline compliance, and quality improvement.

The owners are recommended to define a realistic duration in the contract to avoid not only time extension but also rework, quality defects and accidents on construction sites

Contractors are recommended to continuously monitor the quality of construction activities to avoid any mistakes that may lead to rework, and finally to an expanded deadline

Contractors are advised not to depend on the lowest price subcontractors but to choose them according to their experience and technical qualification of staff to be able to follow the different managerial and technical aspects of the project. Besides, owners are recommended to directly intervene in case of disputes between contractors and subcontractors to reduce the negative impact of such problems on project execution.

The government should simplify administrative procedures for construction firms to reduce the time allowed for the permitting process. Contractors are recommended to act early to obtain approvals from the different government agencies to avoid any potential repercussions on a project schedule.

Adopting new approaches to planning, such as approach allows performing collaborative planning by involving all the project stockholders (main contractors, subcontractors, architects, and suppliers). Furthermore, the planning team should continuously monitor the project progress and find solutions to common problems leading to project delays to avoid them in future projects.

Concerning technology, construction firms need to embrace new technology in their operations. For reducing delay in project contractors must have knowledge about the strength of their resources and obtain up-to-date Machinery and try to obtain new equipment for construction.

Areas that may need more improvement

implementation of Risk Assessment and Risk Management

Risk assessment and risk management can play an important role in projects at the initiation stage as the risks can be identified and mitigated accordingly.

Ownership and Responsibilities

Causes of delays are always reflected in some groups or individuals, although it is not easy to accept the fact of responsibility and the severity of the same becomes very critical for the projects. It is recommended that each concerned group should be able to control, minimize, and mitigate their causes of delay by taking responsibility for their actions.

Optimization of Resources

Optimization of resources is very critical for the projects as it plays an important role in the successful completion of the projects. All associated resources from tools and equipment, materials, and manpower to be used in the most optimized and if required to be sub-optimized as well. The procurement and development of competent resources are very important as the well-equipped resources will have a better understanding of the problems and can propose a solution from their experience and competencies.

Innovation and Creative Approach

The innovative and creative approach is required to achieve better results, project management has been very flexible and adaptable since its inception and still have room for improvement. Stereotype systems and approaches need to be changed and more practical and adaptive solutions are required. Management needs to be more approachable and acceptable in accepting news innovative ideas and implementation of the same.

5.5 Areas for Further Studies

This study has comprehensively examined the causes of delays in the completion of construction projects. The study was limited to the use of new technology to reduce delays within the construction project. A similar study could be conducted focusing on reducing delay with the use of new technology It would be an essential approach for a forthcoming review to assess and consequences on new technology on the project delivery.

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Life cycle Document Management system for Construction

APPENDICES

COVER LETTER

Hamza Hassab
Phone : +212634802451
Email: hamzahassab2@gmail.com

Date:

Dear Participate,

Causes of Delays in Projects – A Questionnaire survey

Introduction:

Delays in construction projects often occur and the critical impact of delays is cost and time overrun. Delays in projects bring a bad name for all associated parties and in a generally bad reputation for the project.

Objective:

The objective of this dissertation is to find out the major causes of delay in construction projects through this quantitative approach, using the questionnaire and identifying the responsible parties.

Invitation:

My name is Hamza Hassab, and I am a Masters in Project Management Student at the International University of Leadership. As a part of my program, I am carrying out a study about the causes of delays in projects. I would like to invite you to participate in this research study, by completing this questionnaire, as you have been a credible consultant, contractors, or owner representative with experience of Project Management.

Simple Instructions:

Completion of the attached questionnaire will take approximately 15 minutes, and all questions can be answered by following the simple instructions. The completion of the questionnaire is completely voluntary. All responses are anonymous; there are no correct or incorrect answers and respondents who take part will not be identifiable. If the results of this study are published there will be a summary of all responses to ensure that your privacy is protected.

Your kind assistance in this is highly appreciated. If you choose to participate in the study, your contribution is greatly appreciated. Thank you for your time and attention. I look forward to hearing from you.

Sincerely,

Hamza Hassab

Questionnaire survey

Instructions:

- **Please answer all questions.**
- **Tick (X) the relevant answer where applicable.**

Section (1) Demography

1- You are representing:

□ Client/ Client Representative □ Engineering Consultant □ Contractor
□ Others

2- Your Company is:

□ Local □ International □ Government □ Private

3- Your current Role regarding construction is:

□ Designer □ Contractor □ Construction Manager □ Project Manager
□ Other (please specify) …….

4- Please indicate your years of industry experience:

□ 0-2 years □ 3-5 years □ 6-10 years □ 11-20 years □ Over 20 years

5- The (Average) Price of your current project(s) is

□ 0 – 50 □ 51 – 100 □ 101 – 500 □ Over 500 (Million)

6- How many projects your organization has undertaken in the past 10 years?

□ 1-10 □ 11-20 □ 21-30 □ 31-40 □ 41- 50 □ Over 50

7- How common your projects are delayed?

□ 10% □ 25% □ 50% □ More than 50%

8 - Do you think delays in projects are directly affecting the performance of all associated parties?

□ Yes □ No □ Not s u r e

I have read and understood the above information. I agree to participate in this study.

1. Yes.
2. No.

1.1. Gender

Male = 1 [ ]

Female =2 [ ]

1.2. Age ..... (Years)

1.3. What is your highest level of education?

Primary =1 [ ]

Secondary =2 [ ]

College =3 [ ]

University=4 [ ]

None =5 [ ]

1.4. What is the name of your department?

Finance =1 [ ]

Human resource = 2 [ ]

Technical/Consultant =3 [ ]

Management=4 [ ]

Operations =5 [ ]

Other department =6 [ ]

1.8. Date of Interview: ……...……

Section 2 Main Constructs

This section is concerned more on management system and project details focusing on the key factors forming the contents of the research in general concerning causes of delay in construction projects, Therefore, you need to select one option at a time unless you have further information or suggestions.

Yes or No

Note that in selecting your choices, tick appropriately (√)

A: Organizational Structure

Organizational structure and project delays	**Yes**	**NO**
1. Line organizational structure promotes fast decision making		
2. Staff or functional authority organizational structure provides expertise, advice, and support for the line positions		
3. Even though a line and staff structure allows higher flexibility and specialization, it may create conflicts between the line and staff personnel		
4. Personnel are assigned to a project from the existing permanent organization and are under the direction and control of the project manager		
5. Matrix organizational structure has a negative effect of dual authority similar to that of project organization		

B: Contract Administration

Contract management and project delays	**Yes**	**No**
1. Our organization has low capacity in handling some projects		
2. A lot of time is required/taken in drawing interpretations		
3. The project managers in the firm have wide experience in people management		
4. A lot of time is required in asking for clarifications in case of discrepancies		
5. Staff in this firm adhere to the professional ethics		

6. The organization values capacity building among the staff		

C: Management

Labour and project delays	**Yes**	**No**
1. Most of the workers in our organization are not motivated		
2. Workers in this firm are not quality conscience		
3. There are laziness and laxity among the workers in this organization		
4. Workers in this firm do not follow work ethics		

D: Finances

Finance and project delays	**Yes**	**No**
1. In our firm, there is a delay in the approval of the budget for assigned projects		
2. Employees are not paid on time and delay in the purchase of material is common in the firm		
3. There are frequent changes of the organization budget		
4. The firm has good credit-worthy records with suppliers and has cultivated healthy working relations with them		

E: Design Variations

Variations and project delays	Yes	No
1. Variations that have cost implications may also have time impact		
2. Changes that have design implications have time impact		
3. The firm is not allowed to apply for an extension of the contract period		

F: Technology

Technology and project delays	Yes	No
1. Technology implications may also have a time impact on project delays		
2. The firm is has embraced the use of advanced technology		

G: Summary

Causes of Project Delay	
In your view what is the major cause of project delay?	