ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF PROJECT MANAGEMENT

ASSESSEMENT OF FACTORS CAUSING DELAY OF CONSTRUCTION PROJECTS: EVIDENCE FROM CONSTRUCTION PROJECT MANAGERS

A RESEARCH PROJECT WORK SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ART IN PROJECT MANAGEMENT

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APPROVED BY BOARD OF EXAMINERS

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Declaration about the research

I, the undersigned, affirm that this research paper entitled: *Assessment of factors causing delay of construction projects: Evidence from construction project managers*, is my original work; prepared under the guidance of Mr. Dereje Teklemariam (Ph.D.) and all references are acknowledged.

Finally, I also assure that this thesis has not been employed and submitted in any way to any educational institutions for a requirement of getting a degree award.

Netsanet Berhanu _____

Name Signature

Endorsement

This research paper entitled *"Assessment of factors causing delay of construction projects: Evidence from construction project managers"* is prepared by Netsanet Berhanu and shall be submitted to Addis Ababa University, School of Graduate Studies for examination with my approval as a university advisor.

_____ _____

Dereje Teklemariam, Ph.D.Signature

School of Commerce

June 2018

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LIST OF ACRONYMS AND ABBRIVATIONS

FI	Frequency Index
MWDC	Ministry of Urban Development and Construction
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
RII	Relative Importance Index
SI	Severity Index

Abstract

This study assessed major factors causing delay of construction projects implemented by Ethiopian private local Grade-1 and Grade-2 contractors from project manager's evidences. Questionnaires were distributed to respondents who are purposively selected from project manager's population in Grade 1 and Grade-2 local private contractors. The respondents were asked to rank the delay factors based on both frequency of occurrence and severity of impact. The questionnaire also enquires respondent's experiences and number of projects executed vs delayed. Analysis of these data indicated that out of the total 108 projects executed 48 projects are delayed, this is 46% of the executed projects. This reveals prevalence of serious delay problems in the projects being executed .The top ranked delay factors were; delay of payment, design problem, delay of designs, Increase in price of materials and wage, limitation of considering contingency plans, limitations of leadership, limitations of communication, delay in decision making and commitment problems. It has recommended that future researches may study the issue in broader perspectives.

Key Words: Project, schedule, project manager, risk, delay, planning, stakeholder, communication, sponsor, leadership, scope.

CHAPTERONE; INTRODUCTION

1.1 Background of the Study

A project is a temporary endeavor undertaken to create a unique product, service, or result according to the description of PMI (2017). A project is distinguished from ongoing business activities because it involves a single, definable purpose, product or result and it usually works under defined constraints of cost, schedule (time), and performance quality. The reason for organizing tasks as a project is to focus the responsibility and authority for the attainment of goals on an individual or small group and accomplish specific goals. Project management is the process of planning, organizing, directing and controlling of company resources for a relatively short-term objective that has been established to complete specific goals and objectives (Kerzner,2009).

Businesses regularly use project management to accomplish unique outcomes with limited resources under critical time constraints. Therefore, managing project requires a specialized management technique necessary for planning, organizing, and control of projects under one strong point of responsibility with many challenges according to Othman (2015).

When a project is for construction and implementation of civil work physical infrastructures, the extents of project management difficulties become even more complex to achieve project success criteria factors of cost, schedule and performance quality according to the description of Bentator.&Thumann (2003).The difficulties in construction project management arise from the inherent nature of construction projects; such as complex and unique activities, mobile workforce, ingrained work cultures, environmental conditions, project-based setup, involvement of diverse sub-contractors and suppliers.

The work environment and culture of a construction project is unique compared to most working conditions. A typical construction project consists of groups of people, normally from several organizations, that are hired and assigned to a project to build the facility. Due to the relatively short life of a construction project, these people may view the construction project as accomplishing short-term tasks. Even small-sized construction projects involve a large number of people hence organizing their efforts is complex, even if they all work for the same organization.(Bentator&Thumann (2003).

Sources of information, location, timing, and problem complexity change as people enter the project, perform their assigned duties, and depart (Garold,.2000).

Construction project management functions to predict as many pitfalls as possible so that the project is completed successfully, by planning, organizing and controlling activities in advance, according to description of Okoye et al (2015)

The construction industry is a fundamental economic activity which permeates most of the sectors of the economy. Since, it has a major role to play on the growth or stagnation of the overall economy and in achieving social economic development objectives of any country; local firms and professionals should be fully involved in the process (Tadesse,Dakhli. & Lafha,2016).

According to description of World Bank Group (2016) report, the growth of Ethiopia's GDP in 2015/16 was attributed to construction and the services sectors. The report also states that the rapid economic growth of Ethiopia since 2004 was driven by public infrastructure investment supported by the conducive environment in the country. In addition, there is shifting of labor from agriculture to services and construction sector and this explains per capita growth over the past decade (World Bank Group 2016). A report of Ministry of Urban Development and Construction (MUDC)(2012), stated that Ethiopian construction sector has been registering remarkable growth during past years and its contribution to the GDP is increasing at an average annual growth rate of 12.43%.The Public and private sectors are investing huge amount of fund in construction industry of Ethiopia. It has contributed much in reduction of poverty, in increasing employment, expansion of small and medium enterprises and job creation (MUDC, 2012).

Despite the growth of Ethiopian construction sector and its high contribution to the overall national economy, several challenges are being noticed in the sector and hence require solutions to sustain and maintain the growth rate in the sector into the foreseeable future. One of these significant problems, which need to be resolved, in the sector is delay of project implementation which can hold back or impair planned economic development.

A research by Hailemeskel, (2013) states that the Ethiopian construction industry has several challenges and limitations. These challenges have contributed to poor performance level of the industry which is manifested by delay, cost overrun, poor quality delivery.

Delay of project implementation can be defined here as late completion of work compared to the originally planned time schedule. Hence delay can be expressed as indicator of problem in project schedule management.

Various researches and observations reveal that there are prominent problems of delay in implementation of construction projects undertaken by local contractors. Impacts of construction delay, particularly those of social infrastructures like schools, hospitals, roads and water projects affect not only the clients and the contractors. The society is also subjected direct or indirect consequences of project delay due to lack of the services they could have benefited in timely completion of these infrastructure projects.

Therefore, implementing effective project schedule management and minimizing incidences of factors associated with project delay problems is of crucial concern. In order to find mitigation measures of schedule overruns, first it is required to identify the causes and factors of delay problem. There are several researches conducted on the topic of project delay. However, researches conducted on different contexts, scopes and perspectives tend to reveal varying findings. This is because projects are working in dynamically changing environments Wysocki, (2014).

This study envisages the central position of project managers in project environments and their frontline actor roles in implementing complex and challenging activities of construction projects. The challenges become even more complex when it is in local private construction companies where there are several interferences both from internal and external organizations that would trouble project managers in exercising their responsibilities of making valid leadership decisions. Othman (2015) describes this situation and states that lack of sound project management by owners or contractors leads to delays and extra costs for both contractors and client organizations. Project manager is the person responsible for leading a project from its inception to execution which includes planning, execution and managing the people, resources and scope of the project (www.techopedia.com). The project managers described in this specific study are those working in the contractor company side.

Therefore, this study intends to assess and describe perspectives of project managers on project delay factors and issues or challenges to implement effective project schedule management practices.

1.2 **Statement of the Problem**

The construction industry is contributing much for growth of Ethiopian national economy, reduction of poverty, increasing employment, expansion of small and medium enterprises, development and job creations (MUDC,2012).It is the major economic sector in Ethiopia where public and private sectors are investing huge amount of fund. The sector has high role on the growth or stagnation of the overall economy according to description of (MUDC,2012).

Despite its growth and high share of contribution to the overall national economy of Ethiopia, several challenges are being noticed in the construction sector that requires immediate actions. Tadesse.,Dakhli&Lafha(2016)states that delay of implementation is one of the significant problems in Ethiopian construction industry that needs immediate actions. A study by Werku,&Jha.(2016) shows that in Ethiopia only 8.25% projects have been completed on the original targeted completion date. The remaining 91.75% delayed 352% of its contractual time. It also states that construction delays are common problems in Ethiopian construction projects and major causes of project failure.

Delay of projects has many consequences and impacts on the economy, on the society and project stakeholder organizations. The main stakeholder organizations in construction projects as per description of Lutchman(2011)are the client, consultant and contractor organizations. Extension of project time, cost overruns, loss of profit, disputes, poor quality of work due to an action to expedite the project accomplishment, creating stress to the client, losses due to acceleration of works, bad reputation of construction team, claims and delay in using the project facility are identified as effects of a delayed project according to descriptions of Mukuka,Aigbavboa&Thwala (2015). Therefore, to find mitigation measures for project delay, it is important to identify factors causing the problem.

Several researches have been made on topics of project delay from different perspectives and methodological approaches. This study intends to identify project delay factors from perspectives of project managers.

The motivation for the research came from recognizing focal and central responsibilities of project managers in project implementation.PMI (2017) stresses about crucial role of a project manager by comparing it in analogy with role of a conductor for a large orchestra.

It states that the project manager and conductor are both responsible for what their teams produce; the project outcome and the orchestra concert, respectively.

The focal responsibility position of project managers gives them the opportunity tobe familiar with day to day project activities and identifying actual challenges facing in project environments. Therefore, their feedbacks have paramount value as firsthand information to identify causes of project delay factors and seek mitigation measures. In view of this, the study aims to identify major project delay factors in construction projects implemented by Ethiopian local private contractors, from perspective of project managers.

1.3 Research Questions

In conformity with the discussion of research problem, this study aims to answer the following specific research questions:

- What is the prevalence of delay in projects of Ethiopian private local contractors?
- What are the top major factors contributing to delay of the construction projects?
- What is the contribution of main stakeholder organizations to the project delay factors?

1.4 Objective of the Study

1.4.1 General Objective

The overall objective of this study is to identify the top major factors causing delay of construction projects implemented by local private contractors, and to explore contribution of main stakeholder organizations to these major delay factors.

1.4.2 Specific objective

The specific objectives of the study aim to address are:

- To explore prevalence of delay problem in projects of Ethiopian private local contractors.
- To identify the top major factors contributing to delay of the construction projects.
- To assess the contribution of main stakeholder organizations to the delay factors.

1.5 Significance of the Study

As stated in statement of problem, this study aims to assess perspectives of project managers about factors causing delay of construction projects in private local contractors.

This study has significance of contributing to efforts of minimizing the prevalence and overall impacts of delays in Ethiopian construction projects thereby to improve performance of the sector. This is because to set appropriate solutions for the delay problem, it is crucial first of all to identify the factors causing the problem. The specific significances of the study are listed as follows;

- **Knowledge generation**

Findings of the research can be taken as valuable material of lesson learnt for project managers and project crews. It can be used to familiarize new project managers joining the construction sector with challenges and issues encountering in their professional careers.

- **To solve practical problems of project schedule management**

Findings of the research can be used at project level to solve project delay problems by giving special attentions to these major delay factors and implementing appropriate contingency plans to minimize the incidence. Identifying and ranking project delay factors helps project managers and stakeholder organizations to keep their eyes on these few but serious factors and to give more attention to them. The ranking has considered both frequency of occurrence and impact severity of the delay factors. This is because some factors occur very frequently but their impact is less while others do not occur frequently but once occurred, their impact is very high. Therefore, to include the overall effects of both factors, the ranking pursued using relative importance index(RII) which it the product of frequency index (FI) and severity index. (SI)

- **To pave the way for further researches**

Findings of this study can also be used as input for other researchers on topics of delay in construction projects.

- **To serve as input for policy or strategy development**

Policy makers and strategy planners in the construction sector can use findings of this study as an input and points of attention in their endeavors.

1.6 Scope of the Study

Conceptual scope of the study is delimited to assess project delay or factors causing problems in achieving project time schedule. It is to identify top major factors that cause delay of construction projects implemented by private local contractors of Grade-1 and Grade-2 categories in Ethiopia, and to describe contribution of the project's main stakeholder organization for the delay factors. The time scope for the study is cases of projects started and completed from 2008 to 2018. It includes only cases of projects that are completed on time, ahead of time or delayed. Projects which are terminated or abandoned for one or other reason are out of the scope. The methodology pursued for the study is by collecting and adopting both qualitative and quantitative data by survey method and literature reviews. The data are analyzed by descriptive analysis and presented in descriptive method.

1.7 Limitations of the Study

This project study has limitations of covering broader scopes of construction project's delay factors. The numbers of valid responses collected from respondents were fewer than what the researcher had expected. This has reduced confidence level of the study findings to 67% which is an implication of a limitation in the research findings. The data obtained from the questionnaire can have some tendency of bias based on respondent's personal experiences and perceptions about the delay factors and tenure of stakeholder organizations. Where different methods of data collection and analysis are used for a research, they enrich and confirm the data or findings. This could also provide means of checking the findings from a particular method as per Greener,S.(2008) description to the term triangulation. Accordingly, for triangulation purpose and backing up limitations pertinent in survey tool used and thereby to strengthen findings of the study, case studies of two actual projects that had history of delay problem have been incorporated to this study.

1.8 Ethical Considerations

The study is undertaken inconformity with basic ethical issues of researches. According to Greener, (2008)the main ethical considerations in researches are giving full information about purpose of the study to participants, gaining informed consent of participants to participate in the research, respecting participants right to withdraw from the research at all stages of the

research, not causing harm to anyone by action or omission of the research, respecting participant's wish for anonymity and confidentiality, honesty and avoiding deceptions.

1.9 Organization of the Research Report

The research is organized into five chapters. Chapter one is about introduction, Statement of the problem, research objectives and research questions, significance of the study, scope of the study and limitations of the study. Chapter Two is about literature reviews on topic of the study. Chapter three is about research design and methodology, sources of data, and sampling technique, tools of data collection and data analysis. Chapter four is about discussion of the research. Chapter five is about summary of findings, conclusions and recommendations. The last pages of the paper contain appendixes of questionnaires, references and other annexed attachments of documents.

CHAPTERTWO; LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Projects and Project Management

Project is a sequence of unique, complex, and connected activities that have one goal or purpose and that must be completed by a specific time, within budget, and according to specification. (Wysocki,.2014). Project is combination of human and non-human resources pulled together in a temporary organization to achieve a specified purpose PMI (2017). Project possesses the following typical characteristics of a defined beginning and end (specified time to completion), a specific, predefined goal or set of goals, a series of complex or interrelated activities and a limited budget and implementation of a project is the step where all the proper planned activities are put into action (Kerzner,2009).

The success of a project is measured in terms of three important criteria- time, cost and scope. Quality refers to the quality standard of the deliverables or products from the project and achieving customer satisfaction. Cost refers the financial resource approved to the project, including all budgets and expenses to deliver the project. Time or schedule refers to a time frame or deadline date within which the project must be completed. Time is an interesting resource in that it can't be inventoried. It is consumed whether it is used or not. Therefore, the objective of the project manager is to use the future time allotted to the project in the most effective and productive ways possible. Once a project has begun, the prime resource available to the project manager to keep the project on schedule or get it back on schedule is time(Wysocki,2014). The third constraint, scope is defined as what a project is trying to achieve and accomplish. It includes all the works involved in delivering the project outcome and the process used to produce. These three constraints are significant in every project and they are described as project triple constraints (Brewer and Dittman, 2010).

Figure 2.1Project Triple Constraints

Source: Brewer and Dittman, 2010

Project triple constraint is the balance of project's cost, time and scope; it is used to measure whether the project's objectives are being met or not. The triple constraints have their own respective effect on the project's performance. They are correlated with one other and each constraint bears effect on the other two i.e. if a change happens on a constraint, another two constraints also will be influenced by the changes. (Brewer and Dittman, 2010).

Generally, a project is said to be successful when is completed within a stated cost or budget, on time and meeting the project objectives or the scope. When these scopes of a project are completed to meet the project objectives then the project quality is said to have been achieved (JIA, 2015).

Bentator&Thumann(2003) describes how construction projects differ from ongoing business activities and also states about the traits accountable for its complexity. A project is typically unique and specific as contrasted with ongoing business functions which are performed on a day-in, day-out basis, ideally with increasing productivity. People assigned to a project may come from any part of an organization or from outside the organization. The project manager will be involved in some or all of these people functions of project management-selecting, training, coordinating, leading, coaching, rewarding, disciplining, and supporting. A project manager deals with people all the time.

When the project is completed, these professionals will likely move on to other projects or back into line functions within the organization.

According to Bentator&Thumann(2003) there is impact of weather condition on schedule performance of construction projects which signifies these projects. Work interruption due to unsuitable usually rainy weather conditions, incidence of machineries idle hours and down times, the effects of decline in productivity of manpower and inefficiency of construction machineries will be manifested in overrun of project schedule and project costs.

Michael,(2010) as cited in JIA(2015) states that construction project is not only the construction work but also included all the planning, designing, management, executing or other works until the end of the construction phase. A construction project can be considered as successful if it satisfies all the requirements and completed on original budget, on schedule, and on the agreed scope set within the project. The construction industry is unique compared to other industries. Because each construction project is different: the workforce is transient, multiple crafts are involved, projects are planned and worked in short time frames, and there is a tremendous variety of material and equipment that must be installed. Also, much of the work is exposed to weather and construction workers are continually working themselves out of a job.

Kerzner,2009 states that research and development projects may have a fixed performance level, whereas construction projects normally are constrained by a date of completion. The duration set for a project is finite with a defined start and a planned completion dates, while day-to-day business functions are typically in place before a project starts and will continue after the project is concluded. Relationships or the people aspect of project management is a crucial aspect of management. The project manager is responsible to manage relationships associated with the project both internally and externally. Internally the relationship with the people in the company who are members of the project team, the boss, the peers and supporting departments., Externally with customer's people associated with the project, as well as any subcontractors and vendors who may be associated with the project. Regarding budget, the project manager is responsible for managing his project budget to achieve on-time and technically sound result within the budget as per descriptions of Michael,(2010) as cited in JIA(2015). Due to these conditions the management of construction is challenging and cooperation of participants is very imperative in effective implementation.

2.1.2 Project Management Knowledge Areas

PMI (2017) defines project management as the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the project management processes for the project. It enables organizations to execute projects effectively and efficiently.

Delay of project implementation is defined as the late completion of work compared to the planned schedule (Bentator&Thumann,2003).

Inline with this, among the ten knowledge areas described by PMI (2017), schedule management knowledge area is relevant to the topic of processes involved in achieving on schedule project completion. PMI (2017) describes project management knowledge area as an identified area of project management defined by its knowledge requirements and described in terms of its component processes, practices, inputs, tools and techniques.

The key concepts of project schedule management are discussed in PMI (2017) as follows; project scheduling provides a detailed plan that represents how and when the project will deliver the products, services and results defined in the project scope and serves as a tool for communication, managing stakeholder's expectations and as base for performance reporting.

PMI (2017) describes that, project management consists of ten areas of knowledge and that a project has life cycle managed by executing a series of project management activities known as project management processes. Every project management process produces one or more outputs from one or more inputs by using appropriate project management tools and techniques. The output can be a deliverable or an outcome. Outcomes are an end result of a process. Project management processes apply globally across industries. Project management processes are logically linked by the outputs they produce. Processes may contain overlapping activities that occur throughout the project. The output of one process generally results in either an input to another process, or a deliverable of the project or project phase.

The knowledge area of project schedule management consists of the following five process groups according to PMI (2017):

i. Plan Schedule Management–The process of establishing the policies, procedures and documentations.
ii. Define Activities-The process of identifying and documenting the specific actions to be performed to the project deliverables.
iii. Sequence of Activities-The process of identifying and documenting relationships among the project activities.
iv. Estimate Activity Duration-The process of estimating the number of work periods needed to complete individual activities with the estimated resources.
v. Develop Schedule-the process of analyzing activity sequences, durations, resource requirements and schedule constraints to create the project schedule model for the project execution monitoring and controlling.
vi. Control Schedule-The process of monitoring the status of the project to update the project schedule and manage changes to the schedule baseline.

2.1.3 Construction Projects

Construction projects are somewhat difficult to manage and meet success criteria requirements due to the nature of the industry; such as complex and unique nature, mobile workforce, ingrained culture, working conditions, and project-based setup, diverse sub-contractors and suppliers according to Okoye et al. (2015).

Bentator.&Thumann(2003) state that construction projects require a wide range of planning and contemplations for on schedule completion, due to its fast changing environmental conditions and huge investments. Technical skill of construction project managers may tend to drive them in favor of doing things like designing, coordinating, negotiating, installing, solving problems, etc. Planning, on the other hand, requires a more contemplative, long-term view of the project, and may encompass planning for activities that are not at hand in terms of when they will occur. This requires more thinking than doing and often receives insufficient attention because it’s not hands-on or immediate in its urgency. Yet, good planning is a cornerstone of a good project.

Careful planning, along with good execution, almost always leads to a successful project. Poor planning, on the other hand, even with good execution, may lead to a successful project,

but often one that is fraught with crises, stress and loss of opportunities. Bentator&Thumann(2003).

Project management is the planning, organizing, directing, and controlling of company resources for a relatively short-term objective that has been established to complete specific goals and objectives. Furthermore, it utilizes the systems approach to management by having functional personnel (the vertical hierarchy) assigned to a specific project (the horizontal hierarchy). Kerzner,2009.

Businesses regularly use project management to accomplish unique outcomes with limited resources under critical time constraints. The basic purpose for initiating a project is to accomplish specific goals Meredith&Mantel(2009). The reason for organizing the task as a project is to focus the responsibility and authority for the attainment of the goals on an individual or small group. In spite of the fact that the PM often lacks authority at a level consistent with his or her responsibility, the manager is expected to coordinate and integrate all activities needed to reach the project's goals. In particular, the project form of organization allows the manager to be responsive to: (1) the client and the environment, (2) identify and correct problems at an early date, (3) make timely decisions about trade-offs between conflicting project goals, and (4) ensure that managers of the separate tasks that comprise the project do not optimize the performance of their individual tasks at the expense of the total project Meredith&Mantel (2009).

Construction companies are organizations that work to deliver projects for an external client or customer. Therefore, there are different projects under the organization. Since project managers use resources assigned from functional managers there arises conflict for resources between functional managers and project managers. Conflict for scarce resources also arises among different projects themselves. The project sponsor acts as a moderator on any potential conflict between the functional managers and the project managers. In order to do this, the project sponsor must have executive authority over both project manager and the functional managers. The Managing director or typically company owner takes this responsibility. If the sponsor does have visible support for a project, the project will be in trouble of failure.

Kerzner(2009) states that project management is a specialized management technique necessary for the planning, organization and control of projects under one strong point of responsibility. It is the application of knowledge, skills, tools, and techniques to project activities in order to meet project requirements.

On the contrary, lack of sound Project Management by owners or contractors on projects on the other hand leads to construction delays and extra costs for both the contractor and the client (Othman (2015).

Construction projects have a planned start and end dates. These dates are not determined by the project manager but they are fixed by the consultant and project client in the contract document. This date fixed for project completion must have to be achieved since its unjustifiable failure will be followed by contractual penalty to the contractor amounting up to 20% of the project price as per the general condition of contract pertinent in Ethiopian construction contracts stated in Ministry of works and urban development, (1994). The contract article describes about penalty payment by the contractor due to project delay under clause 47 Liquidated Damages for Delay "If the Contractor fails to achieve completion of the Works within the time prescribed by Clause 43 hereof, then the Contractor shall pay to the Employer 1/1000 of the contract price per day as liquidated damages for such default and not as a penalty for every day or part of a day which shall elapse between the time prescribed by Clause 43 hereof and the date of certified completion of the works. Depending on the nature of the works, Liquidated damage higher than the minimum limit provided herein above may be fixed in the contract. The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies in his hands, due or which may become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from any other of his obligations and liabilities under the Contract." The maximum limit of the liquidated damage shall be 20% of the Contract.

Therefore, to achieve this contractual project completion date obligation and escape the penalty due to project delay, a detailed schedule must be prepared; this schedule must list key phases, tasks, and milestones. It should also list who is responsible for performing these tasks or meeting the milestones and show dependency relationships among tasks (Bentator.&Thumann, .2003).

The construction industry is a sector of the economy that transforms various resources into constructed physical economic and social infrastructure necessary for socio-economic development. It embraces the process by which the said physical infrastructures are planned, designed, procured, constructed or produced, altered, repaired, maintained, and demolished MUDC (2012).

Construction sector is one of the main sectors creating employment opportunities for citizens. For example, according to description of Ministry of Labor and Social Affairs (2009), one of the strategies set to meet the objectives of generating employment for citizens is accelerating productive employment in the formal private sector. With respect to this the main focus area is to promote development of labor-intensive private construction. Developing guidelines for foreign construction companies to utilize as much local labor as possible to transfer knowledge and build local capacity, design a support program to establish and strengthen small and community-based construction companies and undertaking a comprehensive study and regularly update on the constraints of labor-intensive are set as strategies.

Problem of project implementation delay can be defined as the late completion of work compared to the planned schedule. Project implementation delay can be minimized only when their causes are identified. Delay is common in Ethiopian construction projects and it is the time overrun beyond completion date specified in a contract of agreement. To the contractor, project delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labor cost increases.

According to description of Kerzner (2009) a project manager has responsibility of managing all project resources and work activities. This requires deployment of huge resources of equipment and manpower among others. However, the project manager has no direct power of control over project resources. The resources are controlled by the line managers, functional managers, or, as they are often called, resources managers.

Project managers must negotiate with line managers for all project resources. The project manager's job is not an easy one, Kerzner (2009) states. Project managers may have increasing responsibility, but very little authority. This lack of authority can force them to "negotiate" with upper-level management as well as functional management for control of company resources. They may often be treated as outsiders by the formal organization. In the project environment, everything seems to revolve about the project manager.

Bentator.&Thumann(2003)also describes that project manager works under resources which are not under his direct control. He has to anticipate potential conflict for resources with other projects of the organization and how to achieve support from functional managers who have direct control over the resources. This implies that the project manager has to get support from senior managements or project sponsor in the organization. If this expected support from senior managements who have power over both functional and project managers goes in

contrary the project will be in risk of failure to achieve the three critical success factors, one of which is delay in schedule.

Furthermore, the support must be visible to all organizational positions. It is highly unlikely that any line manager would actively support the implementation of project management without first recognizing the same support coming from above.

Even minimal line management support will still cause project management to struggle. Therefore, it is logical to consider that lack of support to project manager from senior management/project sponsor for one or other reasons will be a big impediment leading to project failure and delay. Project manager is not only responsible for cost and time management but also for managing project quality. For example, Kerzner (2009) states that, project manager has the ultimate responsibility for quality management on the project. Quality management has equal priority with cost and schedule management.

The project manager is supposed to have detail information about challenges and issues of the projects at micro level more than any other person in the project environment. Therefore, they are the right persons to explore about issues of the project.

2.2 **Empirical Review**

Several researches have been under taken on the topic of delay of construction projects and problems in managements of project schedules.

A research has recently been undertaken by Shambel&Patel (2018) to assess the existing system of time and cost overrun and to identify factors that affect time and cost overruns in Addis Ababa Road construction. The research was undertaken based on wide literature review and historical data of completed road projects in Ethiopia. Findings of the research revealed that none of the projects were completed as planned and within the estimated cost and no considerable improvement had occurred over time to cope with problems of project delay factors.

The research also identified factors that have caused delay of road projects as financial problems, improper planning, land acquisition and construction delay, design changes, less materials and equipment supply by contractors, incomplete design are the main sources of delay and cost overrun.

Another research conducted by Zinabu (2016) to assess the level of techniques and software packages used for project time control, factors affecting delay in construction projects and to recommend possible mitigation measures. The study adopted both quantitative and qualitative data from primary sources and literature reviews. According to Zinabu (2016) there is low level application of techniques and software packages for project planning and time control among the contractors. Cash flow problem, mismanagement, improper planning, slow decision making and late delivery of material and equipment were identified as vital factors causing project delay.

A research was undertaken by Tadesse,Dakhli&,Lafha(2016) to assess performance and challenges of Ethiopian construction industry by using both literature reviews and questionnaire methods. The research also revealed that there are similarities of challenges of construction projects delay in most of developing countries. The research demonstrated that the level of construction project management practice in these countries in terms of adapting general project management procedures, project management functions, tools & techniques to be unsatisfactory. Particularly the level of practice in terms of safety, risk and time management was found to be very low.

Regarding challenges, the study identified that time, cost and risk management as the most challenging issues for professionals in managing their day to day's activities. The assessment of the extent of deviation from plan or predetermined requirements on these issues also reinforced the research result. The amount of schedule slippage ranges between 61-80% and that of planed costs and other variables such as risk, quality, resources utilization and safety deviates in the range of 21-40% from predetermined requirements, planned or anticipated at the beginning. Werku&Jha (2016) also carried out a research to investigate causes of delay in Ethiopian construction industries and have stated that, delays in construction projects are the major causes of project failure.

The study identified the factors of the findings show that the main critical factors that cause construction delays in Ethiopia are: (1) Difficulties in financing project by a contractor; (2) Escalation of the materials price;

(3) Ineffective project planning; (4) Problem in scheduling or resource management; (5) Delay in progress payments for completed works, (6) Lack of skilled professionals in the field of construction management (7) Fluctuating labor availability season to season /Seasonal labors availability.

Another study to identify management project control problems of construction industry in Ethiopia was also undertaken by Hailemeskel(2013) and identified key challenges in the sector as shortage of skilled and unskilled manpower, machineries and tools, absence of appropriate standards and guidelines, lack of strong institutional capacity to oversee the construction industry, lack of construction project management and control. These challenges have contributed to poor performance level of the industry manifested by delay, cost overrun, poor quality delivery. Corruption and unethical acts, between the key actors within the industry, are the known constraints that emanates from low implementation capacity. Hence, the main challenges are summarized as low implementation capacity with respect to manpower, material and machinery supply, organizational and systemic issues. He recommends policy makers in building the local domestic construction contractors and consulting company's capacity improve the performance of the public sector and the private clients to implement management controls, ensuring the application of cost effective and innovative technologies and practices to support socio economic development activities. Improving the industry performance to export standard level, introduce institution in charge of construction industry capacity building and prepare and implement national construction industry framework.

Delay of construction projects has several consequences and impacts on stakeholders and society. A study conducted by Mukuka,Aigbavboa&Thwala,(2015) to identify effects of project schedule overrun in South Africa has identified the following effects: extension of time, cost overruns, loss of profit, disputes, poor quality of work due to hurrying the project, creates stress to the client, acceleration losses, bad reputation with contraction team, claims and delay in getting profit by the client were the top ten identified effects of construction projects.

JIA (2015) has also under taken a study to assess how factors that affect cost overrun of a project are related to project delay. In conclusion the study revealed that cost overruns and project delay are the most crucial problems that happen in the construction industry and cost overrun factors are positively related to delay of construction projects.

2.3 **Conceptual Framework**

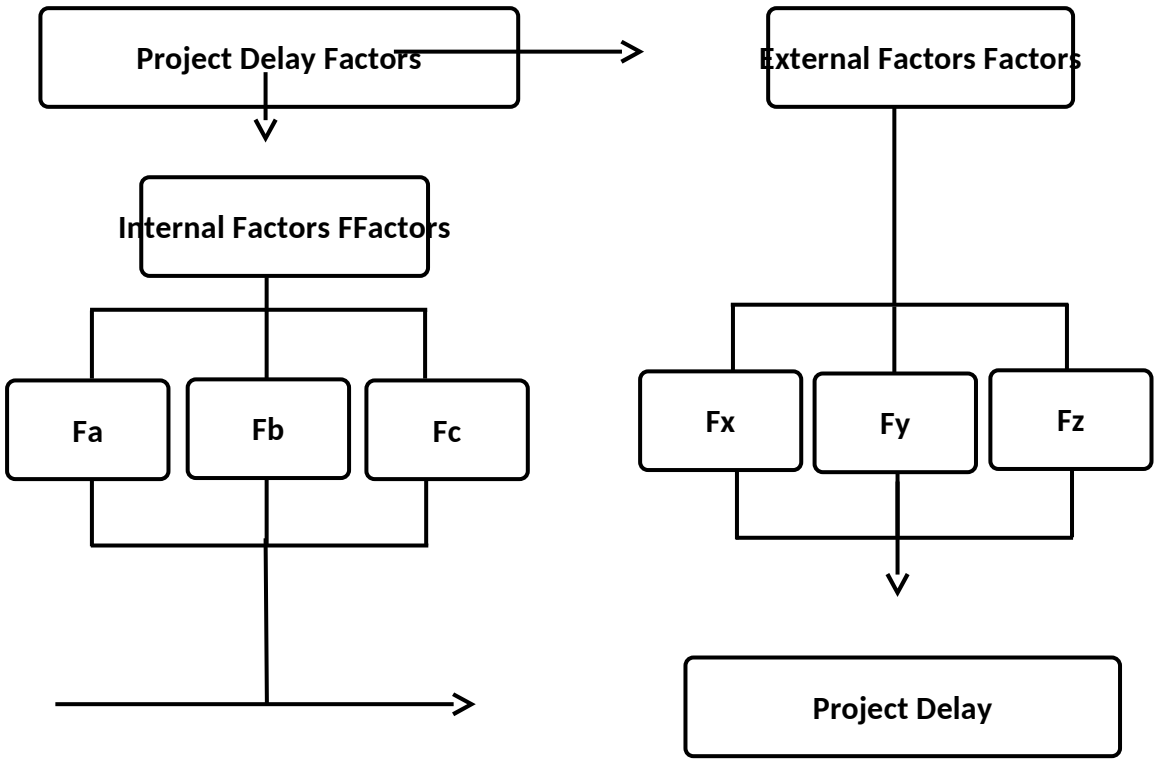

Figure 2.2Project Delay Factors

Adopted from PMI (2017)

As indicated in figure 2.2 there are internal and external factors contributing for project delay. Internal factors emanate from internal stakeholder organization of the project while external factors are out of the control of project internal stakeholders. The study categorized internal delay factors based on contribution of the client, consultant and contractor organizations to occurrence of the project delay.

The concept studied in this research is about project delay and project delay factors which are have implications of problems in project time schedule management. Delay factors are independent variables while time schedule is the dependent variable.

Occurrence of these factors, in the project environment; result in increasing of the time schedule or delay of the project completion. Project delay can be defined here as the late completion of work compared to the originally planned time schedule. Hence delay can be expressed as indicator of problem in achieving effective project schedule management.

CHAPTERTHREE; RESEARCH METHODOLOGY

3.1 Introduction

Research methodology describes researcher's understanding about the research and the strategy used to answer the research question and the process used in collecting the research data based on identified research objectives (Greener ,2008). The research design is followed by target population and samples, data type, source, collection analysis and presentation methods used.

3.2 Description of the study area/Organization

This study is about project cases in private local contractors of Grade-1 and Grade-2 category. Contractors are categorized from Grade-1 to Grade -10, based on the resource requirement criteria set by the regulatory body or ministry of construction to get the construction license. Grade-1 contractors are the biggest while Grade 10 contractors are the smallest class contractors in this category. Project costs contractors are allowed to bid for are based on their Grade. The Grade-1 contractors can undertake projects with cost above 20 Million Birr while Grade-2 contractors can undertake upto 20 Million Birr projects (www.constructionproxy.com, assessed on May 17, 2018).The study focused on cases of these two high class contractors by considering that they run big projects with higher consequences in invent of delay.

3.3 Research Design

The study has adopted both qualitative and quantitative data by using questionnaire survey method. A descriptive approach of research method is used to answer the research questions and achieve objectives of the study. Sreevidya&Sunitha(2011) state that descriptive research describes the state of affairs as it exists at present. Samples of the study are project managers with work experiences in construction projects implemented by local private contractors of Grade-1 & Grade-2.Factors causing delay of projects were collected from various literatures and preliminary information from focus group of project managers. These factors were developed in the form of questionnaire containing two parts to be answered by the samples selected from the target population.

The questionnaire contains two parts. The first part is about respondent's background information and their experiences on project delays during the past ten years (2008 to 2018).

The second part is for ranking project delay factors based on their frequency of prevalence and severity of impacts on delay of construction projects. Contribution of main stakeholder organizations for occurrence of each delay factor was also ranked in this part of the questionnaire.

The data collected from the first part of the questionnaire is used to describe prevalence of delay problems in construction projects. The qualitative data collected from second part of the questionnaires used for ranking the major delay factors in construction projects and to describe contribution of the three main stakeholder organizations (client, consultant and contractor) to the identified delay factors. The data obtained from the questionnaire were analyzed to explore the research findings. For the purpose of triangulation or strengthening findings from questionnaire, case studies of two actual projects that had delay problems are incorporated to the study for comparing with results from research with the case studies. Finally, findings of the study are discussed and appropriate recommendations are forwarded

3.4 Data type and sources

3.4.1 Data Type

Both qualitative and quantitative data were collected from the questionnaire survey and from review of literatures to identify delay factors in construction projects. The quantitative data were used to describe prevalence of delay problem in construction projects. The qualitative data were used to identify major factors contributing to delay of construction projects and to assess the contribution of main stake holder organizations to the identified delay factors.

3.4.2 Data Sources

3.4.2.1 Data from Literature reviews

Review of literatures, books and findings of other relevant researches were used to identify factors relevant to delay of construction projects. In addition to this, preliminary study was conducted by interviewing a focus group of project managers inorder to collect information about factors causing delay of construction projects and these are incorporated it in the questionnaire.

3.4.2.2 Primary data sources

The primary data were collected by survey method using structured and unstructured questionnaires. Respondents of the questionnaires are 46 samples drawn purposively as appropriate for the researcher, from target population of project managers. The sample size determined to be minimum of 10% of total population.

Sample Size = 10% x 372 = 37

The sample size of 46 is more than the minimum size and hence acceptable.

3.5 Target Population and Sample

3.5.1 Target Population

Target population is population of project managers who have work experience in private local Grade-1 & Grade-2 contractor companies. The number of registered Grade-1 and Grade-2 contractors in Ethiopia for 2018 budget year are 133 and 53 respectively, total is 186 www.constructionproxy.com (assessed on May 17, 2018). With assumption that each of these contractors has an average of two project managers in their projects, total population is 372.

3.5.2 Sample Size determination

The sample size taken for this research is 46. The assumption taken in determining sample size of 46 was that, the population of project managers is homogenous with respect to the parameter of interest i.e. identifying project delay factors and contribution of organizations for these factors.

3.5.3 Sample Selection

Sreevidya.& Sunitha.(2011) states that sampling is concerned with the selection of a subset of individuals from those within a target population to estimate characteristics of the whole population. The study assumes that members of the target population are homogeneous with respect to the type and content of data required from the research. Hence selection of the samples will be purposive sampling. According to description of Greener S. (2008) in purposive sampling method, the researcher uses his own judgment to select a sample.

Hence for this study46 samples were selected as appropriate and ease of availability by judgment of the researcher.

3.6 Data collection methods and tools

Primary data are those data which are collected for the first time and original in character while Secondary data are those which have been collected by some other persons for his purpose and published (Sreevidya.& Sunitha.2011).

Primary data for this study were collected by survey of structured and unstructured questionnaires from sample respondents drawn of the population group. The respondents have ranked the delay factors on five Likert scales for ordinal scale description purpose.

Literature review has helped in collecting list of factors that are claimed to have been causing delay of construction projects. Besides this information about project delay factors were gathered from preliminary study by interviewing a focus group of project managers.

3.7 Data Analysis and Presentation

3.7.1 Data Analysis

The quantitative data collected from the questionnaires, regarding experiences of respondents about delay of projects implemented during the past ten years (2008 to 2018), were summarized to describe the extent of prevalence of project delay problem. The qualitative data regarding major delay factors and stakeholders were analyzed by descriptive analysis using Microsoft Excel software. Sreevidya&Sunitha(2011) state that descriptive statistics are used to describe the basic features of the data in a study. Accordingly, the study uses descriptive statistics to answer the specific research questions. The study also includes implications of case studies of two projects that were briefly described in narration form. Findings of the research were then compared with implications from the case studies. This is for purpose of finding out if there is consistency or contradiction of results between the research and actual project cases, hence for triangulation of the research findings. Finally, findings of the study are discussed and appropriate recommendations to minimize overall impacts of project delay problems are forwarded.

3.7.2 Data Presentation

After data analysis, the findings are presented in descriptive form by tables, charts, graphs, indexes, percentages and descriptive narrations.

CHAPTER FOUR; DATARESULT AND DISCUSSION

This part of the research describes the results obtained from the survey tool and analysis of the results and discussion of the findings. .

4.1 Questionnaire Response Rate

Out of the total 46 distributed questionnaires it was managed to collect 38 questionnaires on time. Inturn from these 38 questionnaires 31 were complete and valid. The response rate calculated vs total distributed questionnaires is 67%

Table 4.1Questionnaires Response

Respondents	Questionnaires Distributed	Questionnaires Collected	Valid responses	Rate of Responses
Project Managers	46	38	31	67%
TOTAL	46	38	31	67%

Source: From survey 2018

4.2 Background information of respondents

The background information of respondents has been assessed for both their professional back ground and their years of experiences as indicated in Table 4.1 and Table 4.2.

Table 4.2Respondent's Information

Profession	Level	Frequency	Percentage
Engineering	Diploma	4	13%
	1st degree	20	65%
	2nd degree	3	10%
	PHD	0	0%

Management	Diploma	2	6%
	1st degree	1	3%
Administration	Diploma	1	3%
Total		**31**	**100%**

Source : From survey 2018

Table 4.3Respondent's Work Experience

Years of Experience	**Frequency**	**Percentage**
1-to-5	6	19%
5-to-10	12	39%
10-to-15	7	23%
above 15	6	19%
Total	**31**	100%

Source : From survey 2018

As indicated in Table 4.2 the respondents have appropriate educational and professional levels to identify and describe factors causing delay of construction projects as required to answer the research questions.

Table 4.3also indicates that the respondents have sufficient work experiences ranging up to 15 years in the construction sector. Hence they are deemed to be well familiarized to project issues and delay causing factors in the construction environment.

4.3 Data analysis to explore prevalence of delay in construction projects

As indicated in the Chart 4.1 respondents who have executed each number of projects during the past ten years (2008 to 2018) were plotted together with delayed project numbers for comparison. The chart displays that there are delays in each cases of projects executed by the respondents.

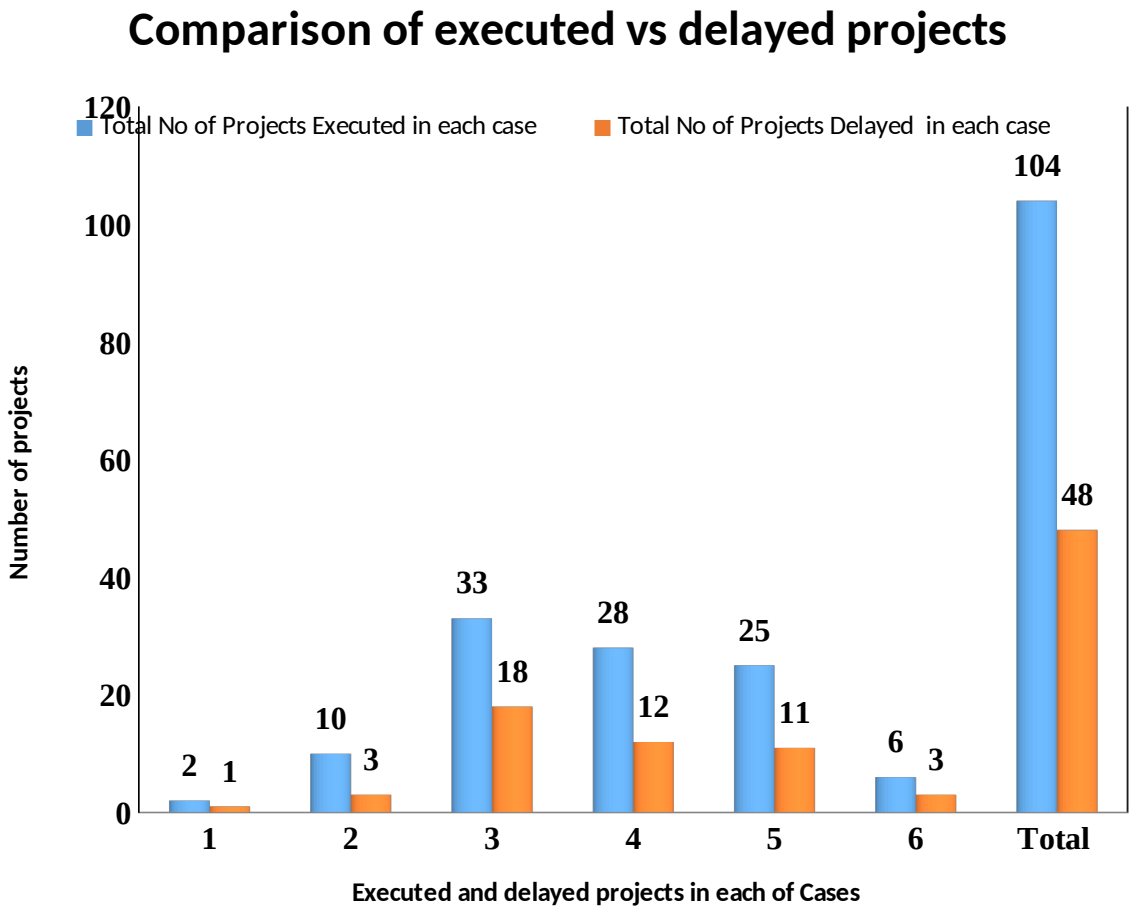

Figure 4.3Comparison executed vs delayed projects

The display on chart 4.1 is summarized to Table 4.4 indicating the number of projects executed vs delayed for each project cases are tabulated. The table summarizes that, out of the total 104 executed projects, 48 projects had problem of schedule delay. This account to 46% of executed projects had problem of delay. Therefore, finding from analysis of the data shows that there is serious concern about project delay problems since significant proportion of executed projects had delays in their implementations.

Table 4.4Projects Executed Vs Delayed

Number of projects executed	Number of projects delayed	Percentage of delayed
2	1	50%
10	3	30%
33	18	55%
28	12	43%
25	11	44%
6	3	50%
104	**48**	**46%**

Source: Survey 2018

4.4 **Samples of major delay factors**

The values in table 4.4 are obtained by calculating frequency index and impact index for each of the sample delay factors, then relative importance index (RII) from the two indexes by using the formula;

Equation 4.1 Frequency Index

$$FI = \sum_{i=1}^{5} \left(\frac{w_{if} \times n_{if}}{5 \times N} \right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{Equation (0)}$$

Equation 4.2Severity Index

$$SI = \sum_{i=1}^{5} \left(\frac{w_{ii} \times n_{ii}}{5 \times N} \right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{Equation (0)}$$

Equation 4.3 Relative Importance Index

$$RII = FI \times SI \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{Equation (0)}$$

Where;

FI is Index for Frequency of occurrence

SI is Index for Severity of impact

RII is relative importance index

w_{if} and w_{ii} are the weight of i^{th} frequency and i^{th} impact severity (Ranging 1 to 5)

n_{if} and n_{ii} are the number of respondents who choose certain n^{th} frequency and n^{th}impact weights respectively.

N is the maximum number of respondents i.e 31, while the maximum value for weights assigned to frequency and impact severity levels is 5. (Zinabu,2016).

The frequency and impacts values calculated for each of the thirty delay factors are different as indicated in an annexed table Therefore, to consider both of the indexes in ranking the delay factors, a third index is calculated i.e relative importance index.

From the ranked sample delay factors the top major factors are selected and presented in the form of separate table and chart for ease of visualization. These identified major factors are also used in relation to their prevalence in each stakeholder organization to give attention and focus to the factors during courses of project planning and implementation.

RANK OF DELAY FACTORS BY IMPORTANCE INDEX

Rank	Factor	Description	RII
1st	F7	Delay in Payment / Preparation, Checking, Approval and effecting/	0.913
2nd	F8	Problem of Financial Management	0.873
3rd	F5	Design problems, incompleteness, not matching with Bill of Quantities	0.843
4th	F3	Delay in Design Drawings / Contractor requests, Consultant Prepares Client Approves/	0.808
5th	F11	Increase in price of material and labor wages	0.794
6th	F21	Limitations in preparing risk contingency plans.	0.766
7th	F29	Limitations in Leadership Practices	0.761
8th	F20	Limitations in communications among Stakeholder organizations	0.751
9th	F1	Delays in decision making	0.738
10th	F6	Commitment problem to achieve Project time schedule	0.726
11th	F10	Shortage of Equipment	0.723
12th	F13	Limitations in monitoring and controlling	0.716
13th	F16	Scope change and variation works	0.695
14th	F19	Change in design and Specifications	0.69
15th	F18	Labor shortage after project work commenced	0.689
16th	F27	Limitations in efficiency of equipment.	0.672
17th	F14	Unsuitable Weather Conditions	0.67
18th	F17	Reworks due to poor works quality	0.67
19th	F24	Unethical practices among stakeholder organizations	0.658
20th	F2	Internal administrative problems	0.651
21st	F26	Limitations in involving important indirect stakeholders	0.651
22nd	F15	Lack of budget after project work started	0.64
23rd	F12	Limitations in thorough prior planning before bidding	0.628
24th	F9	Shortage of Technically capable manpower	0.618
25th	F28	Lack of Experience of the organization	0.617
26th	F25	Unreliable subcontractors and suppliers	0.609
27th	F22	Lack of sponsor support for the project	0.562
28th	F30	Limitations in enforcing regulatory laws	0.520
29th	F4	Delay in Test results and work orders	0.506
30th	F23	Changes occurred in site conditions	0.319

Major delay factors in a rank

As indicated in the tables of project delay factor importance indexes the major factors causing delay of projects are ranked in table. The top ten ranked major delay factors are: Delay in Payment, Problem of financial management, Design problems, Delay of design, Increase in price of material and labor, Limitations in preparing risk contingency plans, Limitations in leadership, Limitations in communication, Delays of decisions and Commitment problem.

Table 4.5Major Delay Factors in a Rank

Rank	Factor	Description
1st	F7	Delay in Payment / Preparation, Checking, Approval and effecting/
2nd	F8	Problem of Financial Management
3rd	F5	Design problems, incompleteness, not matching with Bill of Quantities
4th	F3	Delay in Design Drawings / Contractor requests, Consultant Prepares Client Approves/
5th	F11	Increase in price of material and labor wages
6th	F21	Limitations in preparing risk contingency plans.
7th	F29	Limitations in Leadership Practices
8th	F20	Limitations in communications among Stakeholder organizations
9th	F1	Delays in decision making
10th	F6	Commitment problem to achieve Project time schedule

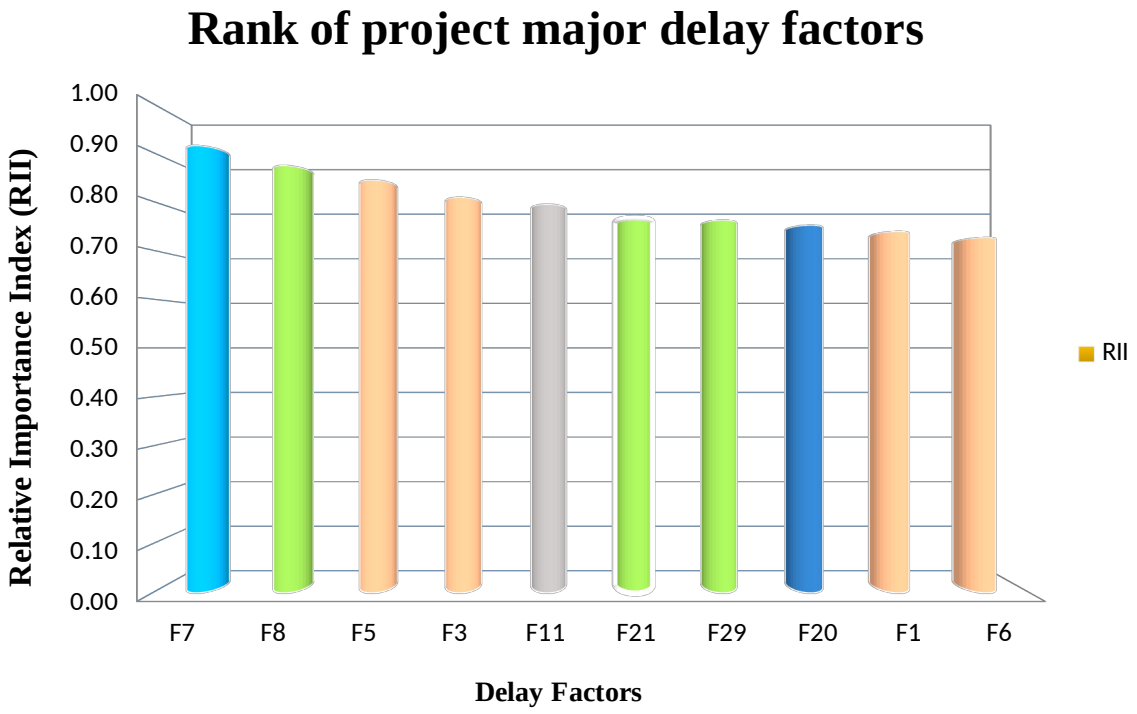

Figure 4.4 Rank of Delay Factors

As indicated in Figure 4.2, the major delay factors are ranked by RII and presented in chart form for ease of observation.

4.5 Analysis of Organizational contributions for delay factors

As indicated in the table 4.7 of organizational contribution for occurrence of project delay factors, three of the main stakeholder organization in construction project (Client, Consultant and Contractor) the organizations are ranked on the level of their contribution to the major delay factors. The values are obtained by calculating weighed mean or importance index of each stakeholder organization for respective factors. Delay of payment and Limitations in communications among Stakeholder organizations are more attributable to the client organization. Design problem, Delay in Design Drawings, Delays in decision making and Commitment problem are more attributable to the consultant. Problem of financial management, Limitations in preparing risk contingency plans and Limitations in Leadership Practices are more attributable to the contractor organizations.

Table 4.6 Contribution Rank of organizations

Rank	Factor	Description	Client	Consultant	Contractor
1st	F7	Delay in Payment / Preparation, Checking, Approval and effecting/	1st	2nd	3rd
2nd	F8	Problem of Financial Management	2nd	3rd	1st
3rd	F5	Design problems, incompleteness, not matching with Bill of Quantities	2nd	1st	3rd
4th	F3	Delay in Design Drawings / Contractor requests, Consultant Prepares Client Approves/	2nd	1st	3rd
5th	F11	Increase in price of material and labor wages	NA	NA	NA
6th	F21	Limitations in preparing risk contingency plans.	3rd	2nd	1st
7th	F29	Limitations in Leadership Practices	3rd	2nd	1st
8th	F20	Limitations in communications among Stakeholder organizations	1st	2nd	3rd
9th	F1	Delays in decision making	2nd	1st	3rd
10th	F6	Commitment problem to achieve Project time schedule	2nd	1st	3rd

4.6 **Further elaborative case studies**

Case studies of two projects which had history of schedule delay problem are incorporated to this study. The two projects were implemented by local private Grade One contractors. Basic Profiles of the two projects at initial start and the actual condition at completion were assessed from documents of the project's initial contract document and the completion

reports. The discrepancies in project time schedules and claim issues raised during the project period are compared and discussed.

Project – 1

Project Cost:Birr 28,568,265.00

Project duration: 12 Months

Project commencement date: May 25,2015

Project completion date as per the contract: May 25,2016

Actual contract completion date: December 13,2016

Major Time Claims issues:

- Claim for time due to delay of effecting advance payment.
- Claim for time due to work interruptions by rainy weather.
- Claim for time due to delayed work start because site was not handed over to contractor.
- Claim for time due to changed work design.
- Claim for time due to absence of supply materials in the local market and requesting additional time for foreign purchase and shipping.
- Claim for time due to work interruption by right of way problem.
- Claim for time due to work interruption by interference of another contractor in the working area.
- Claim for time due to delay of compensation payment for farmer's land and crops.

Comparison of project on start and completion

- Planned project duration = 12 months
- Actual project duration = 19 months
- Increase in project time schedule = 58.30 % of planned project duration

Project – 2

Project Cost:Birr 84,652,946.00

Project duration: 30 Months

Project commencement date:January 9,2013

Contract completion date as per the contract: July 9,2015

Actual contract completion date: June 30,2016

Major Time Claims Issues:

- Claim for time due to delay of site possession problems.
- Claim for time due to right of way problem.
- Claim for time due to delay of interim payment.
- Claim for time due to change of design
- Claim for time due to obstructions in the working area.
- Claim for time due to delay of determining specifications missing in the contract document.

Comparison of project on start and completion

Planned project duration = 30 months

Actual project duration =41 months

Increase in project time schedule = 36.7 % of planned project duration

4.6.1 Summary of Key Implications of Case Studies:

The two project cases imply that there is significant schedule delay problem. The first project had time schedule overrun for 58.3% of planned project duration while the second project had 36.7% of the planned project duration. This is in similarity with the finding from the research study that has revealed prevalence of significant delay problem in construction projects implemented by private Grade-1 and Grade-2 local contractors.

In projects of the case studies, problem of delayed payment and delayed designs are raised as issues for claiming additional project time.

These two factors are also among the major delay factors identified by the research study even though their rank of importance is different in the research and in the case studies. In summary finding from the research study has implication of relevance when compared with the actual project case studies.

CHAPTERFIVE; CONCLUSTION& RECOMMENDATION

5.1 Conclusion

i. The study has shown that there is significant incidence of delay occurring in construction projects of private local construction companies.

ii. The study has shown that there are several factors which cause delay of construction projects. These factors differ in level of their frequency of occurrences and severity of impacts in causing project delays, which are both important in assessing problem of project delay. Therefore, the study assessed project delay factors by taking overall effect of both frequency and severity of impacts. Various delay factors are compared based on these relative importance indexes and ranked out. The top major factors are ranked in their order as: Delay in Payment, Problem of financial management, Design problems, Delay of design, Increase in price of material and labor, Limitations in preparing risk contingency plans, Limitations in leadership, Limitations in communication, Delays of decisions and Commitment problem.

iii. The research has also revealed that three of the main stakeholder organization in construction project (Client, Consultant and Contractor) have different levels of contribution for occurrence of project delay factors. Accordingly, the organizations are ranked on the level of their contribution to the major delay factors. Delay of payment is more attributable to the client; Design problem is attributable to the consultant while problem of financial management is more attributable to the contractor organizations. Contribution for the other factors is also ranked accordingly.

5.2 Recommendations:

Construction projects involve complex activates and several interlinked subcontractors and supplier relations. Therefore, on-schedule implementation of these projects needs smooth financial flow, resource supply, extra commitments and close cooperation among stakeholders in discharging their responsibilities.

- The client organization has to take the initiative in setting foundation for collaboration among all the parties besides resolving limitations observed in its own organization. This is because; the client is prime owner of the project and employer of both the contractor and the consultant

- Clients should attentively and indepth evaluate when employing consultants for the project. Consultants who were partner in projects with serious delay problems should be well assessed to ensure that they were not related to the delay problem.

- Besides government institutions, associations of private contractors have to sponsor and financially support broad researches on project delay and other challenges encountering in the construction sector since they have direct contractual obligation to achieve project schedule or suffer the damage payment for project delay.

- Contractors have to efficiently manage financial resources allocated to the project besides planning for alternative financial sources in cases of payment delay for one or other reason.

- Consultants have to devote their time and energy in preliminary planning of the project actual contexts and preparing complete and comprehensive designs ahead of project commencement.

- Consultants have to be proactive looking forward to likely changes in the project scope and take responsibility of alerting both the client and contractor. This will give them reputation both as organization and professionals.

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APPENDIXES

ANNEX -1

Table: Results of Data Analysis for FI, SI and RII of Construction delay factors

Factor	Description	FI	SI	RII
F1	Delays in decision making	0.865	0.853	0.738
F2	Internal administrative problems	0.846	0.769	0.651
F3	Delay in Design Drawings / Contractor requests, Consultant Prepares Client Approves/	0.892	0.905	0.808
F4	Delay in Test results and work orders	0.731	0.692	0.506
F5	Design problems, incompleteness, not matching with Bill of Quantities	0.911	0.925	0.843
F6	Commitment problem to achieve Project time schedule	0.814	0.891	0.726
F7	Delay in Payment / Preparation, Checking, Approval and effecting/	0.962	0.949	0.913
F8	Problem of Financial Management	0.918	0.95	0.873
F9	Shortage of Technically capable manpower	0.678	0.911	0.618
F10	Shortage of Equipment	0.865	0.835	0.723
F11	Increase in price of material and labor wages	0.917	0.865	0.794
F12	Limitations in thorough prior planning before bidding	0.782	0.802	0.628
F13	Limitations in monitoring and controlling	0.802	0.892	0.716
F14	Unsuitable Weather Conditions	0.815	0.821	0.67

F15	Lack of budget after project work started	0.853	0.75	0.64
F16	Scope change and variation works	0.827	0.84	0.695
F17	Reworks due to poor works quality	0.821	0.815	0.67
F18	Labor shortage after project work commenced	0.833	0.827	0.689
F19	Change in design and Specifications	0.815	0.846	0.69
F20	Limitations in communications among Stakeholder organizations	0.879	0.854	0.751
F21	Limitations in preparing risk contingency plans.	0.834	0.918	0.766
F22	Lack of sponsor support for the project	0.595	0.943	0.562
F23	Changes occurred in site conditions	0.46	0.692	0.319
F24	Unethical practices among stakeholder organizations	0.95	0.692	0.658
F25	Unreliable subcontractors and suppliers	0.879	0.692	0.609
F26	Limitations in involving important indirect stakeholders	0.84	0.775	0.651
F27	Limitations in efficiency of equipment.	0.776	0.865	0.672
F28	Lack of Experience of the organization	0.866	0.712	0.617
F29	Limitations in Leadership Practices	0.801	0.95	0.761
F30	Limitations in enforcing regulatory laws	0.795	0.653	0.520

ANNEX -2

Questionnaire

ADDIS ABABA UNIVERSITY

SCHOOL OF GRAGUATE STUDIES

DEPARTMENT OF PROJECT MANAGEMENT

Dear research participant;

Thank you for your consent to participate in answering this research questionnaire. My name is Netsanet Berhanu. I am prospective graduate of 2018from Addis Ababa University, Department of Project Management in MA degree. I am conducting this research as requirement of partial fulfillment for award of the degree. The research title is "*Assessment of factors causing delay of construction projects: Evidence from construction project managers"*. It will have significant benefits in improving performance of Ethiopian construction sector.

Pursuant to ethical considerations of researches, I would like to assure you that the information you give will be used only for research purpose and your anonymity and confidentiality will be respected. Hence don't mention your name in the questionnaire. It takes you only about 30minutes to complete the questionnaire. Your honest and genuine answer for the question is of high value for the research result. If you need further clarifications of any kind you well come to call me by Tel.No 0911-461086

Instruction

How to answer the questionnaire?

The questionnaire is answered by marking ✓ in the spaces corresponding to your answer.

For questions about delay factors indicate by marking ✓on spaces corresponding to frequency of occurrence, severity of impact, contribution of the client, consultant and contractor organizations for occurrence of the factors.

General Definition:

- Level of frequency of occurrence-describes how frequently this factor is occurring in construction projects.
- Level of severity of impact describes how severely this factor is impacting projects to delay if once it occurs.
- Contribution by stakeholders describes the level of contribution of each stakeholder organization for occurrence of the factor.

RESPONDENT'S GENERAL INFORMATION

1- Please Indicate your Professional Background by marking (✓) in the table

Engineering		**Management**		**Other** **Specify**	

2- Please Indicate your Educational Background by marking (✓) in the table

Diploma		**1St Degree**		**2nd Degree**		**PHD**		**Other** **Specify**	

3- Please Indicate your years of experience as project manager in Local Private Grade 1 or 2 Contractor Company by marking (✓)

1to 5 years		**5 to 10 years**		**10 to 15 Years**		**Above 15 years**	

Please mark✓ how many of the projects were delayed

None		**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**		**Above 10** **Specify**	

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Factor No	Factor Description	Level	Frequency		Impact		Contribution By	V.High	High	Medium	Low	V.Low	No Contribution
F1	Delays in decision making	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F2	Internal administrative problems	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F3	Delay in Design Drawings	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F4	Delay in Test results and work orders	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F5	Design problems, incompleteness, not matching	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								

Factor No	Factor Description	Level	Frequency	Impact	Contribution By	V.High	High	Medium	Low	V.Low	No Contribution
	Commitment problem to	V.High	V.H	V.H	Client						
		High	H	H	Consultant						
		Mediu									

Factor No	Factor Description	Level	Frequency	Impact	Contribution By	V.High	High	Medium	Low	V.Low	No Contribution
F12	**Limitations in thorough prior planning before bidding**	V.High	V.H	V.H	Client						
		High	H	H	Consultant						
		Medium	M	M	Contractor						
		Low	L	L							
		V.Low	V.L	V.L							
F13	**Limitations in monitoring and controlling**	V.High	V.H	V.H	Client						
		High	H	H	Consultant						
		Medium	M	M	Contractor						
		Low	L	L							
		V.Low	V.L	V.L							
F14	**Unsuitable Weather Conditions**	V.High	V.H	V.H	Client						
		High	H	H	Consultant						
		Medium	M	M	Contractor						
		Low	L	L							
		V.Low	V.L	V.L							
F15	**Lack of budget after project work started**	V.High	V.H	V.H	Client						
		High	H	H	Consultant						
		Medium	M	M	Contractor						
		Low	L	L							
		V.Low	V.L	V.L							
F16	**Scope change and variation works**	V.High	V.H	V.H	Client						
		High	H	H	Consultant						
		Medium	M	M	Contractor						
		Low	L	L							
		V.Low	V.L	V.L							
F17	**Reworks due to poor works quality**	V.High	V.H	V.H	Client						
		High	H	H	Consultant						
		Medium	M	M	Contractor						
		Low	L	L							
		V.Low	V.L	V.L							

Factor No	Factor Description	Level	Frequency		Impact		Contribution By	V.High	High	Medium	Low	V.Low	No Contribution
F18	Labor shortage after project work commenced	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F19	Change in design and Specifications	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F20	Limitations in communications among Stakeholder organizations	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F21	Limitations in preparing risk contingency plans.	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
		V.High	V.H		V.H		Client						
		High	H		H		Consultant						

Factor No	Factor Description	Level	Frequency		Impact		Contribution By	V.High	High	Medium	Low	V.Low	No Contribution
F23	Changes occurred in site conditions	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F24	Unethical practices among stakeholder organizations	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F25	Unreliable subcontractors and suppliers	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F26	Limitations in involving	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium											

Factor No	Factor Description	Level	Frequency		Impact		Contribution By	V.High	High	Medium	Low	V.Low	No Contribution
F27	Limitations in efficiency of equipment.	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F28	Lack of Experience of the organization	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F29	Limitations in Leadership Practices	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								
		V.Low	V.L		V.L								
F30	Limitations in enforcing regulatory laws	V.High	V.H		V.H		Client						
		High	H		H		Consultant						
		Medium	M		M		Contractor						
		Low	L		L								