ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATES STUDIES

MASTERS OF BUSINESS ADMINISTRATION IN PROJECT MANAGEMENT

DETERMINANTS OF PROJECT DELAY

(A CASE STUDY ON SELECTED 40/60 CONDOMINIUM HOUSING DEVELOPMENT PROJECTS IN LEMI-KURA SUB CITY.)

By

HILINA SOLOMON

MAY, 2022

ADDIS ABABA, ETHIOPIA

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ID NUMBER: -SGS/0108/2012B

A THESIS PROPOSAL SUBMITTED TO ST. MARY UNIVERSITY, SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER OF ARTS DEGREE IN PROJECT MANAGEMENT

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DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Temesgen Belayneh (PhD). All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted for any degree.

Hilina Solomon Tessemma _____

Name Signature

St. Mary's University, Addis Ababa May, 2022

ENDORSEMENT

This thesis is submitted to St. Mary‘s University, School of Graduate Studies for examination with my approval as a university advisor.

Dr. Temesgen Belayneh (PhD) _____

Advisor Signature

St. Mary’s University, Addis Ababa **May, 2022**

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ACRONYMS & ABBREVIATIONS

AAHCPO	Addis Ababa Housing Construction Project Office
AASHDE	Addis Ababa Saving Houses Development Enterprise
EBCS	Ethiopian building code of standards
GDP	Gross domestic product
RRI	Ranking and computation of relative importance index
SPSS	statistical package for the social science

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Abstract

Project implementation delay can be minimized only when its determinants are identified. The major aim of this study was identifying the major determinant factors delay in condominium building construction projects. The study was conducted on Addis Ababa city on Lemi-Kura sub city administration 40/60 condominium project sites and the total of 105 samples were selected from the sample population and Data were collected from randomly selected project managers, site engineers, contract administrator and supervisors using structured questionnaire and secondary data were also used. Data were analyzed using multiple regression model with statistical software of SPSS version 26. According to the findings, a strong, positive and significant relationship was observed. This means the predictive variables (independent variables) such as (Project related, Client related, Contractor related, Consultant Related problems and External factors) jointly determine the dependent variable which is project delay. The study further suggests that mitigation measures to the above mentioned problems should be considered such as trainings, reducing work load, improving bidding techniques, improving due date delivery of tasks, better monitoring and evaluation techniques.

Key Words: Regression, Delay, Projects, Lemi-Kura, construction

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The definition of the work Delay finds different meanings. Various researchers in project management have different definitions for the word. But in this paper delay is defined as merely being “the inability to satisfy the regular time and cost budget”. Generally, delays are classified into two main categories, excusable and non-excusable. The first one, excusable delays, are delays which can be acceptable and understandable by the parties and non-excusable delays are the opposite kind.

There are further two categories of excusable delays. These are remunerative and non-remunerative (Trauner, T.J, 2009) Remunerative/compensable delays are the ones wherever the contractor is atoned in time and value. These are typically consumer initiated delays. However, the non-compensable are otherwise. Construction project delays can be a result of a range of reasons and will be caused by any of the stakeholders on projects. Some researchers claim that construction projects are always considered to be failures (Atkinson, R., 1999). Researchers such as (Sweis, G., Sweis, R., Hammad, A.A. and Shboul, A., 2008) insist that regardless of the advanced technology and project management techniques applied in projects and the extensive training given to practitioners, it is common that construction projects always experience delays.

Construction projects are always prone to problems especially during execution. Schedule delay is one of these shortcomings and is responsible for time and cost overruns, disputes and sometimes cancellation of construction projects (Afshari, H., 2010). In their nature, delays occur due to one party that might or might not always impact the performance or delivery rate of another party. Several parties such as owner, contractors, subcontractors or other parties can be responsible for delays. Hence, this kind of instance calls for the identification of responsible bodies among parties.

Multiple researchers have invested their effects in inspecting many causes of delay in construction industries and suggested mitigation mechanisms. A study in Jordan mentioned that contractor’s financial inefficiency, change of materials order, and ineffective planning of the projects are some the major causes of delay (Odeh, A.M. and H.T. Battaineh, 2002). Another study conducted in Indonesia (Majid, M.A. and R. McCaffer, 1998) highlighted the major causes of delays, effects of delays, and methods of reducing

construction project delays in. Interestingly, the study identifies fifty-seven delay factors which were later grouped into eight; contractor-related delays; equipment-related delays; client-related delays; material-related delays; finance-related delays; consultant-related delays; external-related delays; and manpower-related delays. The results also showed that time overrun and cost overruns were the most observed effects.

Ethiopia being a growing country makes use of construction industry as the main input for development of its infrastructure, growth and a way of creating employment opportunities. However, the sector is largely underrated and has not contributed to the advancement of the country's economy as desired. This is because it has multiple shortcomings and limitations. One of the most prevalent causes is the common nature of delays and it is the most dominant and rampant in many construction projects. The causes and effects of construction delays is well studied by various researchers. But it differs from region to region and from country to country. Also, since the nature of construction projects has varying attributes, the results obtained can have significant variations.

The number of building construction projects is on the rise increase in Ethiopia but most are experiencing extensive delays leading to higher the initial budget cost and consequently forced to change the quality of the project. The occurrence of a delay in building construction projects is common and significantly affects in enormous ways. This study investigates the impact of various factors on project delay at different stages of building construction which then affects cost and quality of the overall project. To this end, primary and secondary data through personal observation and document review will be collected from different contracting, consulting and also from the client organization and direct questionnaire.

As being a major drawback in construction projects, delay has also significant impacts on other industries such as manufacturing, service and hence influences the overall economy of the country, where construction plays a major role in its development and contributes a lot to the GDP. Thus, this investigation aims to assess the most significant impact of delay in order to ensure that the projects finish on time, within budget and achieve quality on building construction projects against all related factors which affect project delay.

1.2. Statement of the problem

As it has been observed most projects implementation schedule lag behind from what was planned in the feasibility studies submitted by the project owners. A construction project is commonly acknowledged as successful, when it is completed on schedule and within the agreed budget, with the highest quality and in the safest manner, in accordance with the specifications and to stakeholders' satisfaction. Based on the experience and known facts, the impact of delay is found as, construction stage, pre-construction stage, and post-construction stage sequentially. According to Assaf and Al-Hejji (2006) some key causes of delay according to clients are contractor's improper planning, contractor's poor site management, subcontractor issues, and skilled labor supple and productivity; contractors are insufficient client's payments for completed and ongoing work, acquiring difficulties for work permit and approval, and availability and failure of equipment. When large projects deviate from their objectives (either in cost, completion time, performance, safety or environmental effects), the damage caused obviously transcends out of the contracting parties and affects the project stakeholders and the public at large.

Emphasizing the completion time deviation factors as they are very common in our country's construction industry, lack of justified methodologies in quantifying and analyzing delays happens to be the greater challenge (Abebe, 2003). This is because, not also the delays come from a variety of sources, and they also have different effects and implications resulting in complex ramifications, creating considerable difficulty to practitioners in the claim resolution (Kumaaswany, 1997). A critical review of literature suggested that the reason for the continuing difficulty with delay claim resolution can be attributed to a number of problems including lack of uniformity in the application of delay identifying methodologies, lack of sufficient guidance from contacts and poor planning practice.

Delay in projects is considered as one of the most common problems causing a mass of negative impact on the project, the parties involved especially the government projects are concerned sine in Ethiopia public construction consume an average annual rate of nearly 60%, according to MoWUD (2006), and 58.2% according to Wubishet (2004), of the government's capital budget.

1.3. Objective of the Study

This research was aimed at identifying the major factors of project delay in building construction project quality and its impact on the cost of building construction project.

1.3.1 General objectives

This research was aimed at identifying the factors of project delay in project implementation Therefore generally, This paper aimed at identifying the major causes and effects of project delay and their impacts on quality and cost of the project on 40/60 Addis Ababa housing development project office.

1.3.2 Specific objectives

- To identify the determinants of delay in project implementation.
- To identify statistical relationship between various project implementation factors and project implementation.
- To know the causal relationship between the causes and effects of the delay in construction industry.

1.4. Significance of the Study

Construction Industry plays an important role in socio-economy development of any developing country. Construction time serves as a benchmark for assessing the performance of any project. Due to unexpected problems encountered during Conception, designing & construction phase often led to unwanted delay in project completion. A survey was conducted in Ethiopia to determine exact factors responsible for project delay. This was achieved by carrying a critical analysis of the literature and carrying out a questionnaires survey among consultants, project managers and engineers involved in construction projects and collecting their responses. The importance of Project owner's role, contractor related, Financing related, Materials related, Design documents have been cited as main delay factors. Causes of time and cost overruns comparison was done with various past researches done in Asia and Africa, which yielded 7 delay factors: Slowness and Lack of constraint; Incompetence; Design; Market and Estimate; Financial capability; Government; and Worker.

Studying all those factors plays a great role to minimize the cause of project delays which impacts the quality and cost of building construction project.

1.5. Scope and limitation of the study

This research focuses on the determinant factors affecting project delay of condominium housing building projects and its associated factors in Addis Ababa city, specifically on selected 40/60 condominium housing development projects in Lemi-Kura sub city where different building construction activities are carried out. With regard to the scope of the research is mainly focus on literature review and questioner survey by using primary and secondary data were collected from different contracting, consulting and also from the client organization.

1.6. Organization of the Study

The research paper will be organized as the first chapter deals with the introduction parts of the study (background of the study, statement of the problem, research objective, basic research questions, significance of the study, and scope of the study and organization of the paper). The second chapter focus on related literature review, scholar's perspectives and impact of delays. The third chapter focuses on Research Methodology, about data sampling, collection, and analysis. The fourth chapter deals with the work plan and cost budget. Finally, list of reference materials the questionnaire, interview questions

Chapter 2: LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Project Delay

Projects always demand that they be completed with the highest quality which determines their success. To be a success they must satisfy the time and budget allocated for them and fulfill the highest quality and in the safest manner, with reference to the specifications of the stakeholders' satisfaction. Other measures of project execution are being bankable to clients, practicability, absence of claims and lawsuits emanating from poor execution have also been used as measures of project success (Mansfield, N. R., 1994).Construction companies can take pride in their abilities to enhance the performance of their projects which can be one of their main aims. In order to achieve this, increasing the quality of projects, cost reduction and meeting deadlines can be considered viable measures. Both public and private construction projects are part of a country's development initiative. As such, the construction sector takes up a significant share of any country's economic resources.

The timely completion of construction projects is affected by many hindering factors. One of these is which can be defined as the completion of a project beyond its deadline as compared to the planned schedule. Construction delays can be minimized only when their causes are identified. Delay in literatures is defined the word "delay'' as something that happens beyond planned or anticipated which is specified in a contract or beyond the deadline of agreeing parties (Kang sik wei., 2010). It is also defined as the retardation or dropping of rate of completion stopping construction entirely and as a result can lead to time and cost overrun. This can happen at a later date beyond specified in the contract upon which client and contractor parties have agreed upon for the delivery of the project (Fung I. W. H., L. T. 2006).

Delays can be further grouped or categorized into non-excusable delays, excusable with compensable delays, excusable without compensable delays and concurrent delays (Syed M. Ahmed, S. A., Pragnya Kappagantula, and Dharam Gollapudi. 2003). Non-excusable delays are the ones for which the contractor takes the responsibility and the risk associated with it. Non-compensable and excusable delays are ones the result of factors that are not anticipated and are beyond contractors management and control. In these situations, the contractor is not held liable as being negligent and at fault.

Excusable with compensable delays are condonable delays to the wholesome or part of the project caused by the owner's failure to act and is a result from of the owner's breach of duty, stated or implied, in

the binding contract. Concurrent delays are the ones for which both the owner and contractor are jointly accountable for the delay.

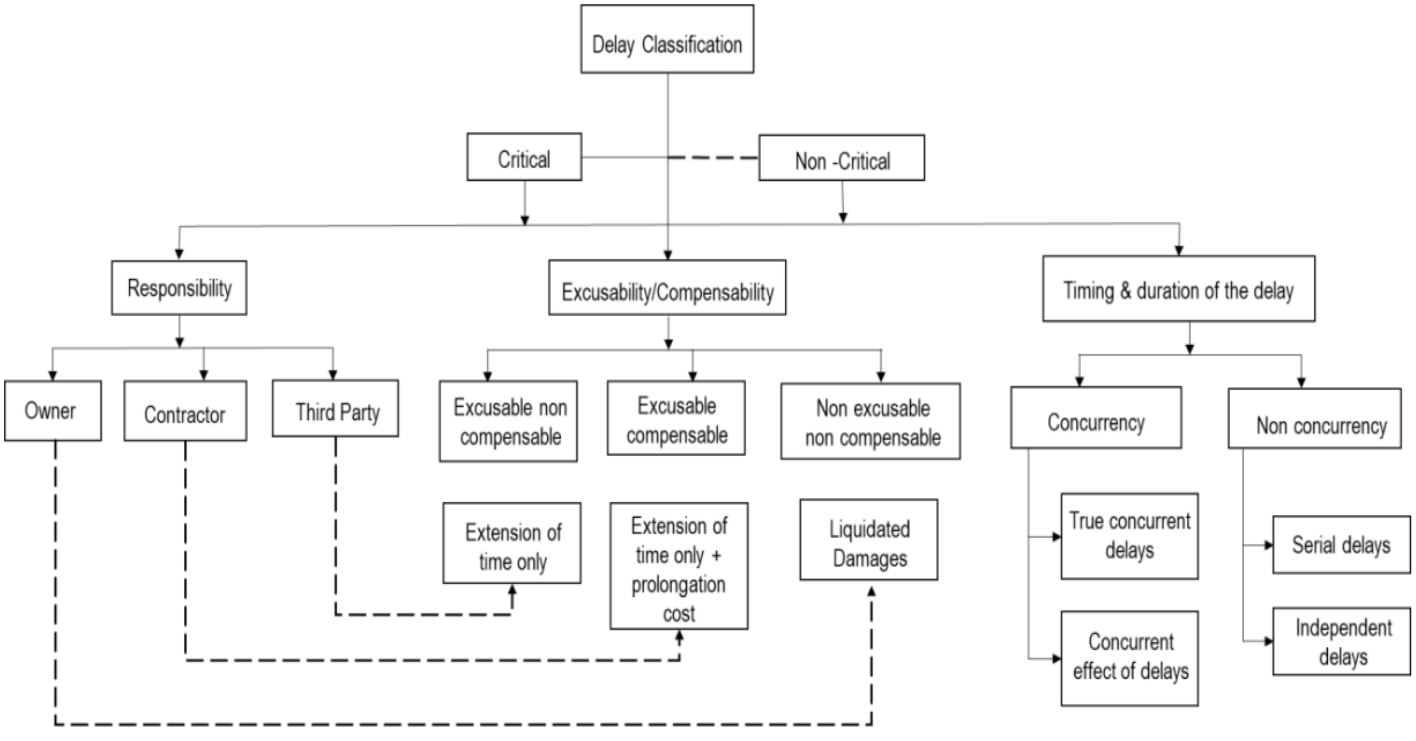

Figure 1- Classifications of Delay (Braimah, N., 2008)

Construction projects, by nature are complex, time and capital intensive endeavors. Delay in the any construction project are one of the major challenges leading to disputes, claims, lawsuits and are responsible for cause of bad relationships among stakeholders of a given project. The significance of delays is dependent on the type and the amount of overrun it causes and the nature of these delays differs from project to project. There have been many research conducted across many nations with different results.

2.1.2. Causes of project delay: Case studies

In construction, delay could be defined as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. It is a project slipping over its planned schedule and is considered as common problem in construction projects. To the owner, delay means loss of revenue through lack of production facilities and rent-able space or a dependence on present facilities. In some cases, to the contractor, delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labor cost increases.

In essence, most construction works emanate from local economic activities. Projects experiencing lags are projects in which different gaps are observed between the actual in progress sites work compared to the work scheduled. When the difference observed is higher it is deemed to be inefficient. Failure to achieve planned time, budgeted cost and the needed quality set out in the initial plan of the prokect, unexpected results will be observed on projects.

Too often, when projects get postponed they are subjected to extension or they will be crashed to accelerate the time of completion and therefore, this will definitely open the door to additional costs. As per standards, projects allow for some percentage of the project cost as contingency which is based on an acceptable range of delay and other uncalled for circumstances. Even though the involved parties, the owner and contractor, set out their own extra time and cost, the untimely execution of projects with additional costs and time usually lead to court claims and lawsuits which open the door for disputes.

Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations. However, it is rarely happen that a project is completed within the specified time.

(Assaf, S. A. and S. Al-Hejji, 2006) studied the causes of delay in Saudi's large building construction projects and identified 56 main causes along with their significance. Their findings as to the major delay factors were that there were delays in payment by owners, contractor's progress, approval of drawings, and delays due design alteration. The decision making process of the owner, the healthy relationship among subcontractors, Cash shortages/delays during construction, were also seen as the main causes of delay from the perspective of engineers and architects.

In a study conducted in Nigeria, a questionnaire survey was performed with contractors, clients and consultants from whom 16 major factors of delay were identified (Mansfield, N. R., Ugwu, O. O. and Doran, T. 1994). Cost overruns and delay were attributed to the fact that there were rampant shortages in materials, inaccurate estimation, price fluctuations, the methods of payment and finance arrangements.

In Lebanon, (Mezher, T. M. and Tawil, W., 1998) conducted the same research that studied the causes of delays in construction projects of Lebanon. As was the case in the Nigerian study, clients, contractors and consultants were the main participants of the study. The results found out 64 cases of delay and the three

participants of the study agreed on the ratings of the major categories of delay factors. Contractors mentioned contractual relationships as the major causes, while owners rated financial issues the highest. Consultants meanwhile, ranked management issues the highest.

The study by (Chan, D.W.; Kumaraswamy, M.M., 1997) assessed and looked deeply into the causes of construction delays in the city of Hong Kong. The study discovered that there was a pronounced discrepancy in the way delays were recognized and acknowledged amongst the different parties of stakeholders in the building and civil engineering works. The authors pointed out that these differing views about the engineering works were the main cause of these stakeholders to put the liability for a given delay to another group of expertise.

When it comes to the study of delays in the Ethiopian construction industry (Amenu Benti Gadisa and Hong Zhou., 2019) studied the inefficiency of the construction industry. The authors examined into the causative factors that affect performances of public construction projects in Ethiopia. A total of 58 factors of delay were identified and analyzed.

To this end they prepared structured survey questions for professionals in the construction industry. The results from the statistical analysis showed that there are a total of 8 critical factors affecting government-financed infrastructures projects performance in the Ethiopia. These were poor planning and administration, ineffective design, increment in materials cost, inadequate management skill and institutional capacities, lack of capacity by contractors, poor scheduling and cost management systems, inefficient project planning system.

Another study was performed by (Abdurezak Mohammed Kuhil and Neway Seifu**.**, 2019) on delays in public construction projects. The study highlighted why time and cost overruns have become one of the most common problems in the industry that cause a range of hampering effects on the projects and many of the involved stakeholders.

The paper was aimed at assessing the main causes of delay in public building construction projects in Addis Ababa Administration done by grade one contractors. In the paper, a total of 42 delay factors or reasons were identified and grouped into a category of 5 groups. The authors used the RRI (Ranking and computation of relative importance index) to assess and rank the most significant and critical factors for delay clients, consultant and contractors in the construction industry who were the main respondents of the survey questionnaires.

The survey found out the top 10 responsible causes for delays in the public construction projects and these can be listed as follows.

1. delay in issuance of drawings and designs
2. Lack of materials on the market
3. Financing delays
4. Payment delays
5. Inaccurate site investigation reports
6. Inflation of project materials
7. Late commencement and resource mobilization
8. Poor management systems
9. Design errors and complex nature of designs
10. Delays in issuing of drawings

In addition to this, while ranking the mentioned factors, the agreement among the groups of respondents was tested and the results reveal that there is a correlation among the three respondent groups. That is the groups more or less agreed to the delay factors mentioned above as being the main causes of project time and cost overruns.

2.1.3. Analysis of Project Delays

Over the years there have been numerous methods developed for the purpose of analyzing and assessing the reasons for project delays. At project sites the kinds of delays encountered vary depending upon the nature of the project and more often involve more than one party. Accordingly, various methods of analysis have been developed to assess the repercussions of delays and identify the responsible group. It is imperative that the methods employed serve the best interests of all stakeholders in providing accurate results that are acceptable. Below are the methods used in the analysis of project delays:-

As-planned vs. As-Built Method

In this method the schedules of planning and operation are compared. The discrepancy in the numbers will then be noted as the delay days of the construction project. This method is described to be one that is inexpensive and easy. But on the downside, the changes in critical paths of a project and its inability to be used in complex projects where delays are intricate are mentioned as its short comings (Ndekugri, I., N. Braimah, and R. Gameson, 2008).

Impacted As-Planned Method

This method uses the planned schedule and adds the extra delays of the project. If either parties of owners and contractors want to obtain delays caused by the other party they can add the number of delays to the planned schedule (Menesi, W., 2007). This method is beneficial to both the contractor and owner of construction projects since they can calculate the number of delays by themselves.

The Collapsed As-Built Method

The baseline schedule in this analytic method is as-built schedule and applied twice both from owner's and contractors viewpoints. From the contractor's viewpoint, the delay caused by owner will be omitted and the number of delays from the contractor and the owner are compared using as-built schedule as basis and the difference is allocated to each party. This method is a general approach and might leave out concurrent delays which can be overlooked and also a projects critical parts might be left out (Lowsley, S. and C. Linnett, 2006).

Isolated Delay Type Technique

This is another method that divides the durations of a project taking the as-planned schedule as a basis. The schedule is designed into multiple cases or scenarios and the analysis is carried out both from the owner's and contractor's viewpoint (Alkass, S., M. Mazerolle, and F. Harris, 1996).

Window But-For Technique

In this method both the owner's and contractor's viewpoint are used in multiple as-planned project duration scenarios. The delay caused by the owner is inserted into the first scenario to form the new baseline. Then contractor-caused delay will be inserted into the new baseline and the first scenario will be analyzed. The new schedule result of the first scenario then becomes a new baseline of second scenario and the same analysis will continue in this manner (Mohan, S.B. and K.S. Al-Gahtani, 2005).

Isolated Collapsed But-For Method (ICBF)

By taking the as-built schedule as basis, this method divides the project duration into scenarios. A given scenario will incorporate all of delay types and the delay will be eliminated according to the types and viewpoints. This method considers the viewpoint of owner and contractor continuously in each scenario.

Effect-based Delay Analysis Method (EDAM)

This method is based on study problems of windows-based delay analysis methods. The method carries out delay analysis using extracted windows and carefully defines the effects of delay on critical path. Therefore, it can be mentioned that the main advantage of this method is the ability to clearly identify responsible parties in order to solve the problems of concurrent delays (Yang, J.-B. and C.-K. Kao., 2012).

2.1.4. Delay Prevention Mechanisms

Prevention of delays can be done with the application of methods that start at the beginning of the project. These methods require planning and analyzing of causes of delays in detail. As such, analytical methods are great in mapping resources, risk identification, allocate and rearrange works to the benefit of the project personnel. To this end, it is imperative that the project stakeholders work in tandem. Identification of problem areas must be done by competent and able consultants and contractors who can work in detail to get rid of any obstacles along the way. The following mechanisms of delay can be employed at construction sites.

Detailed requirements analysis

In the construction industry new methods of approaching work are essential to be competitive. The whole team should work in collaboration from the design up to the completion stage of a project. People management and issue solving need to be solved and managed by effective management in addition to implementing technological systems (*M* Shelbourn, NM Bouchlaghem, C Anumba, P Carrillo. 2007). Interactive planning that defines key checkpoints of the construction phase, constraints and issues is essential. This is done by incorporating the inputs of team members.

Perform training and knowledge transfer

The success of a given project lays the foundation for other successors in replicating the strong sides by taking experience. The valuable information from such successful projects needs to be transferred to those who encounter obstacles and bottlenecks at every stage of their projects. Also, an additional benefit is that those who encountered problems can teach other project managers and clients about their shortcomings since failure is also another way to learn so as not to repeat the same mistakes.

The decisions of project personnel are important as they dictate the success or failure of a project. Success is guaranteed by on-site decisions, as such planning, scheduling and managing knowledge are important to avoid delays and ensure effective supervision (Koch, D.C., 2008). Training coupled with examples to

which the employees of a project can relate to their own experiences is essential in boosting confidence and assurance in quality.

Risk Identification

Risk identification is also another parameter that is vital for projects especially at the commencement stages. The benefit of risk identification is pronounced in developing action plans so to tackle risks head on and to help clients, contractors and consultants knowledgeable about the adverse impacts on time and cost overruns due to potential risks if not properly heeded. It is appreciated to work out the size and magnitude of project budget so that risks can be dealt with at the very beginning of a project (Khamooshi, H., Cioffi, D.F., 2009).

The identification of risks and their nature helps in knowing whether their impacts are significant or minor and allocate budget in such a manner. The number of risks is used to indicate that a given amount of budget can be allocated in relation to the impact of the risk. These numbers are decided according to the project's acceptance and acknowledgment of risks.

2.1.5. Delay Mitigation Techniques

Delays to the projects can be managed through the use of methods that can mitigate or lessen the number and impact of delays. This is done by re-adjustment of works without resulting in excess amount of human power and resource consumption. Hence, performing a task without additional time, cost and other resource overrun is what mitigation is all about. The knowledge and experience of previous project works can be applied in mitigating as per the specific requirements in the process of project execution. This is important aspect in that knowledge is helpful in creating awareness through feedback analysis and prevents delays from hampering progress of any work.

Knowledge Management

The knowledge management process is the use of previous knowledge gained in projects and scenarios so as to solve or address a specific problem. As put forward by Hsiao (Hsiao, L.-H., Lin, Y.-C. 2003)

"Knowledge Management refers to the collection of processes governing creation, storage, reuse, maintenance, dissemination and evaluation of Knowledge in a particular situation or problem solving context."

The knowledge gained in various experiences can be put to use by different project managers and other personnel who can further develop and move forward construction systems and in that way save precious time and cost of solving problems.

Recording experiences

The experiences in projects and during execution should be recorded so that the difficulties faced by the project team and the mitigation and problem solving techniques can be of great value for other future projects of similar nature. The good and bad experiences of the projects can be tools that put light on the delays and overruns caused by the client, contractor or consultants. Hence, the knowledge report is of great help in identifying shortcomings for future managers and other involved personnel.

In projects where delays ae rampant measures to improve cost, productivity and safeguard against disputes can be employed. A conducive system developed to complete projects on time and within the budgeted cost to achieve optimum results has been developed by Wesley (Querns, Wesley R,.1986). The four techniques employed are

1. **Impact evaluation** – In which re-assignment of activities is done with minimum disruption.
2. **resource constraining -** redefines schedules according limits of resources
3. **project expediting -** which is fast-tracking so as to reduce duration systematically
4. **value engineering**- which is the attempt to increase cost and time efficiencies

Project learning

There are cases in some projects whereby learning of current situations and decisions can only be made based on available information on hand. This is project learning and improving performance with time. During this period of initial stage, outputs are below expectations and then pick up after repeated trials. Often Poor or lack of project knowledge management continues to put its own effect the construction industry, in relation to project cost overruns and quality compromising. Hence knowledge management which is put into practice to lessen the effect of delay by project learning is essential (Hamzah Abdul-Rahman; Imran Ariff Yahya ; Mohammed Ali Berawi ; Low Wai Wah., 2008). To this end, delay mitigation model is developed by data collection in three different phases such as initial survey, case studies and interviews.

2.2 Empirical Review

Different researchers in different countries investigate factors influencing project completion from different perspectives. In this sub section, the mythology used and findings identified on studies conducted on project completion influencing determinates are reviewed.

Project related problems and completion of projects

Assaf,S. A. and S. Al-Hejji. 2006, have determined and evaluated the Causes of delay and their importance according to each of the project participants, i.e., the Owner, Consultant and the Contractor in large construction projects in Saudi Arabia. Likewise, Al-Momani (2000) conducted a quantitative analysis of construction delays by examining the records of 130 public building projects constructed in Jordan during the period of 1990-1997. The researcher presented regression models of the relationship between actual and planned project duration for different types of building facilities. The analysis also included the reported frequencies of time extensions for the different causes of delays. The researcher concluded that the main causes of delay in construction projects relate to designers, user changes, weather, site conditions, late deliveries, economic conditions, and increase in quantities.

The field survey conducted included 23 contractors, 19 consultants, and 15 owners. Seventy-three causes of delay were identified during the research. 76%of the contractors and 56% of the consultants indicated that average of time overrun is between 10% and 30% of the original duration. The most common cause of delay identified by all the three parties is ‘‘change order’’. Surveys concluded that 70% of projects related experienced.

Client/owner related problems and completion of projects

According to Theodore (2009) the causes of delay are categorized into 7 groups. The first group has discus the causes of delay occurred by client. Those are poor communication and coordination, delay in progress payments by owner, change orders by owner during construction, slowness in decision making process, delay to furnish and deliver the site, late in revising and approving design documents, delay in approving shop drawing and sample materials, Suspension of work, and conflicts between joint-ownership of the project.

Results indicate that owners are realizing that awarding of projects to the lowest bidder is one of the highest frequent factors of delay. Consultants, like owners, assign awarding the lowest bidder as the most

frequent factor of delay. This is due to that most of owners award the lowest bidder to execute their projects. Generally, the lowest bidders are unqualified contractors' with shortage in resources and low capabilities, which lead to low performance and which cause delay in completion of the work. Also Delivery of materials on site will quite affect the project progress. If that client does not ensure that quality materials are delivered on site then it will cause delay of project completion (Wambugu, 2013).

Contractor related problems and completion of projects

According to Theodore (2009) the Second group of causes is delay occurred by contractor. Those are: difficulties in financing project by contractor, conflicts in sub-contractors schedule in execution of project, rework due to errors during construction, conflicts between contractor and other parties (consultant and owner), poor communication and coordination, ineffective planning and scheduling of project, improper construction methods implement, delays in sub-contractors work, inadequate contractor's work, frequent change of sub-contractors, poor qualification of the contractor's technical staff, and delays in site mobilization.

Failure to clearly comprehend the project, all its aspects can lead to works being executed inaccurately and the attendant correctional steps to remedy the errors will cause project delay. Planning is therefore very key to success of construction project.

Sambasivan and Soon (2007) identify contractors improper planning as one of the causes of project delay. If a contractor fails to come up a workable work program at the initial stages, this will affect project timely completion. A similar observation is made by Jagboro and Aibinu, (2002) in Nigeria. Equally emphasizing on the need for proper planning of construction project is (Pakir et al 2012) in a study carried out in Sudan. McMinimee et al (2009) stated that it was clear those investments in advance planning and project development paid off. Mojahed (2005) states that proper planning in all phases and components of construction project are necessary to avoid re work which in turn leads to delay in project completion. Wideman (2001) concludes that the success of the execution phase of the project is highly depended upon the quality of planning in the prior planning phase.

Consultant related problems and completion of projects

According to Theodore (2009) the third group of causes of delay is delays occurred by consultant. Those are: delay in approving major changes in the scope of work, poor communication and coordination, inadequate experience of consultant, mistakes and discrepancies in design documents, delays in producing

design documents, unclear and inadequate details in drawings, insufficient data collection and survey before design, and un-use of advanced engineering design software.

Wambugu (2013) concluded in a study that inadequate supervision and inspection of work in construction project led to rework in instances of poor workmanship and this led to delay in project timely completion. This also leads to project cost overrun and may result to project abandonment. Inadequate site inspection is one of the factors identified as causing project delays in timely completions according to (Jagboro and Aibinu, 2002). Mojahed (2005) states that occasion of rework are mainly attributed to incompetent craftsmen because of insufficient working skills and knowledge of drawings or to incompetent supervisors because of lack of experience leading to deficient supervision.

When there is no proper inspection/supervision, quality control is greatly compromised. Chism and Armstrong, (2010) agree by stating that inspection and workmanship standards are quite important to achieve quality. Chai and Yusof (2013) identify poor site management and supervision as ranking high in the order of causes of construction project delay.

External factor related problems and completion of projects

According to Theodore (2009), the final group identified as causes of delay is delays occurred by external factors. Those are: effects of subsurface conditions (e.g. soil, high water table, etc.), delay in obtaining permits from municipality, hot weather effects on construction activities, traffic control and restriction at job site, accident during construction, changes in government regulations and laws, delay in providing services from utilities (such as water, electricity), and delay in performing final inspection and certification by a third party.

Project delivery system will also affect project timely completion or not. Chen et al, (2011) state that the project delivery system acts as a management function of the owner in project execution. It is quite important that the right choice on the project delivery system is made. The decision made in the selection of the project delivery system for a project impacts all phases of execution of the project and greatly impacts the efficiency of project execution (Oyetunji and Anderson, 2006).

Moreover, Assaf et al (1995) for example, provide a concise summary of the methodologies used by transportation agencies to establish the contract duration used for highway construction projects, and also provide a schedule guide for field engineers during construction. Similarly, Mohammed & Isah (2012) conducted a review on project delays in developing countries during planning and construction stages. In

their study they found that the delay and cost overruns of construction projects are dependent on the very early stages of the project.

2.3. Research gaps

After an in depth review of theoretical and empirical literatures which provided different factors affecting project completion is conducted in the preceding parts of the chapter. The study has reached up on a conclusion that critical delay factors in project completion due to different independent variable (Project related, Client related, Contractor related, Consultant related and External factor related problems) and dependent variable (Project Delay) are the appropriate theories to construct this study up on. These studies have been carried out and published. From the mentioned delay factors in review above, the five most significant success factors in determining of project delay identified by different author in different countries have been chosen for this study to be independent variables. The dependent variable of the project is Delay. However there is no literature available specific on Lemi-Kura sub city specific on 40/60 Bole Beshale site, which is still under construction stage and all the stake holders, Client (Addis Ababa Housing Development enterprise), Consultant and Contractors are actively participating in the project.

This study therefore aimed to investigate the actual determinants influencing of project completion in Lemi-Kura sub city specific on 40/60 condominium houses.

2.4. Conceptual Framework

The discussion of theories gives direction as to the way of tackling the ways of minimizing delays and increasing the quality of construction projects. In nature, the causes of delays are numerous and the correlated relationship of these causative factors is studied using different analysis techniques that are mentioned in the methodology section of the paper.

There are many characteristics of projects that determine the outcome of their execution. These parameters in construction projects are said to have a designated influence on the cost and time variations that are different from the initial plan of the project. These variance causing parameters are the competition during tender, size and complexity of projects, number of bidders, location and time frame of projects.

The multi-causal essence of delays and the consequent cost and time overruns necessitates the need for multi-dimensional approach of minimization by integration of various strategies. Hence, the conceptual

framework is designed in a composite function by distinguishing the relationship of causes and the mitigation techniques so as to counter act the adverse effects of delays on cost and time. As such, the framework provides explanation on how delays and the associated cost overruns rise and recommends in what ways they can be minimized in construction projects.

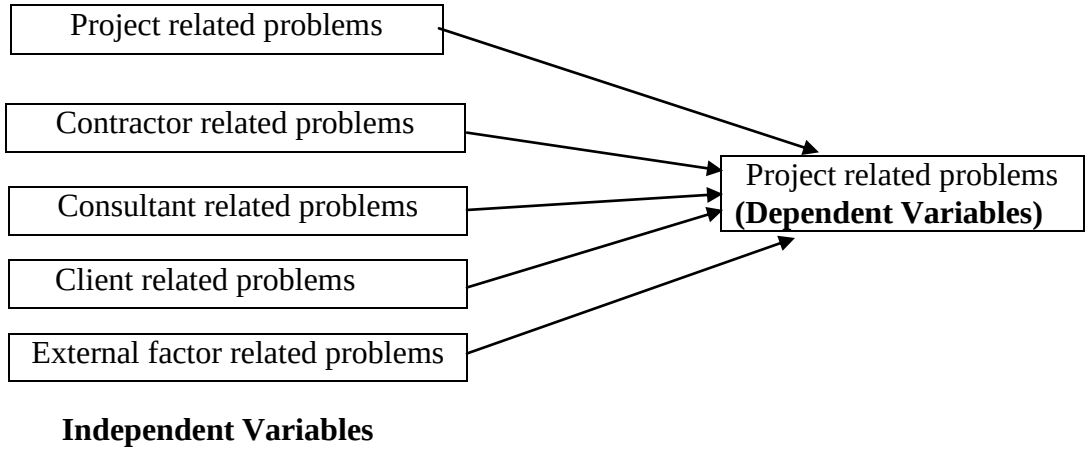

Figure 2 Analytical framework for linking causes of delay

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research design

The research design is the outlook of the entire study, one of the major causes of delays is their complexity and involvement of variety of stakeholders. To investigate the relationship of various causes of delays and their effect, the relationship between dependent and independent variables is studied with the help of a case study. The methodology refers to the procedural framework within which the research is conducted. This chapter will present how the current study was designed and provide a clear description of the specific steps that were taken to address the research problem.

3.2. Research Methods

The cause and effects (causal) relationship between variables are assessed throughout the study. This makes it appropriate for the study to implement explanatory research design. In this study both types of data those can and cannot be quantified are used. There were also unquantifiable data, which were designed to provide respondents with the freedom of expressing what they believe important for the study. This leads for the study to use a mixed research approach which both qualitative and quantitative research methods are applied. Mixed methods research is an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks.

The study is applied taking an actual case and based on data quantitative and qualitative data for empirical results. Survey design for the thesis that is realized through questionnaires and secondary data is also used from published and unpublished documents. In the end, this result is a complete manuscript that allows for comprehensive understanding of the quality hampering effects of cost and time overruns which are results of delays.

3.3. Sampling Techniques

Data Sources

The selected project is located in Lemi-Kura sub city considering one actual case specific to Lemi-kura 40/60 condominium project which is one of the main condominium projects being established by the Addis Ababa housing development city administration. For this thesis Project manager, project coordinator, project team, consultant team, contractor team and client team are identified to be data sources of the project in filling questionnaire surveys. In addition to the primary sources, document review

is performed on secondary data sources. The secondary data sources are project reports, project proposal, and other materials collected from Addis Ababa housing development and city administration bureau.

Population and samples description

The population of the study is the area from which the samples are selected. From this, sample frame can be identified. As highlighted above, all the project participants are targeted to be for samples. This indicated survey study of samples is employed for the project. Those samples include the site experts and admin staffs located in headquarters. This comprises only the professional teams starting from the site engineers to higher-level project coordinators and or manager. All these combined are deemed to be study population. The whole total of condominium housing projects in Lemi-Kura sub city comprises of 142 in number and are identified to be population size the study. Therefore, study employs those project teams to be population in the sample study.

Size and Sampling Technique

As highlighted, the project took consideration in Lemi-kura on one actual case which is Bole beshale condominium housing project and only project participant in this project, because specific subject matter knowledge is needed to answer the questions where all the stake holders are actively participating on the project site. It is assumed this feature would create relatively more homogenous sampling frame and population as it is one of many housing project facing delay against its contract time and as highlight this project is under construction stage/ active condominium housing projects so this will more exemplifies my analysis. Both data on questionnaire and interview are collected through convenient non probability sampling technique is employed. In addition, the population study is few, and all are considered as study samples.

In doing these, the researcher divides the total population (projects) in to different categories and then systematic sampling technique is applied to select the sample projects which represent those strata and the total population (40/60 condominium, projects).

Therefore, as mentioned before the total populations of the study project areas are 142 projects in Lemi-Kura Sub city around Bole Beshale and Bole Hayat project areas with their time of delay. It is very expensive in terms of money and time to collect data from these entire projects or contacts, so that the researcher has to determine sample which is representative for the total population. Uma Sekarar (2003) stated that a simplified formula to calculate sample sizes of finite population, which is used to determine

the sample size for this particular study is stated with below assumptions. A 95% confidence level is assumed to determine the sample size, i.e. at e=0.05 and the sample size is determined by the following formula:

*n= **N/ 1+N (e) 2***

Where 'n' is the required sample size,

N-is the population size and
E -is the level of precision. Applying the above formula, **n**=**1**42 /1+ 142(0.05)2= 142.37 =105 by rounding to the nearby number.

Hence the sample size for the ongoing study included is 105 projects on execution across Lemi-Kura sub city of Addis Ababa city administration condominium housing project. Therefore, the project employees under the listed 105 projects are considered to be the population of the study.

The data collection techniques: Questionnaires

The method of data collection used is, through Google form distributed for each randomly selected respondent to obtain information. These methods are majorly direct cross sectional questionnaires containing four section of questions. The selected contractors, clients and owners of projects number were asked similar questions, in order to understand the situation from their perspectives.

3.4. Data analysis techniques

In the study mostly quantitative methods of data analysis techniques was employed. Analysis of data in this research was done by using statistical tools like correlation and multiple regressions by using Standard statistical software's such as SPSS version 26. Descriptive analyses was also used for demographic factors general project related information such as gender, and for how long has been the project manager life span since its operation, status of Professionals, academic background, organization name, area of profession, size of the project, level of the contractor, service year, project status, time span of delay, time left to finish projects, impact of project delay and the cost of project delay.

In the study there are five hypotheses were analyzed using methods of statistical inference. Pearson Correlation analysis was conducted to test the existence of significant relationship between the delay factors and project delay. Then, the multiple regression analyses were also conducted to determine by how

much percent the independent variable i.e. delay factors explain the dependent variable which is project implementation delay.

Mathematically: the relationship between delay factors and project completion is expressed in the multiple regression equation as:

Y (PD) = X0 +X1 (PR) +X2 (CLR) +X3 (ExFac) +X4 (CrR) +X5 (CR) + e

Where: Y= PD= Project Delay.
PR = Project related
CLR = Consultant Related
ExFac = External factor.
CrR= Contractor related
CR= Client related
X0= Coefficient of the constant parameter.
X1= Coefficient of Project related
X2= Coefficient of Consultant Related.
X3= Coefficient of External factor.
X4= Coefficient of Client related
X5= Coefficient of Contractor related
e = error term

Based on the above mathematical model the constructed hypothesis were tested by considering significance level of each constant parameter in multiple regression analysis

3.4.1 Data Reliability Test and Cronbach's alpha (α) coefficient

The Cronbach's alpha coefficient is used to check the reliability of the collected data through questionnaires. The coefficient is put on a scale of 0-1.0 and indicates the tendency of respondents to give similar answers or ratings to the same question. For example, if all respondents answer the same to all questions the Cronbach's alpha coefficient will be 1 if on the contrary it will be 0.An accepted value for the alpha is 0.7 and if this value is below this threshold it indicates that there is a rampant inconsistency and will deem the data collected as being unreliable. The formula for Cronbach's alpha is the following.

$$\alpha = \left(\frac{K}{K-1}\right)\left(\frac{S^2y - \sum x^2 i}{S^2 y}\right) \quad \_\_\_\_\_ (Eq.3.1)$$

Where α = Cronbach's alpha

K= the number of items or groups

S^2y = The variance in the score recorded

$\sum x^2 i$ = the sum of variance for each item

In any research results, the issue of validity and reliability are important confidence measures. The validity of the instrument was and found valid Cronbach's alpha is one of the most commonly accepted measures of reliability. It measures the internal consistency of the items in a scale. It indicates that the extent to which the items in a questionnaire are related to each other Fubara and Mguni, (2005). The normal range of Cronbach's coefficient alpha value ranges between 0-1 and the higher values reflects a higher degree of internal consistency. Different authors accept different values of this test in order to achieve internal reliability, but, satisfactory value is required to be more than 0.6 for the scale to be reliable (Sekaran, 2003 as cited by Sirbel, 2012).

Table 3.1 Cronbach's Alpha Coefficient for total questionnaire

Cronbach's Alpha	Total N of items
0.965	40

Cronbach's Alpha	N of items
0.922	5

Source: SPSS Out Put version 26 and Own Survey (2022) n=105

In the study the Cronbach's alpha coefficient was calculated of the questionnaire. Table 1 above shows the values of Cronbach's Alpha of the questionnaire and the entire questionnaire. For the fields, the values Cronbach's Alpha is 0.965. This is considered high. Hence, the result ensures the reliability of the questionnaire which indicates very good reliability. Therefore, it can be said that the above questionnaire is adequately reliable.

3.4.2. Relative Importance Index (RII)

The ranking of each causing factors obtained through questionnaire is done using relative importance index (RII). The relative importance index has value lying between 0 and 1. In this specific paper, Likert scale was used to analyze the data for the ranking of causes and effects of delays on quality. The empirical formula for Relative Importance Index (RII) is put as follows.

$$RII = \sum \frac{W}{A * N} \quad \text{(Eq.3.2)}$$

Where W = is the weight given to each question by the respondents, ranging from 1 to 5, 1 being the least and 5 for highest.

A = is the highest weight integer (5 in 5-pont likert scale)

N = is the total number of respondents

3.4.3. Analysis of Variance (ANOVA)

ANOVA is a method for assessing the variance of a statistical method. The method is used to assess discrepancy among the given answers. The significance of variance analysis is that it tests agreement among the responses in their respective ratings. Parties in their rankings. To do that, the null and alternative hypothesis must be set up first and the null hypothesis assumes that there is no significant difference between the groups and the alternative hypothesis assumes that there is a significant difference between the groups.

The null hypothesis is put in a way that **H**o = **μ**1=**μ**2=**μ**3. This means that there is no difference or significant variance between or among the populations of the three groups of respondents that is the client, contractor and consultant. The alternative hypothesis puts forward that **Ha** = **μ**1 ≠ **μ**2≠ **μ**3, which means that the three categories of respondents are at different levels of understanding about the causes of delays.

This hypothesis is tested for validity using F-Statistic by taking to consideration normal distribution. If the value of F-Statistic is greater than F-critical value or table value, the null hypothesis is rejected and the alternative hypothesis is accepted. This in turn proves that mean of the groups are not equal, **μ**1 ≠ **μ**2≠ **μ**3. If otherwise, we accept the value of the null F-statistic is calculated as follows.

$$F = \frac{SSB * (n - K)}{SSW * (K - 1)} \text{ ——————————————————————} (Eq.\ 3.3)$$

Where: SSB = mean sum square between groups

SSW = mean sum square with in groups

n-K = degrees of freedom for within groups

K-1 = degrees of freedom for between groups

n = number of observations

K = number of groups

3.5. Validity of the Instrument and Ethical Considerations

Validity refers to the ability of the instrument to measure what it is designed to measure. Kumar, (2005) as cited by Ndegwa, (2013) defines validity as the degree to which the researcher has measured what he set out to measure. It is the accuracy and meaningfulness of inferences which are based on research results. Validity therefore is whether an instrument is on target in measuring what is expected to measure. To check the validity of the instrument the researcher worked with the adviser as the expert and agreed whether the instrument was valid or not. The tool was also subjected to peer review to ensure its validity. The instrument was subjected to face validity, content validity test and construct validity test through testing it using the research done in the past.

The respondents in the study were assured of confidentiality of the information they provided. The respondents were not required to write their names in the questionnaires or interview schedules. No respondent was forced to participate except those that voluntary agreed to participate in the study. The researcher maintained humility and conducted the research with utmost honesty avoiding distortions and misleading data manipulation. The researcher also endeavored to arrive at conclusions based on objective inferences that are purely and blindly guided by the data collected. The analysis of data and interpretation of the results of data analysis were restricted to what the data actually tell.

CHAPTER FOURE: DATA PRESENTATION, ANALYSIS AND INTERPRETTATION

Introduction

This chapter presents results of the data collection. This was guided by the objectives to present empirical evidence to agree or controvert. The objectives were to determine how poor project initiation influences completion of projects, how poor project planning/design system influences completion of projects, how improper implementation influences completion of projects, to investigate how poor project monitoring, evaluation and controlling system influences completion of projects, to examine how poor communication influences completion projects, to find out how Improper project closure influences completion of projects. Descriptive statistics have been used to describe respondents' characteristics. Further regression analysis has been used to determine the relationship between the initial duration and final project duration. Correlation test has been applied to test the instrument reliability and the correlation of responses on the same issues coming from different professions.

The researcher issued 105 questionnaires and had a return rate of 105 or hundred percent (100%) response rate). Questionnaire Return rate= 105x100/100= 100%. The questionnaire return rate as per the calculation is 100%. This return rate is considered acceptable for the purposes of data analysis, and the discussion here forth came from these data.

4.1. Background Characteristics and General Information of Respondents

A frequency analysis was also conducted for the profiles related to the general information about the respondents and projects. This information includes Descriptive analyses was also used for demographic factors general project related information such as gender, and for how long has been the project manager life span since its operation, status of Professionals, academic background, organization name, area of profession, size of the project, level of the contractor, service year, project status, time span of delay, time left to finish projects, impact of project delay and the cost of project delay.

Table 4.1 Background Characteristics and General Information of Respondents

No	**Background Characteristics**	Classification	Frequency (n = 105) (%)	%age
1	Gender	Male	75	71.4
		Female	30	28.6
		BA/BSC degree	71	67.6
		MA/MSC	30	28.6
		PHD	4	3.8
3	Organization/ Company name	Client	16	15.2
		Contractor	61	58.1
		Consultant	28	26.7
4	Your Area of Profession	Project Manager	23	21.9
		Resident engineer	16	15.2
		Site Engineer/office engineer	49	46.7
		Contract administration	17	16.2
5	Type and size of the project	B+G+9	32	30.5
		2B+G+13	40	38.1
		2B+G+15	33	31.4
6	Level/grade/category	Grade 1	69	65.7
		Grade 2	20	19.0
		Grade 3	11	10.5
		Grade 4	5	4.8
7	Years involved in building construction	1 – 5 Years	10	9.5
		6 - 10 Years	30	28.6
		11 - 15 Years	24	22.9
		>15 Years	41	39.0

This table shows the summary of the respondent's background characteristics. As we can see from the table above, 75 (81.4%) of the respondents were male and the remaining 30 (28.6%) of them were females this shows gender distribution was not equal.

As far as the educational qualification of employees is concerned, the below Table 2 shows that from the total respondents majority, 71(67.6%) of the respondents were degree holders, 30 (28.6%) of the respondents were masters holder and slightly less than a quarter of them (3.8%)4 respondents have doctoral level of education. The results imply that the project executive employees such as Project Manager, Resident engineer, Site Engineer/office engineer, Contract administration are fairly educated and can understand and discharge their mandate in the management of projects.

When we see the status of the company or Organization name 16 (15.2%) were Clients to the condominium construction projects. 61(58.1%) of the study respondents were Contractors and 28(26.7%) of respondents are Consultants.

When we see area of Profession of our respondents Project Manager constitute 23(21.9%),resident engineers constitute 16(15.2%) ,Site Engineers or office engineers constitute 49(46.7%) and lastly Contract administrators have amounted 17(16.2%).Which says site or office engineers have larger number in simpler terms.

Size and Type of each project being executed at those sites constitutes the following percentage Type and size of the project B+G+9 32(30.5%), 2B+G+13 40 (38.1%), 2B+G+15 33(31.4%).

Level and grade category of those project site stakeholders have grade levels like Grade 1: amounted about 69(65.7%), Grade 2: 20(19.0%), Grade 3:11(10.5%), and Grade 4: 5 (4.8%).

The years involved in building construction is explained as 1 – 5 Years 10(9.5%), 6 - 10 Years 30(28.6%), 11 - 15 Years 24(22.9%), >15 Years 41 (39.0%). This indicates that most of the building construction firms who are participating on building those project sites have relatively larger life span on the construction business.

Table 4.2 General Information Frequency and %age of Respondents'

No	**General Information**	Classification	Frequency (n = 105)	% age
1	A Project you are involved	Completed	84	80.0
		Currently under Construction	21	20.0
2	By how much time it delayed	<1 years	13	12.4
		2-3 years	4	3.8
		4-5 years	86	81.9
		>6 years	2	1.9
3	Time elapsed yet for ongoing projects	<1 years	6	5.7
		2-3 years	31	29.5
		4-5 years	25	23.8
		>6 years	43	41.0
4	Delays have an impact on the total cost and quality of the project	Yes	105	100.0
5	how much Percent does the cost overrun	<25%		
		25-50%	57	54.3
		50-75%	19	18.1
		>75%	29	27.6

Based on the above general information projects that completed accounts about 84(80.0%) and 21(20.0%) of the projects are currently under Construction therefore from the study finds out that most of those condominium housing projects are completed and its assumed that they are serving the mass population.

The core focal point of the study which is project delay accounts for the following figures by the years 13(12.4%) are delayed for a years and less and 4(3.82-3) have projects delayed for up to 2-3 years and also 86 (81.9%) have delayed for at least 4 up to 5 years and lastly projects who accounted for 6 years and more delay accounts for 2(1.9%).

Projects which are left with some years after the dead line are presented as Time elapsed yet for ongoing projects 6(5.7%) are projects who are left with a year and less.31 (29.5) projects are spend for 2-3 years additional time to the projects. While 25(23.8%) projects constitute for about 4-5 additional time to the projects. Lastly 43(41.0%) of the projects used additional six or more years to be completed.

Almost all of the study respondents105 (100.0%) agree on the point that project delays have an impact on the total cost and quality of the project. In addition to that it's found out that the cost overrun related with project delay are amounted in to 25-50% :57(54.3%),50-75% :19(18.1%),>75%: 29(27.6%).The ranking of the delay factors.

4.2. Descriptive Statistics

Table 4.3 the ranking of the delay factors

Code	The Delay Factors	Mean	Rank
CLR	Consultant Related	4.29	1st
ExFac	External factor	4.25	2nd
CrR	Contractor related	4.24	3rd
PR	Project related	4.19	4th
CR	Client related	4.05	5th

Source: SPSS Version 26 and Own Computation (2022) , n=105

Table 4 shows the ranking of the delay factors according to the value of their means values. The factors with means exceeding to 3.8 present a fairly high agreement of the respondents and our respondents have responded very positively about the factors and determinants of project delay. Based on the study ranking, the most influential factors of project completion are: Consultant Related (CLR) (mean = 4.29); External factors (ExFac) (mean = 4.25), Contractor related (CrR) (mean = 4.24), Project related (PR) (mean =4.19) and Client related (CR)(mean 4.05). It is easy to find that CLR is the factor having the highest value of the means. This means project related problems such as discrepancies between the contract documents, suspension of the work by owner or contractor, Change orders and Shortage of equity contribution are the most serious problems in project delay analysis.

4.3. Inferential Statistics: Delay Determinants

4.3.1. Correlation between project delay factor determinants and project delay

In this study, to process the correlation and multiple regression analysis, data from the Likert scale typed questionnaires were entered in to the SPSS software version 26. Correlation coefficient is used to specify the strength and the direction of the relationship between the independent variable (Project related, Client related problems, Contractor related, Consultant Related problems and External factors) and the dependent variable i.e. project delay. The results of the correlation between these variables are shown in Table 4.3 below. As it is indicated in the Table 4.3 below, generally there is a positive, strong and statistically significant correlation between project execution delay determinants and factors and project delay at 1%, 5% and 10% level of significance (i.e. P<0.01, P<0.05, P<0.10) which signifies the project execution delay determinants and factors affect the on the project completion delay significantly. From presented correlation matrix table again we can observe that there is a positive, strong and statistically significant correlation between project implementation.

Delay factors and determinants (Project related, Client related problems, Contractor related, Consultant Related problems and External factors) and project execution delay, as the correlation coefficient between each factors and project delay described as 0.370***,0.263*** ,0.171*, 0.175*and 0.141** respectively and in all cases at 1% ,5% and 10% significance level (p < 0.01, p < 0.05, p < 0.10) respectively

Table 4.4 Correlations between determinants of project delay and project delay

No.	Items	Code		Project Delay	
			Degree of the correlation	P value	Significance
1.	Project related	Project related	.370***	.000	Significant
2.	Client related	Client related	.263***	.009	Significant
3.	Contractor related	Contractor related	.171*	.066	Significant
4.	Consultant Related	Consultant related	.175*	.079	Significant
5.	External factor	External factors	.141**	.034	Significant

*Note: *** Correlation is significant at the 0.01 level (2-tailed), and ** Correlation is significant at the 0.05 level (2-tailed) *Correlation is significant at the 0.10 level (2-tailed),*

Source: SPSS Version 26 after Own Survey (2022)

4.3.2. Regression Analysis and Hypothesis Testing Results

The regression analysis was conducted to know by how much the independent variable explains the dependent variable. In this study, regression was employed to examine the effect of the independent delay factors such as Project related, Client related problems, contractor related, and consultant related problems and external factors on dependent variable project delay.

The Multiple regression analysis model the relationship between the independent variable and dependent variable. The coefficient of determination (R2) ad correlation coefficient (R) shows the degree of association between the two. The results of the analysis indicates that R2=0.806 (80.6%)and R = 0.898(89.8%) this indicates that there is a positive relationship between independent variable (Project related, Client related problems, Contractor related, Consultant Related problems and External factors) and dependent variable (project delay).Therefore, to make sure that there is low co-linearity, the values of Tolerance and VIF (Variance Inflation Factor) should be checked. According to Pallant (2007), tolerance indicates to what extent the independent variables do not explain much of the variability of a specified independent variable and the value should not be small (more than 0.10) to indicate the absence of co-linearity. In addition to that, VIF, the inverse of tolerance value, should have a value of less than 10 to avoid any concerns of co-linearity (Pallant, 2007). Hence, the values in the Table 6 below indicate low co-linearity because all Tolerance values are above 0.1 and all VIF values are less than 10. Therefore, these tests reflect that the variables used in the study are free from multi co-linearity.

Table 4.5 Multi co -linearity Test table on the standard Model

No.	Items	Code		**Co-linearity Statistics**	
			Unstandardized Coefficients (β)	Tolerance	VIF
	(Constant)	α	-.311		
1.	Project related	Project related	.370	.237	4.228
2.	Client related	Client related	.263	.334	2.996
3.	Contractor related	Contractor related	.171	.339	2.952
4.	Consultant Related	Consultant related	.175	.301	3.323
5.	External factor	External factors	.141	.474	2.110

Source: Own Survey and SPSS Version 26 (2022) n=105

The results of regression analysis indicate positive and significant relationship between the project delay determinant factors and project delay. This means the predictive variables (independent variables) such as (Project related, Client related problems, Contractor related, Consultant Related problems and External factors) jointly determine the dependent variable project delay. The adjusted R-Square (*R2* =0.796) (79.6%) shows the explanatory power of all variables involved in the study. Hence (Project related problems, Client related problems, Contractor related problems, Consultant Related problems and External factors) jointly determine (explain) 79.6% of the variance in project delay. Whereas 21.4% of the project delay was explained by the variables which were not included under the study.

4.4. Results and discussion

The values of the unstandardized Beta Coefficients (β) indicate the effects of each independent variable on dependent variable. Furthermore, the values of the unstandardized Beta Coefficients in the Beta column of the Table 4.6 below, indicate which independent variable (determinants of delay) makes the strongest contribution to explain the dependent variable (project delay), when the variance explained by all other independent variables in the model is controlled. The *t* value and the sig (*p*) value indicate whether the independent variable is significantly contributing to the prediction of the dependent variable.

Table 4.6 Determinants of Project Implementation Delay

Variables	Codes	Unstandardized Coefficient		Standardized Coefficients			95% Confidence Interval for B	
		β	Std. Error	Beta	T-value	Significance	L-Bound	U-Bound
(Constant)	α	-.311	.271		-1.147	.254	-.850	.227
Project related	Project related	.370	.089	.378	4.155	.000	.193	.547
Client related	Client related	.263	.099	.204	2.664	.009	.067	.459
Contractor related	Contractor related	.171	.092	.142	1.860	.066	-.011	.354
Consultant Related	Consultant related	.175	.098	.143	1.774	.079	-.021	.370
External factor	External factors	.141	.065	.138	2.151	.034	.011	.271

*Note: ***Significant at p<0.01 and **Significant at p<0.05 and * significant level at p<0.10*

Source: SPSS Version 26 and Own Survey (2022).

The study's hypothesis testing was made based on β, *t*, and *P* values. Hence using those coefficient results, the proposed hypotheses for this study were tested as follows.

Hypothesis 1: Project related problems has a significant negative impact on project execution

The results of multiple regressions, as presented in Table 4.6 above, revealed that project related problems had a positive and significant effect on project delay with (β *=0.370,* t = 4.155 *&* p <0.01). Thus, the proposed hypothesis was accepted. This statistics infer that if the owner of the project increased its focus to project related problems by one %, then its project delay would decreased by 37 %. Therefore, project related problems had a positive affect the aggravating project delay. The findings agree with Theodore (2009) and Chan and Kumaraswamy (1997) who argues that the factor that always happen relate to project are: such as discrepancies between the contract documents, Suspension of the work by owner or contractor Change orders, Shortage of equity contribution, Lack of feasibility study of the site, changes in the extent of the project, Owner interference and frequent change of the design, delay of progress payment for the completed works ,Using lowest bid that lead to low performance, slowness in the decision making process ,un realistic imposed contract duration and no approval of the contractor submittals affects project delay time significantly.

Hypothesis 2: Client related problems have a significant negative impact on project completion**.**

The results of multiple regressions, as presented in Table 7 above, revealed that poor project planning/design had a positive and significant effect on project delay with values (β=0.263, t = 2.664, p < 0 .09). Thus, the proposed hypothesis was accepted. Here also the beta coefficient implies that if the attention is given to Client related problems by one %, by keeping the other variables constant its project delay would decreased by 26.3%. Therefore, Client related problems had a negative effect on the project completion time. The findings agree with Theodore (2009) who argues that the factors that always happen relate to client are: poor communication and coordination, delay in progress payments by owner, change orders by owner during construction, slowness in decision making process, delay to furnish and deliver the site, late in revising and approving design documents, delay in approving shop drawing and sample materials, Suspension of work, and conflicts between joint-ownership of the project.

Hypothesis 3: Contractor related problems have a significant negative impact on project completion.

The results of multiple regressions, as presented in Table 7 above, revealed that Contractor related problems had a positive and significant effect on project completion with values (β = 0.171, t = 1.86, p <0.066). Thus, proposed hypothesis was accepted. In this case the beta coefficient describe that keeping

the other variables constant , in this model a one % change in the overall Contractor related problems, the consequence would be made change time in project completion by 17.1 %. Therefore, Contractor related problems had a negatively and significant effect on project completion. The findings agree with Theodore (2009) who argues that the factors that always happen relate to contractor are: difficulties in financing project by contractor, conflicts in sub-contractors schedule in execution of project, rework due to errors during construction, conflicts between contractor and other parties (consultant and owner), poor communication and coordination, ineffective planning and scheduling of project, improper construction methods implement, delays in sub-contractors work, inadequate contractor's work, frequent change of sub-contractors, poor qualification of the contractor's technical staff, and delays in site mobilization.

Hypothesis 4: Consultant Related problems expected to affect project completion period negatively.

Consultant Related problems had a positive and significant effect on project completion period with values (β=0.175, t = 1.774, p < 0 .10). Thus, the proposed hypothesis was accepted. Here also the beta coefficient implies that if Consultant Related problems were changed by 1 %, by keeping the other variables constant its project completion time would increase by 17.5%. Therefore, Consultant Related problems had a negatively and significant effect on project completion. The findings agree with Theodore (2009) who argues that the factors that always happen relate to consultant are: delay in approving major changes in the scope of work, poor communication and coordination, inadequate experience of consultant, mistakes and discrepancies in design documents, delays in producing design documents, unclear and inadequate details in drawings, insufficient data collection and survey before design, and un-use of advanced engineering design software.

Hypothesis 5: External factors related with project delay are expected to affect project completion negatively.

External factors related with project delay had a positive and significant effect on project completion with values (β=0.141, t = 5.15, p < 0 .05). Thus, the proposed hypothesis was accepted. Here also the beta coefficient implies that if the external factors related with project delay differ by one %, by keeping the other variables constant its project delay would increase by 14.1%. Therefore, improper external factors related with project delay had a negatively and significant effect on project completion. The findings agree with Theodore (2009) who argues that the factors that always happen relate to external factor are: effects

of subsurface conditions (e.g. soil, high water table, etc.), delay in obtaining permits from municipality, hot weather effects on construction activities, traffic control and restriction at job site, accident during construction, changes in government regulations and laws, delay in providing services from utilities (such as water, electricity), and delay in performing final inspection and certification by a third party.

This is sometimes called, the Beta Weights. According to Pedhazur, (1997), a β weight coefficient shows how much change there is in the criterion variable, we might expect with a one-unit change in the predictor variables holding all other predictor variables constant.

CHAPTER FIVE : SUMMARY, CONCLUSION AND RECOMMENDATION

5.1. Summary of Major Findings

The main purpose of this study was to investigate the determinant effects of (Project related problems, Client related problems, Contractor related problems, Consultant Related problems and External factors) on project delay in the major construction projects areas under Lemi-Kura sub city condominium housing projects. To examine the effect of factors of project delay, the specific objectives were formulated to investigate the determinants of delay in project implementation.

Before going to the main analysis of the study, a reliability test was administered to check whether the questionnaire is reliable or not. In this regard, all the questionnaires were reliable and acceptable with reliability test value of Cronbach's Alpha (0.965).

Related to the demographic and general informational characteristics: majority of the projects' employees were male individuals amounted (71.1%). Regarding educational level, majority of the condominium housing project area employees were bachelor degree holders (67.6%).

In addition, the result of correlation analysis was made hence all the independent variables (Project related, Client related problems, Contractor related, Consultant Related problems and External factors) are positively and significantly correlated with the dependent variable (project delay) at 1% ,5% and 10% % level of significance ($P < 0.01$, $P < 0.05$, $P < 0.10$). The highest correlation is attached to Project related($r=0.370$), Client related($r=0.263$) and Contractor related ($r=0.175$), Consultant Related ($r=.171$) followed by external factor ($r=0.141$).

Delay factors and determinants such as (Project related, Client related problems, Contractor related, Consultant Related problems and External factors) and project execution delay, correlates by the coefficients between each factors on project delay described as 0.370***,0.263*** ,0.171*, 0.175*and 0.141** respectively and in all cases at 1% ,5% and 10% significance level ($p < 0.01$, $p < 0.05$, $p < 0.10$) respectively.

Before performing multiple regressions analysis a test for the existence of multi-co-linearity was also made. As Table 6 indicates, since all the Tolerance values are above 0.1 and almost all VIF values are less than 10, multi-co-linearity tests reflect that the variables used in the study are free from multi-co-linearity.

Finally, a multiple regression analysis was conducted to test the hypothesis. In this regard, Table 4.5 depicts the results of multiple regressions. The result shows that the model tested is significant (at $p < 0.01$, $p<0.05$; and $P<0.10$) with the adjusted R square 0.796.This value indicates that 79.6 % of delay occurred is attributed to the five independent variables entered into the regression. The remaining 21.4 % of the variance in project completion may attribute to other factors. Regarding the hypothesis illustrated, since the beta coefficients were found significant, the five hypothesis in the study are accepted.

5.2. Conclusion

The conclusions of the whole study was be made through comparison of the project objectives and the end results. The broad aim of this study has been largely achieved in a number of ways. Sufficient evidence has shown that project undertaken on condominium housing projects under Lemi-Kura sub city are highly influenced by influenced by various determinants factors. The study concludes that (Project related problems, Client related problems, Contractor related problems, Consultant Related problems and External factors) totally affect the project completion period negatively.

It has also shown that improper implementation; the constraints of building materials, labor, and construction equipment's have been unable to provide adequate funding to a reasonable and affordable standard schedule time.

It's now clear that project related problems such as discrepancies between the contract documents, Suspension of the work by owner or contractor Change orders, Shortage of equity contribution, Lack of feasibility study of the site, changes in the extent of the project, Owner interference and frequent change of the design, delay of progress payment for the completed works ,Using lowest bid that lead to low performance, slowness in the decision making process ,un realistic imposed contract duration and no approval of the contractor submittals affects project delay time significantly.

Contractor related problems such as the occurrence of lots of lost out items (skilled labor, equipment and material), lack of sufficient knowledge of project management, inadequate planning and control ,poor selection of sub-contractors ,giving too much working load , serious budget deflect resulted from fluctuation and price escalation.

Consultant related problems such as negligence of the staff on site supervision, lack of experience, contract management, waiting time for approval of tests and inspection, quality assurance and control, preparation and approval of drawings, lack of standard formats and low bid have significant negative effect on project completion period

Client related project implementation problems such as changes in the extent of the project owner interference and frequent change of the design, delay of progress payment for the completed works, using lowest bid that lead to low performance, slowness in the decision making process, un realistic imposed contract duration, no approval of the contractor submittals, delay in delivering the site to the contractor significantly affects project completion period negatively.

External factors and determinant characteristics towards project execution stage which are, delay in obtaining the required document from concerned government offices, municipality, regional environmental offices, delay in land acquisition, delay in providing services for utilities such as water, electricity, delay in clearances form various regulatory agencies, unforeseeable reasons such as adverse natural calamities, etc., delay in sub-contractors work , in adequate contractor's work , Seasonality of works to be performed.

.

As the finding of correlation analyses confirmed, there is also a strong, positive and significant relationship between delay factors and project completion. Similarly, from multiple regression analysis result that variability in project completion is resulted from the variability in delay factors hence, from this the study concludes that the project completion is determined by the emphasis that gives to each project delay factors.

Finally, the results of this study revealed that problems under the study such as (Project related, Client related problems, Contractor related, Consultant Related problems and External factors) negatively influences project completion. Hence, it can be concluded that project completion time scheduled was affected due to Project related, client related problems, contractor related, and consultant related problems as well as external factors.

5.3. Recommendation

Based on the above conclusion the study proposes the following corrective measures that should be considered by concerned stake holders in order to reduce project implementation problems such as Project related, client related problems, contractor related, and consultant related problems as well as external factors which have a significant impact on the project completion time for projects constructed and those projects under construction in Lemi-Kura sub city project sites. Typical recommendations of the study are::

- Project related problems are such as discrepancies between the contract documents, Suspension of the work by owner or contractor Change orders, Shortage of equity contribution, lack of feasibility study of the site, changes in the extent of the project, Owner interference and frequent change of the design, delay of progress payment for the completed works ,using lowest bid that lead to low performance, slowness in the decision making process ,un realistic imposed contract duration and no approval of the contractor submission are major one determinant factor of project delay so that any business initiators or starters should select projects those are more familiar and interesting for them and scope of project should be established, controlled and must be clearly defined and be limited with predefined feasibility studies

  .
- Contractor related problems should be improved to have basic indicators for project implementation as opposed to the current practice. Turnover rate should be improved not to lose skilled labor and material handling techniques should be improved. Improving sufficient knowledge of project management issues and, adequate planning and control mechanism should be set. Minimizing work load and efficient budget allocation mechanism should be duly considered.
- Consultant related project implementation issues should be mitigated through by improving staff on site supervision techniques such as good attendance and performance follow up tracking system. Improving and enhancement of employees experience via on job and academic trainings and improving contracts management, minimizing the waiting time for approval of tests and inspection, improving quality assurance and

control, establishing lack of standard formats and practicing better bidding techniques should be considered.

- Reducing changes in the extent of the project owner interference and project design, improving progress payment for the completed works, improving in the decision making process, improving and analyzing realistic contract duration, better approval of the contractor submittals, developing the habit of due date delivery should be considered so as to improve project implementation process on those condominium site projects.

- The last but not the least, improvements in acquiring the required document from concerned government offices, municipality, regional environmental offices, fast land acquisition, upgrading and providing services for utilities such as water, electricity, delay in clearances form various regulatory agencies, developing better forecasting skills such as adverse natural calamities, reducing delay in sub-contractors work ,reducing seasonality of works to be performed should be considered so as to have better project completion time for those condominium site projects.

- **Recommendations further research: The** study gave much attention to the key operational and multidimensional factors that influence timely completion of condominium housing projects built by the government with many stake holders behind in Lemi-Kura sub city. The study could not exhaustively cover all the determinant factors with better data size and therefore there is need for more research in this area with better methodology and data size.

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APPENDICES

Appendix I (Questionnaire)

Dear respondents,

The aim of this questionnaire is to assess the impact of project delay on the quality and cost of some selected 40/60 Condominium Housing construction projects performed in Lemi-Kura sub city. This questionnaire is required to be filled with exact relevant facts as much as possible. All data included in this questionnaire will be used only for academic research and will be strictly confidential.

Sincerely

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May, 2022

Questionnaire

The Impact of Project Delay on The Quality and Cost of Building Construction (The Case study on Selected 40/60 housing development project in Lemi-Kura sub city which are under construction stage.

This questionnaire consists of 4 sections

SECTION A: Respondent Background and General information.

SECTION B: Respondents general information.

SECTION C: Factors that Contributing to Causes of project implementation Delays.

SECTION D: Impacts of project delay.

SECTION A

PART I. Background Characteristics: Please ticks (√) and fill in the blanks under each given questions and if you select others please specify.

1. Sex

   O Male O Male

2. Educational Qualification

   O Diploma O BA/BSC degree

   O MA/ MSC O PHD O Others, Please specify

3. Organization/ Company name:

   O Client O Contractor O Consultant

4. Your Area of Profession

O Project Manager O Resident engineer

O Site Engineer/office engineer O Contract administration

5. Type and size of the project, no of floors/story's (40/60 Condominiums)

O B+G+9 O 2B+G+13 O 2B+G+15

6. Level/grade/category of the contractor or the consultant

O Grade 1 O Grade 3

O Grade 2 O Grade 4

7. For how long your company involved in building construction, since its establishment of your business organization.

O 1 - 5 Yrs. O 11 - 15 Yrs.

O 6 - 10 Yrs. O >15 Yrs.

SECTION B

Part I: General Information, (Form Client, Contractors and Consultants) please ticks (√) and fill in the blanks under each given questions and if you select others please specify

1. A Project you are involved is:

O Completed O Currently under Construction

2. If your answer for Question No. 2 is delayed, by how much day it delayed?

O <1 years O 2-3 years O 4-5 years

O >6 years O others please specify

3. Time elapsed yet for on-going projects:

O <1 years O 2-3 years O 4-5 years

O >6 years O others please specify

4. Do you think that these delays have an impact on the total cost and quality of the project?

O Yes O No

5. If your answer for Q. No 5 is yes, by how much Percentage does the cost overrun?

O 25-50% O 50-75% O >75%

SECTION C

Factors that are contributing for Causes of project Delays during period of construction.

Please tick (√) under each performance. Each scale represents the following rating:

(5) Very highly contributing (4) Highly contributing (3) Medium contributing

(2) Low contributing (1) Very low contributing

Factors	No	Causes of delay	**1**	**2**	**3**	**4**	**5**
Internal factors							
A. Project related	1	Discrepancies between the contract documents					
	2	Suspension of the work by owner or contractor					
	3	Change orders					
	4	Shortage of equity contribution					
	5	Lack of feasibility study of the site					
B. Client related	1	Changes in the extent of the project					
	2	Owner interference and frequent change of the design					

	3	Delay of progress payment for the completed works					
	4	Using lowest bid that lead to low performance					
	5	Slowness in the decision making process					
	6	Un realistic imposed contract duration					
	7	No approval of the contractor submittals					
	8	Delay in delivering the site to the contractor					
C. Contractor related							
I. Related to project management	1	The occurrence of lots of lost out items (skilled labor, equipment and material)					
	2	Lack of sufficient knowledge of project management					
	3	Inadequate planning and control					
	4	Poor selection of sub-contractors					
	5	Giving too much working load					
II. Related to financial problem and cost	1	Serious budget deflect resulted from fluctuation and price escalation					
	2	Utilization of low price of civil work in estimation of the cost					
	3	Cost escalation on various items					
	4	Cash flow problems					
III. Factors of labour related	1	Low productivity level of labour					
	2	Personnel conflict among labours					
	3	Shortage of the required man power					
IV. Supplier	1	Delay in rendering the required design					

related		specifications for specific type of machineries to be erected					
	2	Design change by the winner company					
	3	Delay in the procurement machineries and materials required for the projects					
D. Consultant Related	1	Negligence of the staff on site supervision					
	2	Lack of experience					
	3	Contract management					
	4	Waiting time for approval of tests and inspection					
	5	Quality assurance and control					
	6	Preparation and approval of drawings					
	7	Lack of standard formats					
	8	Low bid					
E. External factor	1	Delay in obtaining the required document from concerned government offices, municipality, regional environmental offices					
	2	Delay in land acquisition					
	3	Delay in providing services for utilities such as water, electricity, etc.					
	4	Delay in clearances form various regulatory agencies					
	5	Unforeseeable reasons such as adverse natural calamities, etc.					
	6	Delay in sub-contractors work , in adequate contractor's work					
	7	Seasonality of works to be performed					

SECTION D

Impacts on projects delays

	Impacts	**1**	**2**	**3**	**4**	**5**
1	Poor quality output					
2	Time overrun (repayment and rescheduling request)					
3	Cost overrun (additional variation payment request)					
4	Bad public relation					
5	Disputes and claim					
6	Total rejection/Abandonment					
7	Arbitration					
8	Litigation					
If others to be listed and marked						

Appendix II

Table-1 Correlations between delay factors and project delay

Correlations							
Control Variables			project related	Client related	Contractor related	Consultant related	External factors
project delay	project related	Correlation	1.000	.358	.294	.382	.219
		Significance (2-tailed)	.	.000****	.002***	.000***	.025
		df	0	102	102	102	102
	Client related	Correlation	.358	1.000	.272	.213	.151
		Significance (2-tailed)	.000	.	.005	.030	.127
		df	102	0	102	102	102
	Contractor related	Correlation	.294	.272	1.000	.379	.188
		Significance (2-tailed)	.002	.005	.	.000	.056
		df	102	102	0	102	102
	Consultant related	Correlation	.382	.213	.379	1.000	.232
		Significance (2-tailed)	.000	.030	.000	.	.018
		df	102	102	102	0	102
	External factors	Correlation	.219	.151	.188	.232	1.000
		Significance (2-tailed)	.025	.127	.056	.018	.
		df	102	102	102	102	0

Table-2 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.898	.806	.796	.38799	.806	82.139	5	99	.000	2.111

a. Predictors: (Constant), External factors, client related, contractor related, consultant related, project related

b. Dependent Variable: project delay

Table-3 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61.825	5	12.365	82.139	.000[b]
	Residual	14.903	99	.151		
	Total	76.728	104			
a. Dependent Variable: project delay						
b. Predictors: (Constant), External factors, client related, contractor related, consultant related, project related						

Table-4 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-.311	.271		-1.147	.254	-.850	.227					
	project related	.370	.089	.378	4.155	.000	.193	.547	.856	.385	.184	.237	4.228
	client related	.263	.099	.204	2.664	.009	.067	.459	.793	.259	.118	.334	2.996
	contractor related	.171	.092	.142	1.860	.066	-.011	.354	.769	.184	.082	.339	2.952
	consultant related	.175	.098	.143	1.774	.079	-.021	.370	.786	.176	.079	.301	3.323
	External factors	.141	.065	.138	2.151	.034	.011	.271	.711	.211	.095	.474	2.110
a. Dependent Variable: project delay													

Table-5 Collinearity Diagnosticsa

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions					
				(Constant)	project related	client related	Contractor related	Consultant related	External factors
1	1	5.942	1.000	.00	.00	.00	.00	.00	.00
	2	.023	16.167	.61	.09	.00	.00	.00	.05
	3	.014	20.275	.01	.07	.04	.03	.01	.93
	4	.008	26.789	.04	.08	.40	.40	.17	.00
	5	.007	29.006	.10	.20	.22	.47	.30	.01
	6	.005	33.199	.25	.56	.34	.10	.51	.00
a. Dependent Variable: project delay									

Table-6 Case Processing Summary

		N	%
Cases	Valid	105	100.00
	Excluded[a]	0	0.00
	Total	105	100.0
a. List wise deletion based on all variables in the procedure.			

Table-7 Reliability Statistics

Cronbach's Alpha	N of Items
.964	40