SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF PROJECT MANAGEMENT

ASSESSMENT ON PERFORMANCE OF GOVERNMENT PRECAST TECHNOLOGY HOUSING PROJECTS IN ADDIS ABABA:-THE CASE OF KIRKOS SUB-CITY WOREDA 06 KASANCHIS BUILDING PROJECT

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JUNE, 2023 G.C

ADDIS ABABA, ETHIOPIA

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ADVISOR: MULUADAM ALEMU (PhD)

A THESIS SUBMITTED TO ST.MARY'S UNIVERSITY, SCHOOL OF GRADUATE STUDIES GRADUATES PROGRAM IN PARTIAL FULFILMENT OF THE REQUIRMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN PROJECT MANAGEMENT

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APPROVED BY BOARD OF EXAMINERS

Temesgen Belayneh (Ph.D)

_____ _____

Dean, Graduate Student Signature

Muluadam Alemu (Ph.D)

_____ _____

Advisor Signature

Yilkal Wassie (Asst. Prof.)

_____ _____

External Examiner Signature

Temesgen Belayneh (Ph.D)

_____ _____

Internal Examiner Signature

DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of MULUADAM ALEMU (PhD). All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

_____ _____

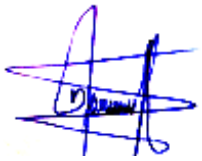
Name Signature

St. Mary's University, Addis Ababa June, 2023

ENDORSEMENT

This thesis has been submitted to St. Mary's University, school of graduate studies Program for examination with my approval as the University advisor.

Muluadam Alemu (Ph.D)



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St. Mary's University, Addis Ababa | June, 2023

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ABBREVIATION AND ACRONYMS

ECWC	Ethiopian Construction Works Corporation
C.G.A.A.C.D.A	City Government of Addis Ababa Construction Design Agency
C.G.A.A.C.D.B	City Government of Addis Ababa construction and Design bureau
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute

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ABSTRACT

The purpose of carrying out this study was to assess the performance of government precast technology housing projects in Addis Ababa using the case of the case of Kirkos Sub-City Woreda 06 Kasanchis Building Project. Descriptive research design and mixed approach were employed as a methodology for this study. The project performance was assessed in terms of the PMBOK knowledge areas of the project process groups using project quality and time management. The study used primary and secondary data sources. Primary data has been collected through in-depth interviews and observation. Structure and unstructured interviews were administered to all 24 key personnel from all three parties involved in the Kirkos Sub-City Woreda 06 Kasanchis Building Project. The findings of the study showed that even though project performance in terms of project *quality management and project time management specifically as it pertains to the government funded housing projects using precast technology in Addis Ababa was very promising in terms of adhering to the fundamental principles of project management, it was still faced with an array of challenges that were quite similar to those housing projects using the conventional type of construction methods. Generally, the researcher concluded that, the performance of project using the aforementioned technology had a better result in terms of quality management but had various issue when it comes to time management and attaining a poor performance as a result. Finally, this study suggested to all the project implementers at each level, that although there were significant challenges faced with regards to the performances of the project in case in terms of quality and time and even though implementing such project won't render a quick fix to the housing problems in Addis Ababa, there are plenty good experiences of that can be taken on board to help serve as a learning curve for future endeavors.*

***Key words**: Project, Project management, Project performance, Quality management, Time management*

CHAPTER ONE
INTRODUCTION

1.1.Background of the study

Housing is a vital part of human being's basic necessities. It contributes enormously to the development of human beings intellectually, socially and physically (Gupta, 2022). Housing in a society when is properly developed it becomes an effective instrument for population's livelihoods and well-being enhancement (Kiduanga, 2015).

According to The World Urban Forum III; "The world is facing a global housing crisis. In cities around the world, almost 1 billion people live in substandard housing without clean water or adequate sanitation. More than 14 million refugees and internally displaced people live in tents or other temporary shelters. Millions of homeless men, women, and children live in the streets of Washington, DC; Sao Paolo, Brazil; Johannesburg, South Africa; Mumbai, India; and other cities. And the problem is getting worse: Every week more than a million people are born in or move to cities in the developing world, driving up the need for new and better housing. The international response to the housing crisis has been muted. While many international donors have helped develop effective models for housing policies and programs, the scale of their application has not been large enough to significantly affect housing outcomes."

Similarly in our country's case, Ethiopia faces the challenge of not being able to supply sufficient new affordable housing and upgrade existing stock to meet the demand required annually. The 2015 Ethiopia Urbanization Review indicates Ethiopia will have approximately four million new urban households by 2027 and approximately 9.7 million by 2037 whereas Demand for urban houses is estimated at 471,000 per year from 2015 to 2025, and 486,000 houses a year from the year 2025 to 2035. (World Bank Group, 2015)

Ethiopia's capital, Addis Ababa's housing sector has been a long-standing challenge. For over a century the rapidly growing Ethiopian capital has been unable to provide adequate and sufficient housing, particularly for its low-income citizens. (Girma, 1992; Zeleke, 1997; as cited in Delz, 2016)

The Government of Ethiopia has taken steps in order to solve the housing problems in Addis Ababa. It collaborated with the German Technical Cooperation (GTZ) to address the housing

issue through a city-wide mass housing program in the 2000s. Whereas the program has created amounts of housing units unseen in Ethiopian history, it has also revealed substantial challenges on spatial and socio-economic levels: the program has failed to provide wide-spread affordable housing to the targeted low-income groups; it has generated spatial and social segregation; it has fostered dependency on imported materials; it lacks design features and spaces that reflect local lifestyles and daily needs; and it has accelerated the peripheral expansion of the city.(Delz, 2016). It showed the massive housing needs are unlikely to be met by the small-scale housing cooperative, government, and upgrading approaches prevailing from the late 1970s until the mid-2000s, especially considering the high demand by the low-income sector of the population for affordable housing (UN-HABITAT, 2010).

In response to this challenge, the Ethiopian government outlined an ambitious vision for low-income urban and housing development, formulated as the Integrated Housing Development Programme (IHDP), initiated by the Ministry of Works and Urban Development (MWUD) in 2005, for all slums to be cleared within ten years' time and for Ethiopia to be a middle-income country by 2025 (UN-HABITAT, 2010).

Integrated Housing Development Program came into being since 2005/06 with the general objective of alleviating housing problems through cost and land saving housing production and improve urban residents' lives through job creation and income growth, the specific objectives on the other hand are: In contrast to the intension of the program, there is extremely low supply of condominium houses in the city, inadequacy of supply, problems related to quality, delay, costs, infrastructural provisions and lack of consideration for vulnerable groups have been complained (Birhanu, 2016).

As reported by MWUD (2010), "during the period 2006/07 to 2009/10, it was possible to construct more than 151,043 housing units and to create 175 thousand jobs opportunities throughout Ethiopian cities/towns. In addition about 6 thousand small and medium enterprises participated in the program (IHDP)." Within this period, it was planned to construct 192,500 housing units in Addis Ababa, of which a total of 80,230 housing units were constructed and distributed to beneficiaries (kidist, 2014). It shows a significant amount of time, cost overrun over that period of time. Furthermore, it has encountered significant quality challenges with regards to finishing materials, sanitary, electrical installation issues etc. (Seyoum, 2018).

Nowadays, the Ethiopian government and the City gov't of Addis Ababa are attempting to use new approach coupled with the existing IHDP in order to solve the housing problem that exists in its capital. One of those ways is the use of precast technology. Precast construction Technology is a system of casting concrete in a reusable mold or "form" which is then treated in a controlled environment, conveyed to the construction site and lifted to the place. Precast Construction Technology consists of various precast elements such as walls, beams, slabs, columns, staircase, landing and some customized elements that are standardized and designed for stability, durability and structural integrity of the building(BMTPC, 2019).

The purpose of this study was to assess the performance of government funded housing projects and in particular the Kirkos sub-city woreda 06 Kasanchis building project. This study will give consideration to two performance indicators so as to provide its verdict namely; quality and time.

This project is aimed at serving as a blueprint for future government funded housing projects with regards to effectively and efficiently completing such projects within the specified time, quality, and cost and most importantly to the customer's satisfaction. The technology used for construction is precast technology, which is as it stands only available for building construction at ECWC, which is a government owned construction corporation. This technology helps to significantly reduce the manpower and the time it takes to construct a building as well as improve the quality of work.

1.2 Statement of the problem

It is a well-documented fact that the construction sector is one of the most essential contributors to the country's growth (EEA, 2007)**.** However, it has seen a dip in recent years due to a variety of internal and external factors. The most significant of them is time and expense overrun, which hinders the building project's performance (Fetene N, 2008).

In particular government funded housing projects have incurred a plethora of obstacles in terms of completing a project within the specified time frame, quality, cost, and to ultimate customer's Satisfaction. (Getachew Admasu, 2016; Tesfaye, A., 2011; Guesh, 2017; Azeb, 2007; Fetene N, 2008).In addition, the technology used to implement such vital and in need of urgency projects hasn't been able to move with the times.

The performance of construction could be assessed by the completion schedule, cost of completion, productivity of works completed and safety (Molavi & Barral, 2016). This is the most important reason why many of the projects are left incomplete and developers move on to the next project. This is very important to understand the effect and factors affecting the time delay and cost overrun.

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

Several papers have looked into the factors that influence construction project performance in a variety of ways. Some of the studies identified the most relevant characteristics in a variety of nations and project types, while others addressed the effects of different factors on the success and failure of construction projects and recommended solutions to enhance and minimize their effects.

Simon-Eigbe et.al.(2022) revealed among others that the factors affecting project performance specifically in the building construction sector are rising material prices, design changes, discrepancies in contract documents, slow resource availability planned throughout the project, time required to implement change orders, unavailability of experienced and qualified personnel, lack of coordination, manager involvement in decision making, and construction work errors.

As a result of its findings, the following recommendations were suggested by the aforementioned such as: how the stakeholders in the industry need to have a clear mission and vision to formulate, implement and evaluate their performance; how the construction professionals and customers should strive to properly take market price inflation into account when developing the quantity table (BOQ); how drawings must be completed and contract management agreed upon projects commence; how resources needed should be readily available for the duration of the project; how regular progress reviews should be carried out to ensure that clear decisions are

made timely to ensure construction process proceeds as planned; how greater efforts should be made to regularly train and properly motivate staff to be up-to-date with latest developments and practices in the construction industry. Additionally, the paper encourages the use of proper construction methods.

Gebeyaw(2018) gave an assessment of the problems affecting the performance of precast construction projects in Addis Ababa stating that transportation & storage techniques utilized for such projects were a massive hindrance to these projects performances adding that during transportation &handling, especially in long distance, the prefabricated concrete elements take time and money, leads to cracks and damages (compromising quality) & subsequently leading to wastage of these vital elements of construction.

However, what this paper along with several others fails to address is project performances regarding the usage of the precast technology for housing projects (residential building) in particular as they concentrate on projects building training centers, administrative buildings etc. i.e. Multi-purpose buildings.

Furthermore, the use of this technology for solving housing problems in Addis Ababa is a nuance in itself as it pertains to our country and the city of Addis Ababa in particular. Due to this fact, there is not enough literature apart from covering the technical attributes of the technology itself as opposed to assessing its performances in projects specifically in housing projects. Hence this study will help shed more light on this nuance being pursued by city gov't of Addis Ababa as a pilot project for reducing the enormous challenge of providing sustainable and affordable housing to its residents.

1.3 Research question

The following main research questions were offered to operationalize the above-mentioned research problems:

- What is the performance of building construction project using precast technology in Addis Ababa in terms of Quality Management?
- What are the quality management practices employed at Kirkos Sub-City Woreda 06 Kasanchis Building Project

- What are the Challenges faced during building housing construction project using precast technology in Addis Ababa with regards to quality and time?
- What are the good experiences that can be taken from such a type of project in terms of quality and time?
- What is the performance of building construction project using precast technology in Addis Ababa in terms of Time Management?

1.4 Research objectives

1.4.1 General objective

The aim of the study was to assess the performance of government funded housing projects using precast technology in Addis Ababa.

1.4.2 Specific objectives

- To assess the performance of building construction project using precast technology in Addis Ababa in terms of Quality Management.
- To determine the quality management practices employed at Kirkos Sub-City Woreda 06 Kasanchis Building Project
- To assess the challenges faced during building housing construction project using precast technology in Addis Ababa with regards to quality and time.
- To assess the good experiences that can be taken from such a type of project in terms of quality and time.
- To evaluate the performance of building construction project using precast technology in Addis Ababa in terms of Time Management.

1.5 Significance of the study

The primary focus of this study centered on evaluating the performance of government funded housing projects using precast technology in Addis Ababa and the important role it can play in terms of solving the housing crisis in the capital and eventually the country. The study aimed at distinguishing between elements that tend to improve and those that tend to inhibit project performance with respect to quality and time. The specific significances of the study are listed as follows;

Knowledge generation

The findings of this research can be put to use as vital lesson learning material for all stakeholders involved but more specifically for project managers and personnel. Even though the technology has been around for more than 40 years in Ethiopia, it is relatively new to the housing construction sector and lacks adequate skilled personnel to mainstream the project countrywide and as a result, it may be used to educate novice project managers entering the construction industry with the obstacles and concerns they would face during their careers.

To solve practical problems of project Quality and schedule management as well as learn from the positive attributes concerning the aforementioned knowledge areas

This study will give some much needed perspective in relation to the way housing projects and especially government funded large scale housing projects can be effectively and efficiently carried out with comparatively less time, better quality and to better stakeholder satisfaction. On the other hand, it also highlights some of the project's pitfalls as it pertains to the aforementioned performance indicators giving insight into primary delay reasons and putting in place adequate contingency measures to reduce the occurrence. Identifying and prioritizing project delay reasons allows project managers and stakeholder groups to focus on these few but critical elements and give them more eyeball.

So as to pave the way for future research

The findings of this study can potentially be utilized as a stepping stone for other studies looking at residential building project delays as it relates to projects using precast technology as well as on the project's cost implications relative to time and quality.

As a source of input for the creation of policy or strategy

This study gives some much needed perspective in relation to the way housing projects and especially government funded large scale housing projects can be effectively and efficiently carried out with comparatively less time, better quality and to better stakeholder satisfaction.

Furthermore, it provides a long term solution to the housing problems in Addis Ababa and paves the way for further research needed in identifying as well as enhancing modern technology as well as technology which has been available for many decades in our country but was deemed surplus to requirements for many years i.e. precast technology by casting some light on this small scale project (kirkos sub-city woreda 06 kasanchis building project). This in turn can be used as important input and areas of focus by policymakers and strategy planners in the construction industry.

1.6 Scope of the study

The study's conceptual scope was confined to Assessment of Performance of Government Housing Projects Using Precast Technology in Addis Ababa. Its goal was to assess the performance of Kirkos Sub-City Woreda 06 Kasanchis Building Project carried out in Addis Ababa by ECWC (Ethiopian construction Works Corporation), a government owned general contractor. Its assessment was limited to the three knowledge areas namely; Quality and time. The research looked at the aforementioned project that started and continued between 2021 and 2023 G.C. Projects that have been cancelled or abandoned for whatever reason were not included in the scope. Geographically this study was confined to the city of Addis Ababa.

1.7 Limitations of the study

The major limitations and challenges of the study were the lack of adequate research and investigations on the area. in addition, other limitations faced were that there is only a single prefabrication production company in Ethiopia i.e. Ethiopian Construction Works Corporation (ECWC), which is governmental, that may or may not provide enough information for the study and no private production and construction company that is based in Ethiopia is involved as well as has no familiarity when it comes to managing a project using such technology.

1.8 Definition of Terms

- **Key performance indicator (KPI):** is a type of performance measurement which evaluates the success of an organization or of a particular activity in which it engages.
- **Time overruns**: is defined as the extension of time beyond planned completion dates.
- **Cost overruns**: is the difference between the original cost estimate of project and actual construction cost on completion of works.
- **Owner**: Organization for whom the construction project is being undertakes.
- **Contractor**: A natural or juridical person under contract with an owner to construct the construction projects
- **Performance**: The accomplishment of a given construction projects against the contractual cost, time and quality standards.

1.9 Organization of the study

The thesis was structured and organized with five major components. The first chapter describes the basic research backgrounds as an introduction part of the research. The second chapter contains the basic literature review which includes from the ancient origins of prefabricated concrete parts to the current trends emphasizing with their advantages as well as ways of managing such projects in order to make up the conceptual framework of the study. The third part covers the Research design and methodology. Analysis of findings, interpretations and discussion on the basis of results were presented in detail in the fourth part of the study. The last part of the study contains the conclusions and recommendations forwarded to the people.

CHAPTER TWO
LITERATURE REVIEW

2. Theoretical literature

2.1 Definition of project

Many people and organizations have defined what a project is, or should be, but probably the most authoritative and comprehensive definition that I found quite fitting for my research is that given in BS 6079 'Guide to Project Management', which is a set of 4 standards from the British Standards Institution, covering all aspects of professional project management. This states that a project is: 'A unique set of coordinated activities, with definite starting and finishing points, undertaken by an individual or organization to meet specific objectives within defined schedule, cost and performance parameters.' Projects are carried out in order to achieve objectives through attaining deliverables.

Project is aimed at practically providing a solution to a predetermined problem identified through research. According to the PMI (2021), a project is defined as a "temporary endeavor with a beginning and an end and it must be used to create a unique product, service or result." This basically indicates that projects at the end of the day are conducted so as to obtain a practical solution to a specific predetermined problem through providing a unique product, service or result.

A project is an endeavor in which human, financial, and material resources are organized in a novel way to undertake a unique scope of work, of given specification, within constraints of cost and time, so as to achieve beneficial change defined by quantitative and qualitative objectives. (Turner, 1999)

2.2 Definition of project management

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. (PMI, 2021)

Project management is an organized common-sense approach that utilizes the appropriate client involvement in order to meet sponsor needs and deliver expected incremental business value. (Wysocki, 2013)

Organizations can use project management to run projects more effectively and efficiently. Individuals, groups, and public and private organizations can use effective project management to

achieve: Business Success goals; Meet the expectations of interested parties; Be more predictable; Increase chances of success; Deliver the right products at the right time; solve problems and problems; Respond to risks in a timely manner; Identify, recover, or cancel underperforming initiatives; Optimize the use of organizational resources Manage restrictions (e.g.., scope, quality, schedule, budget and resources); Balance the impact of constraints on the project (e.g., additional scope may increase costs or cause delays); and change better. Lost Deadlines, cost overruns, poor quality, rework, uncontrolled project growth, tarnished business reputation, dissatisfied stakeholders, and failure to meet project goals are all possible consequences of poorly managed projects or poor project management. Within companies, effectively and Efficient project management should be considered a strategic skill. (PMI, 2017)

2.3 Construction project

The construction industry by enlarge uses projects to accomplish its tasks. The construction industry is inherently complex as it contains a multitude of project parts such as: customers, consultants, contractors, stakeholders, shareholders and regulators. The complexity and the fragmentation of the industry and its employment of casual workers make them vulnerable bad execution of the contract. (Helen, et al., 2015)

Construction is an action or process of building. It consists of a set of measures to create new buildings and infrastructure or may involve changes to existing buildings and infrastructure (Radosavljevic & Bennett, 2012). A construction project is a construction project that is attempted or carried out. A project is a set of complex or interrelated activities and tasks that consume resources to achieve specific goals. It must be completed within a set of budget-limited specifications (Munns & Bjeirmi 1996; Pinto & Slevin 1988). The construction industry faces numerous challenges and problems worldwide. Construction projects are notorious for being over budget, late and over-designed. Many of the problems faced by the construction industry are delays, over budgets and poor quality. The traditional approach to construction management has proven effective in solving some of these problems. Construction management is defined as the overall planning of a project by allocating the appropriate resources to complete the project on time, within budget and to the desired quality. 'Scope triangle', which depicts the relationship between the three trade-offs related to cost, time and quality of a project. Successful project

management can be achieved by assembling the tasks and resources required to achieve project goals and deliverables within set timelines and budget. (Gamal & Fall, 2013).

The successful completion of a project results in the organization moving towards the future state and achieving the specific goal. In general, a project is considered successful when it achieves the objectives according to its acceptance criteria within an agreed timeframe and budget" (Association for Project Management, 2012). Projects are initiated to achieve commercial opportunities that align with a company's strategic goals. A business case is often created before the start of a project in order to define the goals of the project, the necessary investments and the financial and qualitative criteria for project success.

2.3.1 Construction projects using precast technology in Ethiopia

The first prefabrication and construction company in Ethiopia is the Prefabricated Building Elements Enterprise (PBPPE), founded in 1987 GC with the help of the socialist state of Yugoslavia. Until September 2016 the company was called Prefabricated Building Parts Production Enterprise (PBPPE). The main goal of establishing the company was to reduce the waste of natural resources such as formwork mining and to alleviate the immediate demand for housing and now are called low-cost houses because of the lower construction costs and the short construction period.

But after that time it is reorganized and reformed under Ethiopian Construction Works Corporation (ECWC) and called Structural Engineering and Construction Sector (BTCS) and is also a prime contractor. At that time, the country was still in the early stages of construction and few modern buildings were erected in Addis Ababa, mostly without prefabricated elements. In the 30 years of its existence, the EBTCS has not made much progress as an organization; It still uses the same outdated concrete plants, crane systems and even formwork that were installed when it was constructed in previous years and has fixed specifications for every element of the building's structure. The dimensions are still specific and limited, which does not apply to the very long dimensions. However, BTCS mainly focused on component manufacturing and component engineering. In addition to the production and assembly of precast concrete parts, the company is also active in conventional or in-situ concrete construction as a contractor in Ethiopia. Therefore, its main activity is the manufacture of construction elements, erection (assembly) of a building from elements on site, and it also deals with construction by casting. These prefabricated elements

manufactured in BTCS are reinforced slabs, panels, walls, stairs, columns, partitions and beams. Prefabricated structures are generally complex or fully prefabricated structures. Composite constructions are construction methods that use both prefabrication techniques and site construction methods of the same building. The BTCS consists of different departments such as engineering department, production department, logistics department, cost department and commercial department (Kibirt, 2017). Each department has its own civil engineering specialists who intervene in the design, construction, estimation and supervision either on head office or on their construction Sites.

BTCS has constructed three prefabricated government buildings in Addis Ababa, combining components such as Information and communication Technology incubation center (ICTIC) near Gorro, Addis Ababa Melese Zenawi Leader Ship Academy (AAMZLA) near Ayat and Kotebe Metropolitan University Administration Office (KMUAO). The company also used composite construction to build the headquarters of government organizations in Addis Ababa. Some of them are Ethiopian Revenue and Customs Agency (ERCA) and Ethiopian Ministry of Science and Technology (ESTM) etc.

2.4 The Concept of Performance

To explain performance and performance improvements, a performance theory has been developed with six basic concepts that form a framework. Execution means generating valuable output. The entrepreneur can be an individual or a group of people involved in a joint venture. Skill development is a gradual process and your proficiency level describes your position at this stage. Actual performance level depends on 6 elements: context, knowledge level, skill level, identity level, personal factors and fixed factors (Mbugua, Harris, Holt & Olomolaiye 1999).According to Elger (2007), successful performance enhancement is based on three axioms: engagement in reflective practice, immersion in an enriching environment, and performer mindset. The performance goes through many levels that characterize the performance. A high level of performance can be reflected in the following categories:

I. Quality improvement; it is about meeting or exceeding stakeholder expectations and the number of denials/complaints decreases,

II. Capability increase; it is the ability to tackle more challenging achievements or worthwhile projects

III. Capacity increase; when the capacity increases to create more capacity,

IV. Learn more; expands the depth and breadth of knowledge,

V. Increased skill level; Increase acceptance and effectiveness by improving the ability to set goals and maintain a positive attitude.

VI. increased motivation; People develop their professionalism

2.5 Performance Measurement

Crawford (2014) states the importance of performance measurement metrics in terms of assessing the efficiency and effectiveness of project management processes. According to Crawford (2014), a documented performance measurement process evaluates project schedule status and enables the organization to take corrective action. Performance measurement is a vital tool for assessing management performance and formulating corporate strategies (Olayeni, et al., 2016).

To continuously improve performance specifically in the construction industry, numerous performance measurement frameworks have appeared in the literature. These include Integrated Performance Index (Pillai et al., 2002), Contractor Business Performance Framework (Mbugua, 2000), Participant's Project Performance Framework (Soetanto et al., 2002), Contractor's Project and Business Performance Framework (Xiao, 2002; Costa et al., 2004), Project Quality Performance Framework (CIDB Malaysia, 2006), Construction Productivity Measurement Framework (Winch & Carr, 2001) and Key Performance Indicators (KPI) as cited in (Olayeni, et al., 2016).

From the aforementioned frameworks, KPI standS out in terms of longevity and ease of understanding and implementation by project participants (Takim et al., 2003) as cited in (Olayeni, et al., 2016).

2.6. Key Performance Indicators to Measure Project Performance

The performance of the construction sector is a concern for both public and private buyers (Okuwoga, 1998). Karim and Marosszeky (1999) measured project performance using Key Performance Indicators (KPIs). KPIs allow you to compare different projects and companies to identify the presence of certain patterns. Commercial contractors hoped the observed data trends would provide insight into some common inefficiency in the market. Their goal is to use data to reveal inefficiencies and as a basis for industrial development (Karim and Marosszeky, 1999).

Key Performance Indicators (KPIs) used to measure project performance include factors such as time, cost, quality, customer satisfaction; Customer change, business performance and security to measure organizational and project performance in the construction industry. This information can then be used for benchmarking purposes and is a key element in moving any organization towards best practice (DETR, 2000). Lehtonen (2001) confirmed that performance measurement is an urgent issue in both science and business. Samson and Lema (2002) found that KPIs are very important to provide value to stakeholders. To do this, they must be equipped with the right processes and skills. KPIs are also used to track the most competitive and distinctive processes and opportunities that just need improvement or maintenance.

2.7. Construction Projects and Performance

Project success is almost the ultimate goal of every project. The success of construction projects depends primarily on the success of the execution. Much previous research on the performance of construction projects has been examined. Dissanayaka and Kumaraswamy (1999) pointed out that one of the main reasons for the poor performance of the construction industry was attributed to the inadequacy of the contracting system chosen. Thomas (2002) identified the most important performance criteria for construction projects as financial stability, work progress, standard Quality, Health and Safety, Resources, Relationship with Customers, Relationship with Consultants, Management Capabilities, Claims and Contractual Disputes, Relationship with Subcontractors, Reputation and Scope of Outsourcing. Chan and Kumaraswamy (2002) noted that the build time of is becoming increasingly important as it often serves as a crucial reference point to assess the performance of a project and the efficiency of the project organization.

Construction performance can be assessed using various dimensions of performance indicators such as time, quality, cost, customer satisfaction, health, safety and overall organizational performance (Enshassi, Mohamed & Abushaban, 2009). In addition, they argue that time, cost, and quality are the three predominant dimensions of performance appraisal. Chan and Chan (2004) also agreed with Enshassi et al.(2009) who point out that cost, time and quality are the three basic and most important performance indicators in construction projects.

According to Chan and Chan (2004), different parties such as client, consultant, contractor and subcontractor have their own understanding and interpretation of project performance. However,

Construction project researchers agree on project success indicators of time, cost, and quality,

sometimes referred to as the golden triangle, as basic measures of performance (Othman, Torrance, & Hamid, 2006; Sambasivan & Soon, Le-hoai, Dai, & Lee, 2008; Abdullah et al., 2010).

King (2015), on the other hand, established sound project management practices in line with stakeholder interests described in terms of achievement of intended purpose, level of quality, time and cost; and safe and environmentally friendly.According to (Okoye, Ngwu, & Ugochukwu, 2015; Gwaya, Masu, & Wanyona, 2014; Amalraj & Doucet, 2007), the success of a project is measured by the extent to which it meets the specified criteria of cost, time, safety, resource allocation, and quality Owner specifications that are difficult to meet in most construction projects.

2.8 Empirical literature

2.8.1 Factors affecting the performance of the construction project

However, the factors influencing the cost, duration and quality performance of construction projects are defined differently in different publications. A classification of the factors that influence the success of construction projects is the classification of the factors according to their result in cost, time and quality factors. However, identifying variables based on your results may have certain limitations. Because cost, time, and quality are the three interconnected constraints of a project, it's difficult to state factors such as cost, time, or quality. Therefore, factors affecting one constraint are likely to affect the remaining two requirements. According to this categorization, the factors influencing the success of the project were divided into three groups:

2.8.1.1 Cost Factors

The cost factor is a category that includes factors that have a significant impact on the cost of the project. These are factors that affect project cost performance. Yafiah (2013) points out that procurement selection criteria cost, time, quality, project characteristics and external environmental factors affect project performance. Fetene (2008), in his study, the most common impacts of cost overruns are delays due to disagreements with the interested parties, the supplementary agreement and the budget deficit of the project owners. A similar study by Abdullah et al. (2010) pointed out that the rise and fall in material prices, contractors' cash flow and financial difficulties, lack of manpower on site, lack of communication between parties, planning and faulty scheduling by contractors ranked are the main factors affecting the

construction operating cost. However, frequent design changes and owner interventions are considered to be the factors that least affect construction cost performance. Amusan (2011) also identified factors such as poor planning, inflation, endlessly varying orders, contractor inexperience and changes in project design as critical factors in construction cost performance, while project complexity, shortening of project time and fraudulent practices are the list responsible for cost overruns.

2.8.1.2 Quality Factors

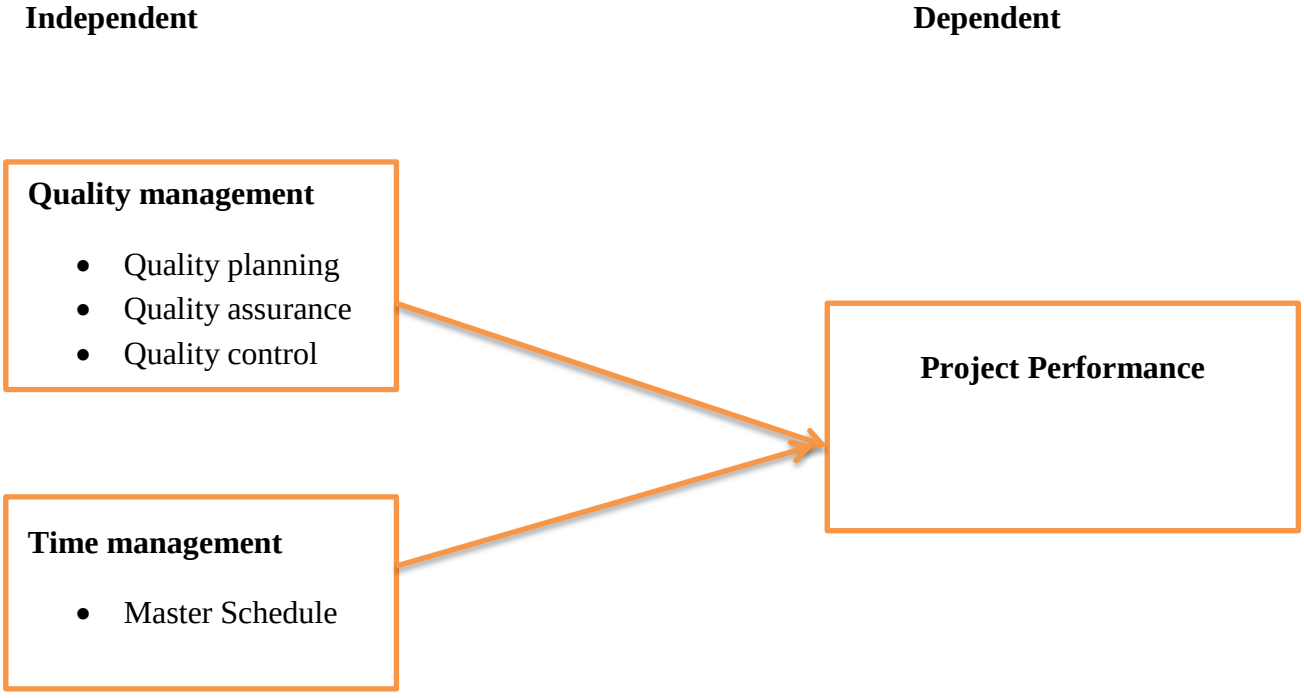
Quality Score is a category that contains factors that have a significant impact on the quality performance of the project. According to Curt (2005), the quality management system monitors and analyzes the quality of the built project and forecasts quality problems and issues. There are characteristic measures of quality, which are; The first is quality control: number of tasks performed, frequency of nonconformance, frequency of change requests and root causes, pass/fail rate, turnover, rework costs and quality costs (ii) Cost of quality assurance (resource cost): cost of quality assurance as a percentage of construction costs, quality cost and quality costs as a percentage of construction costs. Lepartobiko (2012) found that quality can be ensured by identifying and eliminating the factors that cause poor project performance. Jha and Jha (2006) found that the competence of the project manager and the support of top management contribute significantly to improving the quality performance of a construction project. The contractor's lack of experience outweighed the quality-related cause of project failure.

2.8.1.3 Time Factors

Timing Factors is a category of factors that includes factors that specifically affect the timing of the project performance. These are factors that affect project time performance. For these the management capacity of contractors has a significant impact on the cost and time performance of construction projects (Aje, Odusami and Ogunsemi, 2009). Another study by Wiguna and Scott (2005) showed that critical risks affecting both project time and costs perceived by contractors were similar. These were: material price inflation, owner design change, defective design, late contract payments, weather conditions, and defective construction work. Late payments were the largest contributor to global delays in project lead times, while design-related factors also caused the most delays.

2.9 Conceptual framework

The researcher provided the following link between the two performance indicators; quality, schedule variances, as well as the overall elements that contribute to the construction project performance gap, based on the studied literature. This proposal was diagrammatically represented in order to clarify the notion of this research, which primarily focuses on construction project performance.



Source: - own researcher

Figure 2. 1 Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

The methods that were used to conduct the study, the type of research design employed, the target population, the sample size, sampling processes, the procedure used to get samples, and the research equipment and data collection method are all covered in this chapter. It also explained the methods for analyzing and presenting data.

3.1 Research design and approach

The goal of this research was to have a complete understanding of assess the performance of government funded housing projects using precast technology in Addis Ababa. As a result, descriptive design is an excellent way to stress the necessity of assessing and describing the current situation.

The research used a mixed methods approach, which will look for and analyze both qualitative and quantitative data. The source of data is going to be both primary and secondary. The primary data will be collected through observations, interviews with purposive representative sample of project stakeholders, such as contractors and consultants, whereas the secondary data will be obtained from all relevant documents such as project documents such as the contract agreement, books, journal articles, published and unpublished research papers.

3.2 Population and Sampling Techniques

Hair, et al. (2010) defines the target population as a specific group of people or objects for which questions can be asked or observed in order to collect the necessary data structure information.

This study analyzed the performance of government funded housing projects in Addis Ababa. Therefore, the study focused on projects currently under construction in Addis Ababa with special emphasis given to Kirkos Sub-City Woreda 06 Kasanchis Building Project. Project performance primarily affects all those involved in the construction process, but the target audience of the study was organized into groups that include bifurcated groups such as clients, contractors and consultants.

Due to the nature of the study, Survey questionnaires were not utilized but rather structured and unstructured interviews with the aforementioned target group involved in this particular project coupled with data obtained from project documents such as the contract, Master schedule, test results and inspections, daily reports and site orders etc.

3.3 Data Sources and Data Collection tools

In statistical investigations, data gathering is critical, and the data acquired served as the foundation for the entire structure. Because data serves as a raw material for statistical analysis interpretation, the entire statistical analysis is predicated on how the data was collected or obtained. . After applying the approaches, the details of the methods and techniques, the sources and instruments of data collecting, the facilitation selection strategies, and the methods and instruments of data analysis were elaborated.

3.3.1 Data Source

Both primary and secondary data collecting devices were utilized to acquire information from relevant sources.

• **Primary data**: Primary data are data generated by the researcher specifically for the goal of solving the study challenge. It is the information gathered by the researcher from the sample population. The primary data was collected from contractors (project managers, project management team members etc.), and consultants (project coordinators, resident engineers, site inspectors) as well as client (contract administrators)

• **Secondary data**: Secondary sources of data were gathered from contract agreement, master schedule, test documents, reports, books, journal articles, published and unpublished research papers and other search engines.

3.3.2 Data Collection Tools

Primary data for this study were collected by survey of structured and unstructured in-depth interview from the population. Respondents were given a structured interview questions with closed-ended questions about the research problem. This is because in-depth interview is the most effective tool for reaching everyone in the sample due to the fact that the number of key personnel participating in the project in case is small. The study used census of all key informants so as to ensure that the right respondents with the relevant knowledge, authority and experience on the

different themes were adequately selected. Before collecting data from the population, the interviews were conducted with a few non-relevant respondents, and appropriate changes were made to the questions in the interviews based on the input received.

3.4 Methods of Data Analysis

The methods of analysis used in this research were selected due to the type of data available for the analysis and the objectives of the research.

The data gathered through in depth interviews as well as through looking through the relevant project documents from the parties involved in the particular project were presented in the form of Tables and figures. Finally, conclusions were made based on the results/findings of the study and recommendations were forwarded on the basis of the data analyzed.

3.5 Research Ethical Consideration

Prior to conducting observation of the work activities on site as well as the in-depth interviews with the relevant key personnel, the required approvals were obtained, and participants were made aware that no information was made public and that the study was conducted solely for academic purposes. Furthermore, Individuals taking part in this study may expect their personal information to be kept strictly confidential at all times.

3.6 Reliability and validity

In order to ensure reliability of the research instrument, the interview questions were developed beforehand and sent to advisor for approval. Furthermore, the in-depth interview questions were pilot tested on by using 6 respondents which were randomly selected. Additionally, it used clear and concise language avoiding any complex or technical jargon that participants may not comprehend, thereby ensuring that the participants interpret the questions in the same way.

As it pertains to validity, the results obtained as a result of this study were properly compared with other relevant data in relation to projects using precast technology and building construction projects in general so as to attain an unbiased outcome.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

In this section, the result and discussion on the assessment of the performance of government funded housing projects and in particular the kirkos sub-city woreda 06 kasanchis building project is presented. 24 in depth interviews were conducted, and all of them was filled and returned. They were conducted with key personnel's like project managers, project coordinators, team leaders, site engineers, precast structural element placement experts, head of precast element fabrication and assembly, resident engineers, site inspectors quality assurance department team leader, general foreman etc. The response rate to the interviews conducted was 100 %. In addition to the in depth interviews, the researcher conducted an observation that spans 3 months using 5 working days per week from 4:00 morning up to 6:00 lunch time local time in the site at kasanchis as well as the ECWC precast element fabrication and assembly site at kality. The researcher was also able to get vital information through review and use of all relevant project documents pertaining to the project i.e. contract document, master schedule, off-site and in-situ test documents etc.

4.1 Respondents demography

In this section, respondent personal information which included age, educational level and general work experience and work experience pertaining to projects using precast technology is included.

Table 4. 1 Respondents demography

NO	Variable	Range	Frequency	Percent
1	Age	<25	1	4.16%
		26-35	16	66.67%
		36-45	4	16.67%
		>45	3	12.5%
		Total	24	100%

Source: - Own survey, 2023

As the table shown above most respondent were between the age of 26 and 35 which is account 66.67% and age between 36 and 45 were 16.67% of the respondents. This gives an indication that most of the key personnel involved in the project are youth.

Table 4. 2 Education

No	Variable	Education level	Frequency	Percent
1	Education	Diploma	3	12.5%
		Degree	13	54.17%
		Masters	8	33.33%
		PHD	0	0%
		Total	24	100%

Source: - Own survey, 2023

Based on the above figure 54.17% of the respondents have a bachelor degree, 33.33% of the respondents have a master's degree and 14.28% of the respondents have a diploma. This illustrates that all the respondents have the necessary educational background in order to properly to properly conduct the interviews with them.

Table 4. 3 Work experience

No	Variable	Years	Frequency	Percent
1	Work Experience	0-5	6	25%
		5-10	12	50%
		10-15	4	16.67%
		>15	2	8.33%
		Total	24	100%

Source: - Own survey, 2023

The above table indicates that most respondents have the work experience of 6-10 years (50%), 25% of the respondents have 0-5 Years of experience, 16.67 % of them have 11-15 years' experience, whereas 8.33% of them have more than 15 years of experience.

Table 4. 4 Work Experience in projects using precast technology

No	Variable	Years	Frequency	Percent
1	Work Experience in projects using precast technology	0-10	21	87.5%
		11-20	2	8.33%
		21-30	0	0%
		>30	1	4.17%
		Total	24	100%

Source: - Own survey, 2023

This table illustrates that most respondents as it relates to projects using precast technology have work experience of 0-10 years (87.5%), 8.33% of the respondents have 11-20 Years of experience and 4.17% of them have more than 30 years of experience. It indicates that there are few people with the adequate technological knowhow.

4.2 Assessing Quality Management Practices at Kirkos Sub-City Woreda 06 Kasanchis Building Project Based on the Quality Management Process Groups

4.2.1 Quality Planning

The outcome of a rigorous quality planning is the quality management plan which outlines all the necessary standards with which to judge the quality of work, product, process involved in implementing a certain project.

The researcher found out that as the contact was a Design Build contract agreement, the responsibility of developing the quality management plan fell on the hands of the contractor i.e. ECWC. Since ECWC was the only construction firm with the required skillset, expertise, knowledge related to the precast technology which was the most crucial component in terms of constructing the apartment buildings, it played a vital role with this stage of PQM.

This plan can be found in different clauses of the contract document starting off from clause 3 titled “Engineer” referring to the consultant, which goes into detail on the sub clauses on the roles

and responsibilities of the Engineer, delegation of the Engineer, instructions of the engineer, replacements of the engineer and determinations.

It further elaborates on clause 4 titled “the contractor” which consists of the sub-clauses such as the contractor’s obligations, performance security, subcontractors and their respective obligation, Acceptance criteria, quality assurance measures (allows the consultant to perform quality audits), safety procedures, progress reports, transfer of goods (very crucial in terms of safeguarding the transportation of precast structural members from assembly factory to the site and therefore ensuring its quality is left intact upon arrival)etc..

Furthermore, clause 5 titled “Design” also contains important contents of the quality planning process namely technical standards and regulations, training, operation and maintenance manual as well as design error.

In addition to this, clause 7 of the contract document titled “plant, materials and workmanship” contains some vital sub-clauses in relation to quality planning. They include manner of execution, samples, inspection, testing, rejection, remedial works, ownership of plant and materials (this helps ensure accountability in terms of supplies and their subsequent quality with ECWC being its own supplier of all the materials used for constructing the buildings and other related works and simultaneously giving the final power of supervision over those materials to the consultant).

Hence, in general the quality plan has been well integrated into the contract document giving the necessary roles and responsibilities for each activities involved in the project to the relevant party.

4.2.2 Quality Assurance

The quality assurance system set up for this project is written on sub-clause 4.9 of the contract document which stipulates

“The contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the contract. The system shall be in accordance with the details stated in the contract. The engineer shall be entitled to audit any aspect of the system. Details of all procedures and compliance documents shall be submitted to the engineer for information before each design and execution stage is commenced.”

On the basis of the contract, the researcher gave an in-depth interview to the consultant personnel assigned to this project which include the project coordinator, the resident engineer and Site Civil Engineer at City Government of Addis Ababa Construction Design Agency. The researcher asked them questions with regards to the tools and techniques they used so as to perform quality assurance. This was their response.

4.2.2.1 Checklists

This was one of the most frequently used tools pertaining to managing the quality of each major activity that lay the cornerstone for d/t project milestones within the projects. This include activities such as

- Excavation work,
- Backfill,
- Foundation Work
- Masonry work,
- Ground floor slab,
- Grade beam,
- **Erection of precast structural members i.e. slab, cantilever, Column, shear wall, staircases and landing, top tie beam, girders**
- Roofing
- Sanitary installation
- Electrical installation etc.

Source: - C.G.A.A.C.D.A archives, 2023

The one highlighted above is the standout and most important work activity for projects using precast technology whereas the rest of the work activities are evaluated by checklists that are already common for projects built through in-situ casting.

4.2.2.2 Testing

Testing is conducted on numerous types of materials that can be used for construction so as to check whether those particular products or raw materials meet the design requirements. The contractor is obliged by the contract under sub-clause 7.4 which states

“The contractor shall provide all apparatus, assistance, documents and other information, electricity, fuel, consumables, instruments, labor, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The contractor shall agree, with the engineer, on the time and the place for the specified testing of any plant, materials and other parts of the works.”

It goes on to state that “the engineer may vary the location or details of the specified tests, or instruct the contractor to carry out additional tests. If these varied or additional tests show that the tested plant, materials or workmanship is not in accordance with the contract, the cost of carrying out these variations shall be Bourne by the contractor, notwithstanding with other provisions of the contract.”

On the basis of these provisions, the consultant has performed various forms of test. Namely;

- Cubic test- test conducted to check the compressive strength of concrete
- Slump test-test conducted to test the workability of concrete
- HCB compressive strength test
- Sand replacement test:-used to check the degree of compaction, moisture content, MDD of the soil
- Yield strength – used to test the yield strength of reinforcement bars
- Standard penetration test:- used to check the bearing capacity of the soil
- Water absorption test among others

4.2.2.3 Observations

This tool is also utilized to check whether a particular raw material can be deemed suitable for use in a site. E.g. professionals in construction can visibly decide whether a hard rock can be used for Masonry work by simple observation of its features.

4.2.2.4 Reports

Reports can provide some much needed information on what goes on in the site in terms of materials used, activities undertaken as well as their magnitude, personnel present, the weather conditions, significant meetings and decisions undertaken as a result, time frame for activities undertaken etc.

Some of the reporting technique utilized by the consultant includes;

- Site dairy and site book
- Informal reporting i.e. using photos, texts and online apps such as telegram

4.2.3 Quality Control

In terms of the Quality Control System in place for the project, the researcher found out that there seems to be a misconception that exists with regards to Quality control and Quality Assurance. The project uses those terms interchangeably and hence makes decisions with regards to acceptance, reworks, and quality adjustments on the basis of results obtained using tools and techniques used for quality assurance/quality control. Tools such as checklist, testing, Meetings will provide the necessary information related to whether or not the specific activities, plants, materials and workmanship have adhered to the specific technical and quality requirements and specifications that were set out during quality planning phase of the project.

The outputs of quality control which are acceptance rework or quality adjustment will be conducted as specified under the sub-clause 7.4 of the contract agreement which is titled Remedial works.

4.3 Assessing challenges faced at Kirkos Sub-City Woreda 06 Kasanchis Building Project in terms of Quality Management Based on the Quality Management Process Groups

During the researcher's interviews with the relevant key personnel involved in the project, it was asked about what were the main challenges that are facing the project in relation to quality management. Their response was that the main challenges arise during quality planning and quality assurance process.

During quality planning, it was observed that due to nature of the contract agreement i.e. DB contract, it gives more of the onus to the contractor to provide details with regards to setting out the quality standards, specifications and milestones. This is due to the reason that the contractor i.e. ECWC is the only construction company based in Ethiopia with required theoretical as well as practical knowhow pertaining to precast technology. As a result, it left little room for involvement of the other parties in the planning phase. This made the consultants task difficult in terms of managing (supervising) the contactor by measuring its performance using standards,

specifications and milestones that were mostly influenced by the contactor. This was especially the case regarding the areas of the room in each house, finishing materials to be used (it specifies only the use of products that are made in Ethiopia) as well as related to materials and vital components of precast construction technology (no standards set against which the consultant could evaluate its quality performance).

As for quality assurance, the biggest challenge that arose as per the key personnel response was with the checklists and testing. For checklists, even though there are specifications for 71 work activities usually used for in-situ construction plus 3 more for work activities relating to precast construction, it failed to incorporate a checklist for a key work activity which is pre-stressing of the pre-tensioning wires.

Furthermore, for testing it fails to have any testing equipment available in the country to measure the yield strength, elongation etc. for the pre-tensioning wire so that the consultant can adequately give the contractor the go ahead or work permit to proceed with the next work activity. The reason given by the experts in terms of reasons why the testing couldn't be provided was that the pre-tensioning wire has yield strength of more than four times that of an average reinforcement bar thereby making it impossible to test (attain the ultimate yield strength) with the already available testing equipment in the country since the force applied wouldn't make the pre-tensioning wire yield. So in order to check the quality of this vital material, it would require taking a sample and testing it abroad and waiting for several weeks if not months for a response.

Another critical part mentioned as a challenge by the interviewees as well as upon the researcher's observations was the constant pressure that came from client and high level government official on to consultant, contractor and subcontractors to deliver the project in time for the customer which in this case were the residents that were temporarily displaced from the area. This pressure came in terms of pressurizing the contractor and sub- contractor to compromise the quality of the work activities in order finish the 2 block in particular before the project deadline as well as consultants to look the other way when it was carried out. This was especially the case as it pertains to finishing work items such as external and internal plastering work, painting and sanitary work. The reasons upon informally speaking to key personnel seems to be due to the fact that there were 27 families temporarily displaced as a consequence of the

construction and they were promised by the City gov't of Addis Ababa that they would be rehabilitated before the summer. In the rush to make it possible and ensure that also the pilot project is seen as a success, gov't officials engaged in such aforementioned tactics.

4.4 Assessing Time Management Practices at Kirkos Sub-City Woreda 06 Kasanchis Building Project Based on the Time Management Process Groups

As pertains to time management, the most important tool utilized for managing the schedule of the whole scope of the project was the master schedule. Master schedule is the end product that encompasses all the time management process groups. It is formulated in accordance with the contract agreement and all the work activities included in the document are provided the time period as per limitations placed in the aforementioned agreement. In the case of this project, the document is 11 pages long.

Upon review of the relevant contract agreement document signed by all three parties and the master schedule prepared by ECWC, In the case of the kirkos sub-city woreda 06 kasanchis building project, the time period for the overall project completion was **8 months**. The contract agreement states that the site handover is on **November 30, 2021 G.C**. it then provides a mobilization period of 14 days. The start date for the project is **December 15, 2021 G.C** and the finish date is **August 15, 2022 G.C**. during the interviews with relevant key personnel involved in the formulation of the master schedule, the researcher asked questions regarding the thinking behind the documents formulation and the response was that the time allocated to the work activities was based on the contractor's work methodology of carrying out the construction of all 4 blocks in conjunction using power cranes among other relevant heavy equipment, materials and daily labors.

Even though this was the case, in reality the results of the project's performance indicate something different. The project was set to complete on august 15, 2022 G.C but it still hasn't been completed to this day. After the finish date, **only 2** out of **4 blocks** were completed and no site work was conducted. Based on the schedule and time period given to the completed tasks as well as the financial cost implications for the planned and earned, using schedule performance index, we get the following results;

Schedule performance index (SPI) = Earned Value/Planned Value

= 45,866,000 ETH BIRR/ 96,161,000 ETH BIRR

= 0.47

Since SPI= 0.47<1, it indicates that the project in case is **behind schedule.**

4.5 Assessing challenges faced at Kirkos Sub-City Woreda 06 Kasanchis Building Project in terms of Time Management Based on the Time Management Process Groups

During the researcher's interviews with the relevant key personnel involved in the project, it was asked about what were the main challenges that are facing the project in relation to time management. Their response was that the major challenges in relation to time management arise during developing schedule and controlling schedule.

In terms of developing schedule, the client was the one that ultimately decided the project duration in consultation with the contractor. The client stressed the importance of finishing the project with as less time as possible which did put pressure on the contractor to deliver the project in a short space of time. Hence as per the directions set out by client, the contractor's thinking as mentioned in 4.5 was that the time allocated to the work activities was based on the contractor's work methodology of carrying out the construction of all 4 blocks in conjunction using power cranes among other relevant heavy equipment, materials and daily labors. The construction of all four blocks was planned to take 175 working days and 33 working days were allocated for the site work, fence work and greenery work. This assumption was on the basis of all site clearance was completed beforehand and that all the materials i.e. precast structural elements, pre-stressing wire, wedge, support structures, cement, sand, aggregate, boulders for masonry work and hardcore, select materials for backfill, hollow concrete blocks (HCB), finishing materials etc. and Equipment i.e. power crane, roller, excavator, plate compactor, mix truck, dump truck, loader etc. together with the assembly line(where fabrication of the precast structural elements takes place) would be readily available. This basically assumed a perfect situation which made it very challenging to develop and make it viable.

As it pertains to the challenges faced during controlling the schedule, upon interviewing the relevant key personnel involved, the researcher came to the conclusion that there were several

things that went against the schedule more specifically with regards to difficulties in implementing the contractor's work methodology. They include:-

4.5.1 Border dispute

Figure 4. 1 Four houses that weren't demolished before and during construction

As seen in the above figure, before the commencement and during construction of the project, 4 houses were not demolished. This in turn caused a significant hindrance for the contractors work methodology and thereby had to find new ways of working through this obstacle. This meant constructing only block A for about 4 months of the total 8 months of the product duration which caused significant delay. The first 3 houses were demolished in January 27, 2022 G.C i.e. 48 days after project start time, while the 4^{th} house (which holds the largest area out of all demolished houses) was finally demolished after a long and exhaustive court battle on March 11, 2022 G.C i.e. 91 days after project start time.

4.5.2 Material shortage and Equipment availability

The material shortage coupled with Equipment availability was a huge obstacle in terms of delivering the project as per specified in the contract. The three materials with the most frequent shortages as mentioned by key personnel of the contractor were cement, pre-stressing wire and HCB (particularly having depth of 10cm and 15cm). Cement was a critical component for the cast-in-situ structures such as combined footing, footing pads on the combined footings, ground floor slab, grade beam, shear walls (only for block A, the rest of the 3 blocks used precast shear walls with exception to the foundation shear walls), the channels in between the precast slabs and cantilevers, masonry work, partition, plastering work, cement screed as well as lean

concrete. Reasons for this shortage were given to be due to the unsafe routes as a result of instability in places around the country plus the low level of cement production because of lack of available foreign currency to bring in the necessary ingredients pivotal for mass production. The same goes for HCB's which the contractor is responsible for supplying to the sub-contractors for partition work. The other one is pre-stressing wire which is an important material used to support the precast slabs and cantilevers through tension. The material is not available in the Ethiopian market and exported from India. This means it requires foreign currency so as to purchase it, which is really hard to come by in our country these days. In addition, after the pre-stressing wire arrives by marine transport at Djibouti, it takes weeks to finish the paper work and arrive at the site. Consequently, this caused the delay of the project for more than a month as per the information provided by the contractor and consultants' status report. This result does in some ways coincide with a previous study by Gebeyew,(2018) on assessment of problems for projects using precast technology in Addis Ababa.

As far as Equipment availability goes, crane is the most instrumental equipment for conducting the project using precast technology. It is used for a wide range of activities such as transporting materials, small equipment and personnel, storage and erection of the precast elements, placement of concrete for cast in-situ elements etc. Hence, the daily availability of this equipment means a huge difference between success and failure or even the possibility of implementing the project altogether. Due to the use of the contractor's power crane simultaneously for other projects, it has hindered the performance of the project in terms of time.

4.5.3 High demand of the Assembly line

The only assembly factory for precast structural members in the country and more specifically in the capital is the ECWC assembly and fabrication factory at kality. Through interviews conducted with personnel working at this assembly and fabrication factory, the researcher found that it takes from 5-7 days so produce a precast structural element depending upon the type of admixture used for fabrication. The molds used to produce these elements are predated, with more than 40 years of service. The researcher found out that different attempts were made in order to replicate this mold through collaboration with relevant academicians from Addis Ababa University, but it came to no avail. Hence, due to the demand of various projects using precast technology, it makes it difficult to deliver the precast structural elements in time plus transport those elements from

assembly line to site. Additionally, due to the relative small working space available in the site, it is difficult to properly store precast structural elements on site in abundance which also hinders the project's performance. This result also coincides with a previous study by Gebeyew,(2018) on assessment of problems for projects using precast technology in Addis Ababa.

4.5.4 Disputes between contractor and client over quality due to miscommunication and Uncertainty (doubt over the technology)

Even though this construction technology has been around in our country for over 40 years, it is a nuisance in terms of its use for housing projects. This made it difficult for personnel assigned especially from client to comprehend. This led to incidents like disputes over the quality of compaction required under the precast footing pads for one of the blocks under construction b/n client and contractor. This incident, which was as a result a lack of technological knowhow on the part of the personnel from client, was able to delay the project for 2 weeks.

4.5.5 Design changes during construction

Although the area of each house per block was more than 2 and 3 times that of the previous demolished houses, the architects form the consulting firm upon reviewing the first block (block A) during their site visit came to the conclusion that the area for each purpose rooms didn't meet the required standards and hence required changing. This resulted in the project reducing its scope from providing 20 families per block to 15 families per block with exception to block A which was done with the partition work. Hence the total families the project could inhibit were reduced from 80 families to 65 families. The design changes required to make this happen took time to rectify and get approved hindering the project in case performance in terms of time while enhancing its performance in terms of quality. This result is also backed by a previous study of Wiguna and Scott (2005) on Nature of the critical risk factors affecting project performance in Indonesian building contracts.

4.6 The good experiences to be taken in terms of time management at Kirkos Sub-City Woreda 06 Kasanchis Building Project

With regards to the time management aspect for the project in case, there are also clear positives to take away from it. It begins from the first four important process groups for project time

management, namely; Define Activities, sequence Activities, Estimate Activity resource and Estimate activity duration.

The use of this technology enables an ease and relative to cast in-situ construction a much better, accurate and precise way to carry out the tasks in the aforementioned process groups. This is due to the way the work activities are developed, aligned, their resources estimated and the time allocated for the activities to be concluded. This enhances the level of expectation on all parties so as to deliver the project in a timely manner in comparison to the common construction methods.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

The main objective of this study was to assess the performance of government funded housing projects using precast technology in Addis Ababa. The section dealt on the summary of the findings generated from the data analysis. The summary was done along with the objective of the study. The dependent variable under study was project performance in terms of quality and time management while the independent variables were project quality and time management process groups. The results for each project quality and time management process groups are summarized below.

The results showed that both quality management and time management practices in the project in case for the most part followed the right standards and project management principles starting from project initiation all the way up to project monitoring and evaluation. Although during interviews with the relevant key personnel, there seemed to be a confusion surrounding the differences between quality assurance and quality control, the rest was in accordance with the project management values and principles which is a vital good experience to take from the practice of the aforementioned knowledge areas.

With regards to the challenges faced, it is very important to stress the fact that this project in case was seen as a pilot project, which helps highlight the use of precast technology for reducing the significant housing problem in Addis Ababa and delays in construction projects as well as quality issues observed throughout the construction industry. With such an ambitious goal comes its own challenge. These challenges were highlighted during the implementation phases of the project and more specifically as it pertains to the two project management knowledge areas. They include the project giving more power to the contractor, problems with checklists and testing, communications and lack of proper stakeholder involvement during the quality planning phase, constant pressures on the part of gov't officials to complete the project in less time which lead to compromising the quality of some of the work activities specifically in finishing works in terms challenges for quality management. On the other hand, border disputes, material shortages and Equipment availability problems, high demand of the assembly line, Disputes between contractor and client over quality due to miscommunication and Uncertainty (doubt over the technology),

Design changes during construction were the challenges faced in terms of time management on the basis of the results obtained from respondents and also upon observation and review of relevant project documents.

5.2 Conclusion

In conclusion, it is essential to highlight the objectives and the research questions that were raised during the study. As such, it was fitting to make the following conclusions on the basis of the objectives and research questions of the study.

Project performance assessed in terms of Project Management Knowledge Areas: this study uses the practice of two project management knowledge areas namely; Project Quality Management and Project Time Management. It takes into account the process groups for each project management knowledge area and gives an assessment of the practices, the challenges faced as well as the good experiences that can be taken on board for future practice.

Finally, it can be concluded that although the government's use of the precast technology in order lend a helping hand for solving the ever-increasing demand for houses in the capital is commendable and its use indicates that such projects can be completed in a short space of time as well as with better quality in comparison to the conventional building construction methods that have been employed so far, there exists the same type of challenges facing these types of projects as the ones that have faced and are still facing the conventional ones. Hence, it would be wise to integrate the good experience and weed out the bad ones in relation to the management of projects using the precast technology before transforming this pilot project into mainstream.

5.3 Recommendations

In accordance with the previous discussions and conclusions, the researcher gives the following recommendations.

- Better stakeholder involvement in the planning phase

Many of the challenges faced arose from lack of proper understanding of the projects attributes by all three parties. Especially in the planning phases of the two knowledge areas as it relates to the study, the results clearly indicate that Hugh pressure fell on the part of the contractor i.e. ECWC to prepare most of the documents relating to the project leaving little if any room for input from the other relevant stakeholders. This would have allowed for the contractor to share the burdens

and risks attached with implementing such projects as well as allowing for a trust between the parties, smooth information flow and strong project management practice. Due to this case, it would be in the best interest of such projects that all 3 parties but mainly the consultant and contractor were properly in the planning phase

- Finding ways to enhance the use of this technology in abundance and with ease

Finding new actors as well as enhancing the capacity of the precast structural elements production is pivotal for its future success in housing as well as other purpose projects. Hence, it would be better served in the future if the pros and cons of such techniques put to use for this project would be properly analyzed and scrutinized so as to develop a better system for future similar projects to benefit from.

Lastly, due to the technology's many positives with regards to significantly enhancing the performance of housing projects and as a result minimizing the enormous task of providing homes for its residents in the capital, it should continuously find ways to reduce the administrative bottlenecks that caused and continues to cause an obstacle to its performances.

5.4 Future Studies

For the future studies & further research, the researcher recommends including additional

Project management knowledge areas like project cost and scope management as well as incorporating more projects on larger scales than the project in question so as to increase the scope of the study and deeply scrutinize and make better informed judgement on the use of precast technology in relation to government housing projects in Addis Ababa moving forward.

Reference

Abdullah, M. R., Aftab, H. M., Azis, A. A. &Rahman, I.A. (2010).Factors affecting construction cost performance in project management projects: case of Mara large projects, University of Hussein, Malaysia.

Aibinu, A. A., and Odeyinka, H. A., 2006, Construction delays and their causative factors in Nigeria, Journal of Construction Engineering and Management, 132, pp. 667–677.

Al-Khalil, M. I., and AL-Ghafly, M., 1999, Important causes of delay in public utility projects in Saudi Arabia, Journal of Construction Management and Economics, 17(5), pp. 647 – 655

Al-Kharashi, A., and Skitmore, M., 2009, Causes of delays in Saudi Arabian public sector construction projects, Journal of Construction Management and Economics, 27(1), pp. 3–23

Amin, M., 2005, Social science research, conception, methodology and analysis, Makerere University Prente, Kampala, Uganda.

Amusan A. S, Adebile O. A, (2011): " The Non-Oil Sector and the Nigeria Economy a Case Study of Cocoa Export Since 1960 " International Journal of Asian Social Science, Vol.1, No.5, PP. 142- 151

Association for Project Management. (2012). APM Body of Knowledge (6th ed.). Buckinghamshire.

Azeb, K. (2007). Housing for the Poor in Addis Ababa -2006 – 12. Addis Ababa.

Belassi, Walid & Tukel, Oya. (1996). A New framework for determining critical success/failure factors in projects. International Journal of Project Management. 14. PP. 141-151

Birhanu Leta.G, (2016).The Effect of Integrated Housing Development Program on Housing Ownership of Lower-Income Groups: The Case of Dire Dawa. Public policy and administration research journal. ISSN 2224-5731, Vol.6, No.2.

Building Materials and Technology Promotion Council (2019). Performance appraisal certificate issued for M/S Ubanaac Infrastractures Pvd.Ltd. India

Chan Daniel w. m. and Kumaraswamy Mohan M., (2002), Compressing construction durations: lessons learned from Hong Kong building projects, International Journal of Project Management, Vol.20, PP. 23-35

Chan, D. W. M., and Kumaraswamy, M. M., 1997, A comparative study of causes of time overruns in Hong Kong construction projects, International Journal of Project Management, 15(1), pp. 55–63.

Construction Industry Task Force (1998). Rethinking Construction. Department of the Environment, Transport and the Regions, London

Department of the Environment, Transport and the Regions (DETR), Key performance indicators Report for the Minister for Construction by the Key performance indicators Working Group, January 2000.

Delz, S. (2016), Ethiopia's Low-Cost Housing Program – How Concepts of Individual Home-Ownership and Housing Blocks Still Walk Abroad, No Cost Housing Conference at ETH Zurich, Addis Ababa, Ethiopia.

Dissanayaka Sunnil M. and Kumaraswamy Mohan M., (1999), Comparing contributors to time and cost performance in building projects, Building and Environment, Vol. 34, PP. 31- 42

Elger, D. (2007). Theory of performance. Faculty guidebook: A comprehensive tool for improving faculty performance, 1, 19-22.

El-Razek, A. M. E., Bassioni, H. A., and Mobarak, A. M., 2008, Causes of delay in building construction projects in Egypt, Journal of Construction Engineering and Management, 134, pp. 831–841.

Enshassi, A., Mohamed, S., & Abushaban, S (2009). Factors Affecting the Performance of Construction Projects in the Gaza Strip. Journal of Civil Engineering and Management.Vol. 15(3). PP. 269-280

Ethiopian Construction Works Corporation (2021).”Works Contract Agreement for Design and Build of Kirkos Sub-City Woreda 06 Kasanchis Site between City Government of Addis Ababa construction and Design Bureau, Ethiopian Construction Works Corporation and City Government of Addis Ababa Construction Design Agency.”

Ethiopian Economic Association, (2007). Report on the Ethiopian Economy; the current state of the construction industry, Vol. 6, PP. 233-255

Fetene Nega, (2008), Causes and effects of cost overrun on public building construction projects in Ethiopia, MSc thesis, AAU, Civil Engineering Department, Addis Ababa.

Getachew Admasu, (2016) Achievements and Challenges of Condominium Projects in AddisAbaba, A Case Study in Yeka sub – city, Addis Ababa Ethiopia.

Guesh Dejene, (2017), the Assessment of 20/80 Condominium Housing Projectsin Addis Ababa: The case of Bole and Akaky Kaliti Sub cities, MA thesis, AAU, Public Administration and Development Management Department, Addis Ababa.

Gündüz, M., Nielsen, Y., and Özdemir, M., 2013, Quantification of delay factors using the relative importance index method for construction projects in Turkey, Journal of Management in Engineering, 29(2), pp. 133–139.

Gupta K. (2022), Role and importance of Housing, LinkedIn.

Hailemeskel,T.(2013). Management control of projects in construction industry: Ethiopian Context

International Project Management Association. (2006). ICB - IPMA Competence Baseline, Version 3.0 (ICB Version 3.0 ed.). Nijkerk.

Iyer, K. C., and Jha, K. N., 2005, Factors affecting cost performance: evidence from Indian construction projects. International Journal of Project Management, 23(4), pp. 283–295.

J. Rodney Turner (2009), the handbook of project-based management. Leading Strategic Change in Organizations. Third Edition, New York.

Karim K. and Marosszeky M., (1999), Process monitoring for process reengineering using key performance indicators, International conference on construction process reengineering, CPR 99, Sidney UNSW 12-13 July, Building Research center.

Kidist Merkebu Amare, (2014). Assessment on the Performance of Integrated Housing Development Program with Particular Reference to the Program's Objectives: Focusing on Addis Ababa, MSc thesis, AAU, Department of Business Administration, Addis Ababa.

Kiduanga J., (2015), Challenges for Urban Housing Development for Improving Livelihoods and Wellbeing of Population of Low-Income Group in Tanzania: The Case of Dar es Salaam, 7th African Population Conference in Session 805 Urban Livelihoods: Urbanization and Well-being, Institute of Development Studies, University of Dar es Salaam, Tanzania.

Kothari, C. (2004). Research Methodology Methods and Techniques (Second revised edition ed.).Jaipur (India): New age international publishers.

Krejcie, R. V. and Morgan, D. W., (1970), Determining sample size for research activities, Educational and Psychological Measurement, 30, pp. 607-610.

Kumaraswamy, M. M., and Chan, D. W. M, 1998, Contributors to construction delays, Journal of Construction Management and Economics, 16(1), pp. 17–29.

Kunle E. OGUNDIPE, Hezekiah F. OLANIRAN, Adekunle M. AJAO, Babatunde F. OGUNBAYO, Assessing the Impact of Quality Supervision on Construction Operatives' Project Delivery in Nigeria. International Journal of Civil Engineering and Technology, 9(9), 2018, pp. 426-439. http://iaeme.com/Home/issue/IJCIET?Volume=9&Issue=9

Lehtonen Tutu Wegelius, (2001), Performance measurement in construction logistics, International Journal of Production Economics, Vol. 69, PP.107-116

Love, P. E., & Holt, G. D. (2000). Construction business performance measurement: the SPM alternative. Business process management journal.

Mansfield, N. R., Ugwu, O. O., and Doran, T.,1994, Causes of delay and cost overruns in Nigerian construction projects, International Journal of Project Management, 12(4), pp. 254–260

Marwa Gamal Swefie Fall (2013). Improving Project Performance Using Lean Construction in Egypt. The American University in Cairo School of Sciences and Engineering Construction and Architectural Engineering

Munns, A. K., & Bjeirmi, B. F. (1996). The role of project management in achieving project success. *International Journal of Project Management*.

Nkado, R. N., 1995, Construction time-influencing factors: the contractor's perspective, Journal of Construction Management and Economics, 13, pp. 81–89.

Okuwoga Adeyinka A., (1998), Cost ñ time performance of public sector housing projects in Nigeria, Habital Intl., Vol. 22, No. 4, PP. 389 – 395

Olawale, Y. A., and Sun, M., 2010, Cost and time control of construction projects: inhibiting factors and mitigating measures in practice, Construction Management and Economics, 28(5), pp. 509–526.

Othman, A. A., Torrance, J. V., & Hamid, M. A. (2006). Factors influencing the construction time of civil engineering projects in Malaysia. Engineering, construction and Architectural management, 13(5), 481-501.

Patience Tunji-Olayeni, Timothy Olusoji Mosaku, Olabosipo Ishola Fagbenle, Ignatius Owoicho Omuh and Opeyemi Joshua (2016), "Evaluating Construction Project Performance: A

Case of Construction SMEs in Lagos, Nigeria," Journal of Innovation and Business Best Practices, Vol. 2016 (2016), Article ID 482398, DOI: 10.5171/2016.482398

Pinto, J.K. and Slevin, D.P. (1988), "Critical success factors in effective project implementation, "in Cleland, D.I. and King, W.R., (eds.), Project Management Handbook, 2d ed., New York, N.Y. Van Nostrand Reinhold,.

Radosavljevic, M., & Bennett, J. (2012), Construction management strategies: a theory of construction management. London: Wiley-Blackwell.

Sambasivan, M., & Soon, Y. W. (2007), Causes and effects of delays in Malaysian construction industry. International Journal of project management, 25(5), 517-526.

Samson M and Lema NM, (2002), Development of construction contractors performance measurement framework, 1st International Conference of Creating a Sustainable

Seyoum M., (2018). Quality challenges of low cost housing: the case of Addis Ababa 20/80 condominium project, MSc thesis, SMU, Department of project management, Addis Ababa.

Simon-Eigbe et al. (2022), Factors Affecting Project Performance of Building Construction Projects in Federal Capital Territory (FCT) Abuja, Nigeria. Current Journal of Applied Science and Technology, 41(35): 44-53; Article no.CJAST.92353

Tesfaye, A., (2011). Problems and prospects of housing development in Ethiopia. Property Management, Vol. 25, No. 1, pp. 27-53.

UN-HABITAT (2010). The Ethiopia Case of Condominium Housing: The Integrated Housing Development Programme. United Nations Human Settlements Programme: Nairobi.

Werku Koshe, K. N. Jha. Investigating Causes of Construction Delay in Ethiopian Construction Industries. Journal of Civil, Construction and Environmental Engineering. Vol. 1, No. 1, 2016, pp. 18-29

World Bank (2019). Unlocking Ethiopia's Urban Land and Housing Markets: Urban Land Supply and Affordable Housing Study. https://openknowledge.worldbank.org/handle/10986/32756 (Accessed 27 May 2023) Pg. 39.

World Bank Group. (2015). Ethiopia Urbanization Review: Urban Institutions for a Middle-Income Ethiopia. © World Bank, Washington, DC. http://hdl.handle.net/10986/22979 (Accessed 27 May 2023) License: CC BY 3.0 IGO.

Wysocki, R. (2014). Effective project management: traditional, Agile, Extreme (7th ed.): Inc. Indianapolis, Indiana: John Wiley and Sons.

Vijay K. Verma. (1995). the Human Aspects of Project Management. Organizing Projects for **Success.** Project Management Institute, Inc. Four Campus Boulward Newtown Square, Pennsylvania 19073-3299 USA.

Appendix

Appendix- I QUESTIONNAIRE

Survey Questionnaire

Dear Sir/Madam

The in-depth interview is designed to collect the required data so as to conduct research titled "Assessment of Performance of Government Precast Technology Housing Projects in Addis Ababa: The case of Kirkos Sub-City Woreda 06 Kasanchis Building Project" which is designed to determine the performance of government precast technology projects in Addis Ababa specifically as it pertains to Kirkos Sub-City Woreda 06 Kasanchis Building Project. This study is conducted in partial fulfillment of the requirement for award of MSc. Degree in project management from St. Mary's University. I would like to kindly request to take your precious time in order to conduct this interview. I inform you that, the information you provided will be consumed for academic purpose only. Your responses will be handled with utmost confidentiality. You are not required to write your name. You have a right not to participate in the research if you want to do so. Your genuine response will contribute highly to the validity of the result. I would like to thank you for your willingness to participate in this study.

If you have any question to ask, please contact me at any time.

Phone: 0931520771

Email:-negaabrham1708@gmail.com

Part I. DEMOGRAPHIC RELATED QUESTIONS

Please, put √ or x mark in the box in front of the item of your choice

1.Sex: ☐ Male ☐ Female

2.Age: ☐ Below 25 ☐ 26 – 35 ☐ 36 – 45 ☐ Above 45

3.Educational Background

☐ Certificate ☐ Diploma ☐ Degree ☐ Masters ☐ PHD

4. Years of Work Experience

☐ 0 – 5 ☐ 6 – 10 ☐ 11 – 15 ☐ Above 15

5. Years of Work Experience related to projects using precast technology

☐ 0 – 10 ☐ 11 – 20 ☐ ☐ 21 – 30 ☐ Above 30

6. Please indicate your part in the project

☐ Director ☐ Project manager ☐ Project Coordinator ☐ Resident Engineer

☐ Project team member other; please specify _____

Part II. INTERVIEW QUESTIONNAIRE

1) What were the quality management practices employed by your organization for the project in case?

2) Is there a standardized or formal documented process on how to manage Quality in your organization and specifically as it pertains to the project in case? Does it adhere to the Project Quality Management values and principles?

3) What are the tools and techniques employed for Quality Planning for the project in case?

4) What are the tools and techniques employed for Quality Assurance for the project in case?

5) What are the tools and techniques employed for Quality Control for the project in case?

6) What was the reporting system utilized by your organization for the project in case?

7) What were the major challenges faced in relation to the process groups by your organization in terms of quality management of the project in case?

8) What are the good experiences that can be taken from this project in case at it pertains to Quality Management?

9) On the basis of the above mentioned parameters, what was the project performance of the project in case with regards to Quality Management?

10) What were the time management practices employed by your organization for the project in case?

11) Is there a standardized or formal documented process on how to manage Time in your organization and specifically as it pertains to the project in case? If so, does it adhere to the Project Time Management values and principles?

12) What were the tools and techniques utilized as it relates to the process groups for Time Management?

13) What were the major challenges faced in relation to the process groups by your organization in terms of Time Management of the project in case?

14) What are the good experiences that can be taken from this project in case at it pertains to Time Management?

15) On the basis of the above mentioned parameters, what was the project performance of the project in case with regards to Time Management?

16) Do you thing that the project in case's performance so far is satisfactory? State your reasons behind your answer.