THE EFFECT OF PROJECT COMPLEXITY ON PROJECT SUCCESS: IN THE CASE OF ADDIS ABABA CITY ADMINISTRATION HOUSING DEVELOPMENT AND ADMINISTRATION CORPORATION

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Declaration

I, the undersigned, certify that this thesis is my original work, prepared under the supervision of Lakew Alemu (PhD), the thesis adviser. All sources of information used in the thesis have been properly credited. I further confirm that the thesis has not been submitted to any other higher learning institution, in part or in whole, for the intention of acquiring a degree.

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Letter of Certification

This is to verify that Meseret Melak Hunegnaw completed his thesis work under my guidance and supervision on the theme The Effect of Project Complexity on Project Success "In The Case Of Addis Ababa City Administration Housing Development And Administration Corporation." As a result, I certify that his work is adequate and of sufficient quality to be considered for the MSC in management with a specialization in quality management and organizational excellence.

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DEDICATION

For their unwavering support and tolerance over the last three academic years, I dedicate this thesis to my lovely wife w/r Mulunesh Ashebir and my children Elizabeth Meseret and Bezawit Meseret.

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Acronyms

PMBOK: Project management body of knowledge

RBV: Resource based view

CMT: Construction management theory

FGD: focused group discussion

PMT: project management institute

IEEE: Institute of electrical and electronics engineers

IHDP: Integrated housing Housing development program

INDOT: Indian department of transportation

MWUD: Ministry of works and urban development

MDGs: Millennium development goals

SPSS: Statistical package for social science

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Abstract

Addis Ababa is a capital city of Ethiopia and striving to assure the demand of shelter for the inhabitants. One of the strategies to solve the problem of housing is constructing huge number of condominium houses at earlier possible time with required quality. In this research the construction projects management practice of Addis Ababa city administration has been assessed based on project complexity dimensions (information complexity, task complexity ,technological complexity, organizational complexity, environmental complexity and goal complexities) in lined with project success factors (time, cost,quality ,health and safety ,environmental performance ,participants satisfaction and users satisfaction).complexities in a project are inevitable. The necessary data were collected using both qualitative and quantitative research methods, largely quantitative research methods. The survey conducted using data collection tools such as document analysis and questionnaire .The collected data's were analyzed by applying descriptive research design mixed research approach ,management bodies, employees, contractors and consultants of the corporation were unites of the observation and 142 samples were taken from these office .The study relies mainly on primary data .The collected data was analyzed using frequency distribution, percentage, mean and standard deviation and also linear regression model was used to analyze project success. The value of 0.851 R square indicates the independent variables (project complexity) explains 85.1% of the variability of the dependent variable (project success) in construction projects and 14.9% (100%_85.1%) of the variation is caused by factors other than the predictors included in this model .All independent variables have significant contribution for project success .while misunderstanding of project complexity hinders project success to the corporation. Hence to solve the problem wisely understanding and implementing project complexity is forwarded suggestions. This study contributes theoretically in the field of project management and on practical level study will not only help the Practioners in the field of PM, but also helpful for project managers of mega engineering projects. On societal level this study may help the Government intuitions in formulating rules and regulations such as PM certifications that can improve the project success.

CHAPTER ONE

INTRODUCTION

The first phase of the research is covered in this chapter. It basically includes background of the study, statement of the problem, research questions, and research objectives, significance of the study, scope of the study, limitation of the study, organization of the paper and description of the study area.

1.1 Background of the Study

Construction projects are termed projects since they are the pursuit of any effort that meets the interests of various stakeholders (PMI, 2016). The success of a construction project is frequently measured in terms of quality, time, and cost. The Project Management Institute (PMI) recognizes that successful projects are completed on time, within budget, and at the intended quality. Various initiatives around the world are struggling to fulfill these performance goals. In the Construction Extension of the Project Management Body of Knowledge (PMBOK), it is noted that most construction projects are unique because they are fraught with uncertainty and are often highly complex, especially because of the complex project environment (2016). They are expected to respond to the different weather, site, economic, community, and physical conditions prevalent at the times of execution. As such, these projects inherently complete beyond the time schedule and outside the budget.

Construction projects that fail to finish on schedule and on budget are a typical occurrence around the world and meeting customer needs is often a reflection of project management techniques. The project managers have considered projects successful when they complete the project meeting the scope, cost, and time targets (Lock, 2014). When these critical constraints are not met, the projects often delay, can have astronomical cost overruns, and might not satisfy the client/stakeholders. Several projects have failed to meet these two critical constraints, and they end up being completed beyond the initial time schedule and cost estimation (for instance, Alaghbari, Kadir, Salim &Ernawati, 2017; Gündüz, Nielsen &Özdemir, 2013; Mahamid, Bruland&Dmaidi,t. 2012; Ruqaishi& Bashir, 2015). Al-Hazim, Salem, & Hamad (2017) note

that the cost/budget overruns are common in construction projects, a challenge that persists across the world.

The success of building projects is influenced by projects management methods and complexity, independent of their location. Fayek (2013) argued that when a construction project extends beyond its due date and budget, they consequently affect the company's performance and the country's economy. The construction project timetable has a significant impact on the project's success, and timing delays have a negative impact on the project's success. Al-Hazim et al. (2017) examined the project management practices related to time delays and cost overruns in construction projects in Jordan and highlighted that the causes far apart from nation to nation and what might cause significant delays in one country might differ from another country (Alaghbari et al., 2017). According to Abraham (2007), shortage of housing is one of the major problems that call for immediate action. Even the majorities of houses in Ethiopia are below qualitative standard and lack adequate space. The extent of provision for water supply, electricity, and drainage is also very minimal. These affect the lives and health of people living in these houses.

As a result, lower income households that are unable to access affordable housing either because there is an inadequate total supply or because the limited supply that does exist is rented to those with a higher capacity to pay, are forced into housing stress by virtue of having to pay 30 percent or more of their income in rent (Ibid).

Even though numerous attempts have been made to enhance project management practices in construction projects, they have never been entirely addressed, and they continue to have a negative impact on project success. The challenges are so common that a construction cost overrun is encountered in 9 out of 10 projects (Flyvbjerg, Skamris Holm, & Buhl, 2014). It has been noted that these construction cost overruns can be as high as 183% of the original budget (Odeck, 2014; Love, Sing, Wang, Irani, &Thwala, 2012). Even in developed countries like the UK, construction cost overruns and delays are common and a major cause of concern for the construction industry (Olawale& Sun, 2017). Even the state projects in the United States, Bordat et al. (2014) acknowledged in their report that time delays and cost overruns were a challenge to the Indian Department of Transportation (INDOT) construction projects.

In Africa, the challenge has been extensively studied, but it is not yet to be fully addressed. Ineffective project management practices have led to time delays and cost overruns that have continued to affect the performance of public projects, as is evidenced by the Ugandan Civil Aviation Authority (CAA) (Alinaitwe, Apolot, &Tindiwensi, 2013). Projects in Botswana, Egypt, Zambia, and South Africa face the persistent challenge of effective project management (Mukuka, Aigbavboa, &Thwala, 2015; Aziz, 2013). Saleh et al. (2019) highlighted the causes of delay in construction projects in Libya, noting that it affects the successes of the projects and is often linked to project management practices. The challenge is experienced in Nigeria (Aibinu&Odeyinka, 2016; Amusan, Dolapo, & Joshua, 2017).

In another study, Gituro&Mwawasi (2016) highlight that construction projects contribute to a country's economy in developing countries, and this has been a considerable challenge for project managers. Researches show that, Yimam (2011) in Ethiopia many construction projects are suffering with different problems such as delay, cost overrun and quality issues. One of the mega construction projects running in the nation are the construction of condominium houses in Addis Ababa. The Addis Ababa integrated housing initiative is in charge of the building, the Integrated Housing Development Programme (IHDP), launched by the Ministry of Works and Urban Development (MWUD) in 2005, is a significant current government initiative to addressing the low-cost housing dilemma. The initiative is a follow-up to the 'Addis Ababa Grand Housing Programme,' which aided the Ethiopian government's efforts. The IHDP aims to:

- Increase housing supply for the low-income population
- Recognize existing urban slum areas and mitigate their expansion in the future
- Increase job opportunities for micro and small enterprises and unskilled laborers, which will in turn provide income for their families to afford their own housing
- Improve wealth creation and wealth distribution for the nation

According to Addis Ababa City Administration communication office year book (2015/2016), AAAIHDP have been undertaken the construction of 278,634 houses in Addis Ababa. Out of these 184,562 transferred to the users and the remaining 94,072 houses are under construction with the management of eighteen project offices. Accordingly in the year 2015/2016 budget

allocated for those projects were 11.08 Billion birr comparatively 62.9% of the city public procurement budget. These projects occupy the majority of the country's and Addis Ababa's administrative budgets. Despite the positive aspect of attaining goals, building projects suffer from time and cost overruns, contrary to the program objectives. Such construction projects inquire efficient construction project management system or modern construction project management approach. This research will try to review the effect of project management for the project success in Addis Ababa city administration housing development Corporation.

1.2 Problem of the Statement

The demand for housing is directly proportional to the rate of urbanization. More residences are predicted to be required as a country gets more urbanized to accommodate the growing population in metropolitan areas. The practice, however, does not support this in that the acceleration in urbanization is not accompanied by the provision of adequate housing. This is one of the reasons for the development of informal settlements, which provide housing to most low-income groups (UN-HABITAT, 2002). In Kenya, for instance, it was reported that rapid urbanization is placing an enormous strain on an already stretched urban infrastructure, housing stock and services, and resulting in the proliferation of informal housing settlements (www.citiesalliance.org).

Various factors have been pointed out in relation to this divergence between the inadequate availability of housing on the one hand and the rapid urbanization on the other. In addition to the low level of economic development, the lack of genuine political will to address the issue in a fundamentally structured, sustainable and large-scale manner is commonly cited (UN-HABITAT, 2002). Other factors can also be made in relation to this. The absence of urban policy (including housing policy), which is crucial for successfully narrowing the gap between urbanization and project complexity are the major factors for housing development /project success.

The GTP (2015) characterized management problems issues such as capacity limitation, lack of integration, finance shortage, lack of good governance, technology gaps, lack of monitoring, and implementation as a problem to be addressed in the national development plan in Ethiopia in general and particularly in Addis Ababa. Shifwrawet, al also affirmed the government of

Ethiopia was over ambitious in planning mega projects and did not allocate sufficient time for the front end project development phases critically crucial to the success of projects .Unfortunately, despite decades of research using a variety of methods, the debate over the determinants of housing development or project success in Addis Ababa city remain unsettled.

Even if there are numerous research findings from various scholars on the opportunities and challenges of housing development in Ethiopia, particularly in Addis Ababa, there are discrepancies and inconsistencies among them. For example a study done by Dr.HailemeskelT.Hailemarkos/2020/ focuses only on the technical aspect of project management body of knowledgy (the independent variable) and the main predictors' for project management are contractors, consultants and clients. However, in practice, several factors such as management commitment, staff performance, and other project complexity issues all hamper (hinder) the performance of the construction industry. Those studies do not reveal or indicate who is responsible for putting the results into action in the organizations. As a result, it's critical to measure and recognize the impact of project complexity on project success (housing development) in order to provide an alternative source of information for decision-makers and professionals in the future. The goal of the research was to present a feasible answer for these pressing issues by presenting a timely remedy. If there is a lack of understanding of modern project management skills, the home development organization will be unable to finish projects within the budgeted cost, time, and quality. So, the dependent variable for this research was project success/ time, cost, quality, health and safety, environmental performance, participant's satisfaction and users satisfaction that affects housing development or the output and the independent variables/inputs/project complexity with project complexity dimensions such as information complexity, task complexity, technological complexity organizational complexity, environmental complexity and goal complexity.

1.3.Research Questions

Based on the above problem statement the study has been initiated to seek answers for the following basic questions:

1. How does goal complexity affect the performance of Housing construction projects in Addis Ababa city Administration?

2. How does organizational complexity affect the performance of Housing construction projects in Addis Ababa city administration?
3. How does task complexity affect the performance of Housing construction projects in Addis Ababa city Administration?
4. How does technological complexity affect the performance of Housing construction projects in Addis Ababa city Administration?
5. How does environmental complexity affect the performance of Housing construction projects in Addis Ababa city Administration?
6. How does information complexity affect the performance of Housing construction projects in Addis Ababa city Administration?

1.4.Research objectives

1.4.1. General Objective

The overall goal of this study was to examine and investigate the impact of project complexity on project success in the Addis Ababa city administration.

1.4.2. Specific Objectives

- ❖ To determine the effect of goal complexity on project success.
- ❖ To determine the effect of organization complexity on project success.
- ❖ To assess the effect of task complexity on project success.
- ❖ To examine the effect of technological complexity on the project success.
- ❖ To determine the effect of environmental complexity on the project success.
- ❖ To determine the effect of information complexity on the project success (housing construction) in Addis Ababa city administration.

1.5.Significance of the study

The Addis Ababa City Housing Administration Corporation will benefit greatly from this study.

- ➢ To contribute towards the understanding of modern project management and identify the major effect of project success through literature review.

- To improve and enable the performance of project management time, cost, quality, health and safety, environmental performance, participant's satisfaction and users' satisfaction.
- To contribute towards the improvement of project closeout management skills.

1.6.Scope of the study

The study was conducted on Addis Ababa city housing development and Administration Corporation. The research has been limited to 142 sampled housing development and Administration corporation management bodies, employees, contractors and consultants.

1.7. Limitation of the study

The goals of this academic study were met; nonetheless, several limitations were discovered. The study's main shortcoming was that it only looked at one government agency, therefore the findings cannot be applied to other government agencies or the private sector for more recent information on the impact of project complexity on project success. The other big challenge at the time of data collection was Corona (COVID-19) that made the respondents felt uncomfortable and others were simply not bothered. However, the data collected through the distribution of questionnaires were adequate to safely conclude about the effect of project complexity for project success at housing development and Administration Corporation.

1.8. Organization of the paper

The research was divided into five sections: The first chapter covers the following topics: the study's background, the organization's background, the issue statement, the research questions, the study's objectives, the study's significance, the study's scope, the study's limitations, and the paper's organization. The review of linked literatures is presented in the second chapter..Chapter three discusses the research methodology which contains: research design and approach, population of the study, sample size and sampling techniques, data types and sources, data collection tools, data collection procedures, validity and reliability test, data analysis method and ethical consideration. Chapter four of the thesis is the analysis of the data, results and discussions of findings of the study. The data presented is statistically treated in order to cover the relationship of the variables involved in the study. And the last chapter is comprised of three sections: Summary of the findings, conclusions and the recommendations of the study.

1.9. Description of the Study Area

Addis Ababa, with an area of 540 km is divided in to 10 sub city and 117woredas. Addis Ababa lies at an altitude of 7,546 feet (2,300meters) and located at9°1′48″N 38°44′24″E coordinates: 9.1 48°N 38.74°E.the city lies at the foot of mount Entoto. from the lowest point, around Bole international Airport,2,326 meters (7546 feet) above sea level in the southern periphery, the crises to cover 3,000 meters (9800ft) in the Entoto mountains to the north (Addis Ababa City Government (AACG), 2010).

The city serves as the political and economic hub of the country, as well as the headquarters of the African Union and the United Nations Commission for Africa. Many international aid and development organizations, as well as more than 100 embassies, are located in Addis Ababa. According to the Central Statistics Authorities' 2006E.C census, the city's population was 3,384,569. Addis Ababa is a city with a lot of potential.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Introduction

In this chapter, the researcher reviewed different sources of literatures consisting of theoretical and empirical literature on project complexity that affects project success.

The literature on the project complexity and project success aiming to show the implementation of housing construction projects. The chapter also identifies the existing gaps in research and shows the conceptual framework of the study.

2.2 Theoretical Review of Literature

2.2.1 Construction Management Theory

The construction management theory (CMT) proposed by Bennett and Radosavljevic (2012). provides a rough theory on the basis of a toolkit of relationships and efficiency of construction products Valence (2013). The innovative way in which organizations manufacture a product and where developers deliver projects are critical aspects in the thought behind this construction management philosophy. According to Bennett and Radosavljevic (2012) the complexity of construction projects, it is essential to understand the concepts and factors inherent in construction projects .The concepts under this theory are learning and performance, interactions and relations ,products and processes ,and organizations /Valence 2013/, note that the factors that underlie these concepts include how well established the relationships are termed internal or not /termed /boundary relationships feedback loops and communication .

In addition to this ,the theory's propositions include the reduction of the number of construction teams ,relationship improvement between the construction teams , reduction of the variability of construction teams and the reduction of external interference experienced by the construction teams / Bennett and Radosavljevic (2012) .All these propositions are aimed to improve efficiency in construction project management. Effective communication, which can be improved by fostering correct communications and limiting the effort necessary for accurate communication, is at the heart of improving the construction team connection.

In addition to these Bennett and Radosavlevic (2012) mentioned that project managers can involve strategies that encourage the construction teams to achieve accurate communication with minimum effort and resource and accepting the terms of their transactions which can potentially transform boundary relationships in to established relationships. If these tactics are used consistently, all relationships will eventually be internal.

The construction management theory (CMT) is central to construction management in general and to housing development in particular as it primarily focuses on project success, learning, relationships, interactions organizations, products, constructions and concepts that make up the successful project management principle (Gituro&Mwawasi 2016)**.**

As a result, project managers provided a model with which they can represent essential success aspects such as those mentioned above, emphasizing and encouraging the value of relationships in building projects. Because construction projects are inherently complex, the idea focuses on team relationships and fostering precise communication between teams, which is equally important in residential building construction projects. The obstacles that these projects typically confront will be reduced when good and precise communication is ensured.

2.2.2 Complexity Theory

According to Sackey, Enock, Martin Tuuli and Andy dainty (2011) Complexity theory is a subset of chaos theory, it focuses on how groups of living things behave. Its primary advancement came through its application in biology with the pursuit of an explanation regarding the evolutionary complexity of living organisms. Mikulecky (2011) also argues "Complexity is the property of a real-world system that is manifest in the inability of any one formalism being adequate to capture all its properties".

According to Lucas (2006) Complexity theory states that critically interacting components self – organize to perform potentially evolving structures exhibiting a hierarchy of emergent system properties.

In addition to these Weaver Patrick (2011) mentioned that complexity theory aims to define how order and patterns arise out of seemingly chaotic systems and how complex behavior and structures emerge from simple underlying rules. Its focus is to determine how systems consisting of many elements can lead to well organized and predictable behavior. Although, it

is not possible to calculate the chaos that is inevitable in a project, it is possible to study the implications of complexity theory in order to develop better strategies for dealing with the changes that are brought about through disorder and unpredictable circumstances. To put it simply, the current “control systems” that are currently in the project manager's tool box are not the entities in control: people control their actions and the environment dictates many variables. He also argues that, although the concept of contingency has existed, this concept supposes that there are controllable unknowns.

In general, complexity theory's philosophies and ideas should be used to foster various managerial thought processes about how systems and organizations operate. A fundamental point regarding complexity theory in the context of project management is that a project team is a social network: a social structure of nodes that are joined by some form of relationship. The influences and stimuli that are encountered by this social network have more implications for the success of the project than the traditional project controls. Removing the focus from traditional project controls and looking toward managing the social network will assist project managers with project goal attainment (Ryan Burnham). (Patrick Weaver) also says in a Simple View of ‘Complexity’ in Project Management identifies two primary attributes of the social network, referred to as social capital: the knowledge required to deliver the project outcome and the willingness to achieve the project outcome. He also noted that complexity accepts that there are simple unknowns and the best manner to handle these would be to have a flexible process rather than a rigid contingency. Although the concept of contingency has existed, this concept supposes that there are controllable unknowns. This step is the first in accepting that complexity exists in projects, and one can be certain that the future of project management will be more inclusive of this kind of attitude.

In addition to the above mentioned theories the butterfly theories, the six degree of separations and the patterns within chaos will help to show the importance and presence of project complexity especially those in the virtual environment.(complexity theory and project management hand book written by Wanda Curlee and Robert L. Gorden). Because housing development and construction is inherently complex, the theory is necessary to enable project managers to engage in transformational leadership behaviors rather than the usual management structure.

2.3 Empirical Review

2.3.1 project Management and Planning

In Serrador p. (2013) study to show the impact of planning on project success, He clearly show that planning and the level of completeness of planning are very important for project success .In his study he concluded that 20-33% of efforts must be spent on planning and can get a clear return on this investment in terms of project success and project management planning is associated with project success both project efficiency and overall project success.

In Naeem, Khanzada, Mubashir, &Sohail's (2018) study to investigate the role of project planning on the success of projects, they considered risk management's mediating role and culture's moderating role. A positive correlation between project success and project planning was established; noting that effective project planning during the initial stages of the project life cycle significantly influenced the success of the said projects. The study emphasizes the importance of planning in the early stages of a project, as well as the need for project managers to ensure that the planning phase is not overlooked and is given the time and resources, successfully focusing the function of risk management throughout the planning stage.

Yilak (2013), defined in his literature survey; "Project management is the art of directing and coordinating human and material resources throughout the life of the project by using modern management techniques to achieve predetermined objectives of scope, cost, time, quality, and participant satisfaction. In general Project Management is an essential responsibility of the project which starts from the inception and goes to the completion of the project. For the successful completion of the project efficient management is essential. For the competent project management: the use of knowledge, skills, tools and techniques are very important to meet project requirements in light of the stakeholders' needs and expectations, and challenging demands for scope, time, cost and quality.

In a study by Simiyu (2018) to examine the role of project management practices on the success of agricultural projects, it was found that the different project management practices influenced the success of the agricultural projects. The result underscored the role of project monitoring &evaluation, planning, implementation, communication in the success of the projects. Most notably, the project implementation team's planning actions early in the project life cycle

resulted in much fewer issues as the project continued. Project planning, according to the participants, improved the success of the initiatives by ensuring that there were fewer bottlenecks along the route.

According to Hailemeskel. T.Hailmarkos(2020) Ethiopian Construction Project Management Maturity Model Determination and Co relational Prediction of Project Success study to examine Ethiopian Construction Project Management Maturity Model Determination and Co relational Prediction of Project Success, To ensure the construction industry's long-term viability, construction project management knowledge maturity (project managers) should be given special attention beyond project implementation.

2.3.2 Project Complexity and Its Effect on Project Success

2.3.2.1 Project complexity

Various scholars have recently attempted to foster and traverse the definition and applications of project complexity in order to improve project success. According to M. Padalkak and S.Gopinath (2016) in a project context there is a lack of consensus on what complexity is? In the Luhmannian system theory, complexity is the sum of the following components; differentiation of functions between project participants, dependencies between systems and subsystems, and the consequential impact of a decision field. Project complexity can also be interpreted and operationalized in terms of differentiation (number of elements in a project) and interdependencies and connectivity (degree of interrelatedness between these elements), which are managed by integration, that is, by coordination, communication and control (C. Brockmann and G. Girmscheid,2007).

According to Cooke,Davies Cicmil Crawford and Richardson, (2007) a paradigm shift is needed for managing complex projects, which includes virtual projects from the traditional project management processes. Accepting that people operate in settings where alternative solutions exist, persons working on complicated projects must become more flexible and versed in the currents of their organization indirectly by collaborating with others in the environment rather than trying to reshape the environment in to something that is rigid and inflexible ,which is not in harmony with the environment. They also argue that understanding and implementing complexity enables the project manager to lead virtual projects.

Managers must break away from the past and embrace the dynamic future's new structure. To be successful as virtual project managers, they must be knowledgeable about how to resolve conflicts when they emerge, how to develop trust in a scattered team, how to employ suitable leadership styles, and how to comprehend the differences in communication and technology. The virtual project plan should also address the additional communication requirements, as well as the need to standardize technology and energize the team.

Julien Pollack (2007) states that in the Changing Paradigms of Project Management current project management practices are too deeply rooted in the following characteristics.

- Predefined project goals
- Positivist and Realist philosophies
- Emphasis on control
- Quantitative measures
- Reductionist techniques
- Emphasis on structure
- No need for participation
- Project Manager as Expert

According to Pollack, traditional project management is fundamentally a functionalist activity that prioritizes reductionist tactics and control systems. These attributes imply stability and predictability, which makes it difficult for companies to implement necessary change. Furthermore, these project management practices reduce people to predictable parts in a machine and therefore discourage learning and flexibility. The traditional approaches to project management appear to maintain validity when the goal of the project remains stable and the work is straightforward and obvious; however, there is a growing acceptance that for projects that are complex, uncertain, and time-limited, conventional methods might be inappropriate. In light of this information, it can be concluded that chaos and complexity perspectives offer a more profound view of the dynamic nature of projects and can offer empowerment to the project managers leading them.

The effect of complexity according to L.A. Vidal and F. Marle (2008) it can have both a negative and a positive effect on projects. The negative effect, in terms of difficulty to be understood and controlled, is because of the emergence of new properties that none of the elements of the system

owns. The positive influence is due to the vision of phenomena that could not be predicted due to the sole knowing, even complete, of the behaviors and interactions of the elements of the system. In order to properly manage complexity, project managers must know how to grab the opportunities emerging from complexity and to know how to avoid or at least diminish the negative effects of complexity.

Even if project complexity has both negative and positive effect on projects, Baccarini (1996) generalizes and emphasizes the importance of complexity to the project management process as follows:

- Project complexity helps determine planning, co-ordination and control requirements.
- Project complexity hinders the clear identification of goals and objectives of major projects.
- Complexity is an important criterion in the selection of an appropriate project organizational form.
- Project complexity influences the selection of project inputs, e.g. the expertise and experience requirements of management personnel.

But the Institute of Electrical and Electronics Engineers (IEEE) published lists of common factors that lead to project failures are;

- ✓ Unrealistic or unarticulated project goals
- ✓ Inaccurate estimates of needed resources
- ✓ Badly defined system requirements
- ✓ Poor reporting of the project's status
- ✓ Unmanaged risks
- ✓ Poor communication among customers, developers, and users
- ✓ Use of immature technology
- ✓ Inability to handle the project's complexity
- ✓ Sloppy development practices
- ✓ Poor project management
- ✓ Stakeholder politics
- ✓ Commercial pressures

According to IEEE research, projects seldom fail owing to just one or two of the aforementioned causes; rather, numerous of these flaws occur at the same time, resulting in the project's failure.

2.3.2.2 Dimensions of project complexity

Despite the fact that many academics have studied project management and project complexity, particular factors have not been proven. In a study conducted by Baccaini D. (1996) two types of project complexity were most commonly referred in project management context. That is, organizational complexity and technological complexity. According to his thought let's see their application.

1. **Organizational complexity**

The function of a project organization structure that includes definition of relationship, in terms communication and reporting, allocation of responsibility and authority for decision making, allocation of tasks. Construction projects are typically characterized by the engagement of several separate and diverse organizations, such as consultants and contractors, for a finite period of time. This leads to the creation of a temporary multi organizational structure to manage the construction project.

2. **Technological complexity**

According to the study, technological complexity entails the use of material resources, processes, knowledge, and skills. Many authors have also defined technological complexity in terms of the difficulty of completing a task**.**

According to Lan Luo and Wu Guangdong (2016) studies to investigate the relationship between project complexity and success in complex construction after two round interviews a total of 41 potential factors of project complexity for complex construction projects were identified and these factors were generalized to six dimensions of project complexities for complex construction projects. These dimensions are:-

- Information complexity
- Task complexity
- Technological complexity

- organizational complexity
- Environmental complexity and
- Goal complexities

The following table summarizes the relationship between potential factors and six categories of project difficulties and project success factors.

Table 2.1 potential complexity factors and measures of complexity in construction projects

Dimensions of project complexity	Potential factors or variables
Goal complexity	Diversity of goals (PC1); uncertainty of goals (PC2); inconsistency of project goals (PC3); number of stakeholder requirements change (PC4); project urgency for time limit (PC5); urgency for project cost (PC6)
Organizational complexity	Number of organizational structure hierarchies (PC7); number of organizational units and departments (PC8); cross organizational interdependence (PC9); experience of participants (PC10); change of project organization (PC11); trust among project organization (PC12); sense of cooperation (PC13); cultural differences of project organization (PC14)
Task complexity	Diversity of tasks (PC15); dependence of relationship among tasks (PC16); dynamics of task activities (PC17); uncertainty of project management methods and tools (PC18); availability of resources and skills (PC19); sources of funding way (PC20); complexity of contractual relationship (PC21)
Technological complexity	Diversity of technology in project (PC22); dependence of technological processes (PC23); risk of using highly difficult technology (PC24); knowledge of new technology (PC25); novelty of construction products (PC26)
Environmental complexity	Environment of changing policy and regulation (PC27); environment of changing economy (PC28); environment of changing nature (PC29); complicated geological conditions (PC30); changes in the project construction environment (PC31); remoteness of project location (PC32); the influence of external stakeholders (PC33)
Information complexity	Information uncertainty (PC34); level of processing information (PC35); capacity of transferring information (PC36); degree of obtaining information (PC37); integration of more than one system or platform (PC38); dependence of information system (PC39); variety of language involved (PC40); number of countries or nationality involved (PC41)
Project success	Time (PS1); cost (PS2); quality (PS3); health and safety (PS4); environmental performance (PS5); participants' satisfaction(PS6); user satisfaction (PS7); commercial value (PS8)

Source; Lan Luo and W U Guangdong Article in journal of management engineering July 2016

2.4 project success

The concept of project success has remained ambiguously defined in the construction industry (Chan et al. 2004; Joslin and Müller 2015). Stakeholders cannot achieve a consensus on project success when it comes to project practices (Joslin and Müller 2015; Lim and Mohamed 1999).

According to Atkinson (1999; Jugdev and Müller 2005; Molenaar et al. 2013) the earliest criterion of project success is the golden triangle which consists of time, cost and quality. But these measures are important but don't include the necessary measures of modern factors of project management for project success. Chan et al. (2004) proposed the success standard system of construction projects on the basis of literature review, including time, cost, quality, health and safety, environmental performance, participants' satisfaction, user satisfaction, and commercial value.

2.5 summaries of literature Review and research gaps

Table 2.2 summaries of literature Review and research gaps

Author	**Purpose**	**major finding**	**Research gaps**
Serrador (2013)	Studied the importance of the project planning for project success	The research findings highlight a positive correlation between planning and project success.	This study focused on project success based on traditional project management: but the current study will look at project success based on modern project management perspective;
Naeem, Khanzada, Mubashir, &Sohail's (2018)	Studied Project planning on the project success with the moderating role of culture and mediating role of risk management	The research findings highlight better planning during the early stages of the project life cycle have positive impacts on the project performance	The study used moderating variables of culture and risk management; but this study will look as a whole project complexity Issues for project success.
Yilak (2013)	Studied the responsibilities of project managers from the inception and goes to the completion of the project.	The research finding highlights the effect of modern project management on project success from inception phase to completion phase of projects.	The current study will look at project success based on modern project management perspective; I.e. project complexity as a moderating role for project success. But his study tries to see the effect of modern project management without specifying project complexity dimensions.
Simiyu (2018)	Studied Project management practices, the performance of	Project planning, implementation, Monitoring & evaluation	This study focused on project success based on traditional project management: But the current study will

	agricultural projects, Bungoma County in Kenya	and communication influenced the performance of the project.	look at project success based on modern project management perspective; i.e. project complexity as independent variables for project success.
Lan Luo and Wu Guangdong (2016)	To investigate the relationship between project complexity and success in complex construction	The research finding highlights six dimensions of project complexity factors that affects complex construction projects.	This study focused on the overall complex construction projects in china, But the current study will focus on public housing construction projects in Ethiopian particularly in Addis Ababa.
Hailemeskel. T.Hailmarkos(2020)	To examine Ethiopian Construction Project Management Maturity Model determination and Correlational Prediction of Project Success	The research finding highlights project management body of knowledge (PMBOK) is important, contractors, consultants and clients are the major predictors for project success.	This study focuses only on the traditional project management, but the current study focuses on modern construction project management.

In general from the above table and from the literature reviews we can conclude that, previous research findings on the effect of project management for project success mostly focuses on the project management body of knowledge (PMBOK) based on the traditional project management principles and standardizations. And these principles and standardizations did not address today's complex project phenomena and virtual environment of project management communication skills. Moreover, Wanda Cur lee and Robert L. Gordon,(2011) also argues PMI does not suggest a formula for managing complexity, in the past few years, there has been an upward growth of projects as organizations continue to grow in size, companies continue to outsource, the world continues to see people cross borders and the project managers must also deal with the additional complexity dimensions. As a result, understanding project complexities allows one to understand the entire notion of project management, which takes into account not only plans but also ongoing modifications to project management techniques to accommodate the project complexity dimensions indicated in literature reviews.

2.6 Conceptual framework of the study

The following conceptual framework is utilized to explain the interrelationships between the variables in this study. The proposed model were Lan Luo and W U Guangdong Article in journal of management Engineering's(2016) model and Silva Kumara and BhadraJinada HewapattuArachchige (2015) medels with slight modification to explain the relationship

between project complexity and project success. Which means project success is a dependent variable and project complexity is independent variable. Likewise, effect is a mediating/intervening variable that explains the relationship between the dependent and independent variable as shown below.

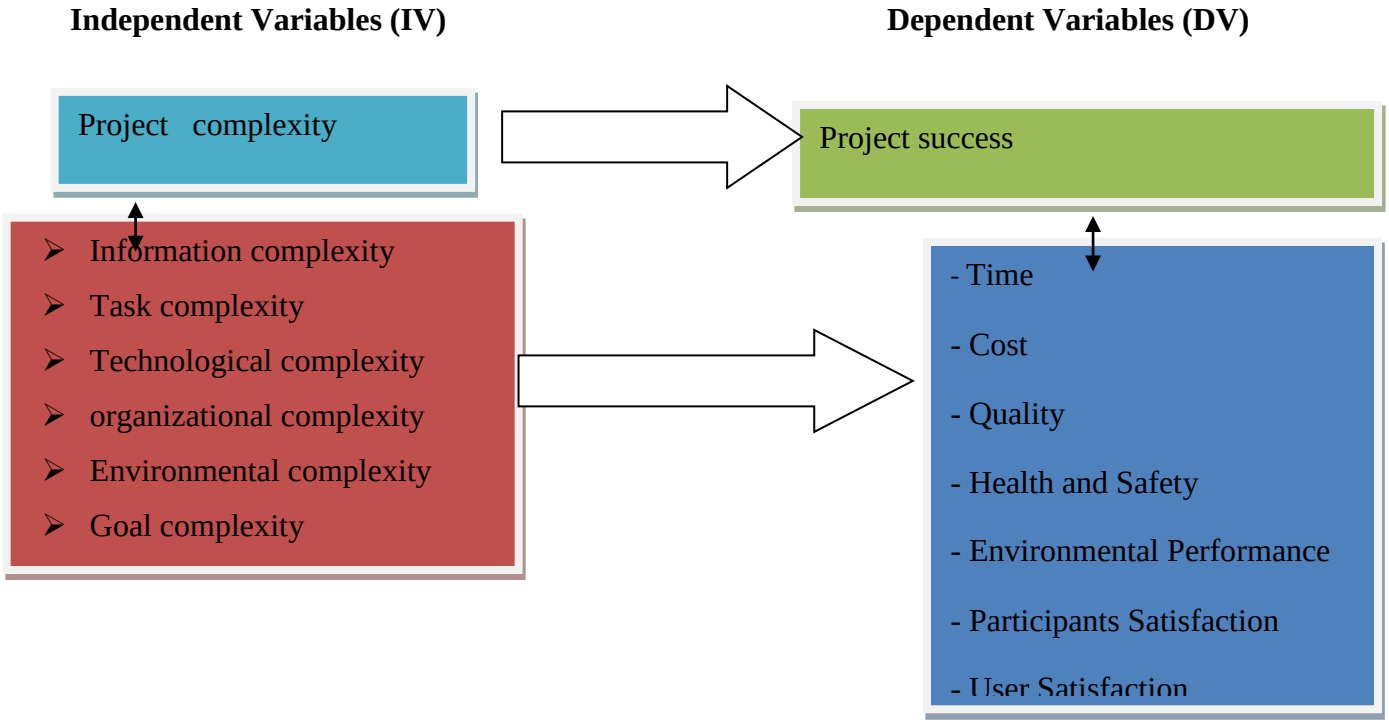


Figure 2.2 Conceptual framework of the study

Source: an Luo and W U Guangdong (2016)

CHAPTER THREE

RESEARCH METHEDOLOGY

3. Research Methodology

The purpose of this part was to discuss the research methods employed, how the research was designed, and why the choices were made. As a result, the chapter begins with the author's preconceptions, study choice, and point of view. The research philosophies follows, then research Approach, research design, and the chosen research strategy. The research technique and paradigm will also present in this chapter. The chapter also presents the questionnaire structure and explains data collection method. The chapter ends with the analysis method and precision measurement.

3.1. Research Design

The research design that was employed in this study was mixed research approach; because using mixed research method could offset the biasness of any single quantitative data (Creswell, 2009). Particularly, co relational research design was applied; I. e survey descriptive- co relational form of research design. Descriptive research is concerned with describing a population with respect to specific variables. A survey is a method of collecting data from participants who answer questions administered through interviews or questionnaires. The purpose of this quantitative, co relational study was to show whether project complexity and housing development or project success have negatively or positively related.

The descriptive research design will be appropriate; because, it is suitable to describe the degree and nature of problems of access to residential housing that government employee's encountered in the study area. According to (Hall: 1996), using both strategies is due to gradually agreed realization by social scientists to compensate the problems associated with both strategies by the strength of the other. The mixed research approach was useful to capture the best of both qualitative and quantitative approaches.

Thus, the study was employed both quantitative and qualitative research approach of data collection and analysis to keep its validity and reliability. Quantitative aspects which focused

upon the data with numeric nature will select to address the research objective that aimed to assess the existing problems and qualitative type also helps to compensate the deficiency of quantitative analysis and provide a more explanatory power to it.

3.2 Research Method

A research method is a method for tackling a research problem in a systematic manner. It can be thought of as the science of performing scientific study. Depending on the sort of environment and the type of questions to be addressed, a researcher may use qualitative, quantitative, or a combination of the two methodologies. Based on the nature, objectives and available resources, in this study, the research was used descriptive survey research in accordance with co relational research design. According to Leedy et al (2005) descriptive survey involves acquiring information about one or more groups of people by asking them questions and tabulating their answers. Collecting data from big populations via a descriptive survey research does not take long. It would be possible to make inferences about a certain population based on the sample's replies.

3.3 Types of Data

For this research both primary and secondary data types were used. Primary data of the study were gathered from management bodies, employees, contactors and consultants of the houses Administration Office through questionnaires. According to Kothari (2004), Primary data are fresh data that are gathered for the first time and thus happened to be original in character. On the other hand, the secondary data was collected from different sources such as, websites, books, and journals, periodicals and articles, released by the housing Administration Office.

3.4 Population and Sampling Design

3.4.1. Target Population of Study

Garson (2012) defines population as "the entire set of individuals, events, or items of interest that the researcher needs to study". So as to perform this study, the first step was to get the total number of populations. The target populations of the housing Administration of Addis Ababa city, Currently the Office had more than 220 total population consisting of 7 *management*

bodies, 140 employees, 48 category 1 and 2 contractors and 25 categories 1 and 2 consultants. The study was undertaken so as to draw the sample from these total population.

3.4.2. Sampling Design

3.4.2.1. Sampling Frame

This is a list of elements from which the sample is actually drawn (Jackson, 2009).Thus, the sample frame for this study was comprised of management bodies, employees, contractors and consultants of the corporation found in Addis Ababa City.

3.4.2.2. Sample Size Determination

Sample size, according to Garson (2012), is a subset of the population picked to reflect the complete population. This is owing to the fact that studying a subset of the population is more manageable in terms of time, expense, and accessibility than studying the full population. As a result, the sample size was chosen to represent the entire population. The sample size will be determined in this study using Yamane's (1967) statistical formula, which Mitiku has adapted (2017) and illustrate as: n =N/N (e) 2+ 1

Where,

n = sample size

N = population of the study

e = % level of significance or margin of tolerable error.

The researcher had considered 5% level of significance or margin of tolerable error and the confidential level is 95%. A 95% confidence is conventionally accepted level for most business research, most commonly expressed by denoting the significance level as $p \leq .05$. In other words, we say that at least 95 times out of 100, our estimate will reflect the true population characteristic. By computing the sample size of the population using the above formula, the sample size for both who receives questionnaires and conduct an interview to the study will be; 142

$n = N/N (e)^2 + 1$

$n = 220/220(0.05)^2 + 1$

n= 142. So, 142 sample management bodies, employees, contractors and consultants were respondents who receive questionnaires.

3.4.2.3. Sampling Technique

To conduct the study both Convenient and Stratified sampling techniques were used in combination as a sampling technique. For respondent/participant selection convenient sampling technique is a non-random probability sampling technique that was used to collect the data. This technique was used since respondents was selected because of their convenient, accessible and proximity to the assessors. The sample of the total population will be stratified on the basis of each respondents and calculate using this simple formula (Mitiku, 2017) as shown in table below.

Where X = sample size in each stratum. $X=n\,(p)/N$

n = total sample size of the study who receives questionnaires

P = population size of respondents N = total population of the study

Table 3.1 target population of the study

Respondents	No of pop/p	Sample/n/	Total pop/N/	X =n(p)/N	X
Management bodies	7	142	220	142(7)/220	5
Employees	140	142	220	142(140)/220	90
Contractors	48	142	220	142(48)/220	31
Consultants	25	142	220	142(25)/220	16
Total	220				142

3.5. Data collection instruments

The major instruments were questionnaires, which were carefully prepared to address the study's essential categories or themes. A questionnaire is a research tool used to inform researchers about what they need to know and to elicit the appropriate answer in the form of empirical data from respondents in order to achieve the desired goal. According to Dobis (2016; questionnaire is an instrument for gathering information and quite often including requests that a given subject reacts to a lot of oral or composed inquiries .

A number of variables which influences project success have been proposed. Some variables are common to more than one list, but there is no general agreement on the variables (chan.et al 2004).

Yong and Musttoffain (2012) further suggest that construction success factors could be grouped under different categories depending on the evaluation dimensions that the researchers are looking at.

According to Silva Suvil Kumara and BhadraJinada Hewapattu Arachchige's (2015) research on crucial success elements for construction projects, project success variables reported by many researchers were divided into two major categories from the perspective of contractors. They are ,success factors on which contractors has no or has the least control and success factors on which contractors has full or considerable level of control /influence .

So, based on these assumptions, I focused on the second success element, which was that contractors had a lot of power. In addition, I used Lan Luo and W U Guangdong's (, 2016) and Suvil Kumara and BhadraJinada Hewapattu Arachchige's (2015) model instruments to apply project complexity dimensions and prospective elements that influence project success. The questionnaires were distributed after the expected participants were selected and informed about the purpose of the research. The questionnaire were consists of two parts: section one of the questionnaire contains instruction and respondents' personal information; section two of the questionnaire includes variables which was measured using Likert scale with five response categories (strongly disagree, disagree, neutral, agree, and strongly agree).

3.6 Validity and Reliability of the instruments

3.6.1. Validity of the instruments

According to Kothari (2014), an instrument's validity refers to how well it measures what it's supposed to measure. As a result, it illustrates how well the data acquired with a specific instrument resembles the real study region. The content validity of these instruments were reviewed by research professionals to ensure that the information in the questionnaire was relevant and suited to the study.

3.6.2. Reliability of the instruments

Kothari (2014) further claims that producing consistent results qualifies a measuring instrument as dependable, implying that same results should be produced after multiple administrations of the instrument. Questionnaires were used to conduct reliability tests. The internal consistency approach was employed to establish reliability in this investigation. Cronbach's alpha coefficient was calculated to determine the collection between different items under study. Sakaran (2016) suggests that reliability coefficients closer to 1.0 are considered to be better but as they fall less than 0.60, they are considered to be poor. As a result, coefficients about 0.70 are acceptable, whereas those over 0.80 are desired. In most circumstances, a coefficient of 0.70 or greater is sufficient (Sreevida&Sunitha, 2013).

The questionnaires conducted to the management bodies, employees, contractors and consultants. About 142 questionnaire papers were distributed to get information by closed and open questionnaire. To eliminate subjective, bias, and observer errors with the validity test, the questionnaires were acquired from previous studies.

Table 3.2. Coefficient reliability for each item or instruments

No	**Project complexity dimensions**	**Items in numbers**	Cronbach's alpha val**ue**
1	Information complexity	5	0.89
2	Task complexity	6	0.66
3	Technological complexity	8	0.64
4	Organizational complexity	5	0.82
5	Goal complexity	4	0.66
6	Environmental complexity	1	0.66
7	Project success	5	0.837

- Source; Lan Luo and W U Guangdong Article in journal of management Engineering July 2016.Chonging university

3.7. Method of Data Analysis and Presentation

Data analysis, according to Githinji Angela (2014), is the act of editing and reducing accumulated data to a manageable amount, producing summaries, searching for patterns, and employing statistical methodologies. The researcher edited the data every day to ensure that the responses were comprehensive and logically consistent. The data which was collected by the

researcher were analyzed with the help of the Statistical Package for Social Sciences (SPSS) version 20 and then the researcher had produced descriptive statistics such as frequency distribution, percent, mean and standard deviation. Inferential statistics such as Pearson's correlation and simple linear regression were also used in the study's analysis. The correlation analysis was used to determine the strength of a relationship between project complexity aspects, and the regression analysis was utilized to demonstrate the link between project complexity and project success. Tables were used to illustrate the data, and inferential statistics were calculated using a regression model. I.e., $PS = \beta+\beta1X1+\beta2X2+k\beta3X3+\beta4X4+\beta5X5+\beta6X6+Ɛ$

Where: PS is the dependent variable (project success), and independent variables

X1: is Information complexity

X2: is Task complexity

X3: is Technological complexity

X4: is Organizational complexity

X5: is Goal complexity

X6: is Environmental complexity and

Ɛ -standard error term

3.8 Ethical consideration

The willingness of the respondents to participate in the researcher work study was respected, and verbal agreement was obtained. In any event, the names of participants or workers were not mentioned in the report without their approval. It is confidential. And also, the Questionnaires, and survey tacks place in this study were only for educational purpose and all information in my study has been secrete or not exposed to other external body. In addition to this, in order to guarantee that the research investigation was conducted according to the ethical standards and practices, the researcher obtained an introductory letter from the university and submitted to the corporation.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

This chapter focuses on the analysis of the results of the study. This chapter has two sections, The demographic profile of the respondents is described in the first portion of the chapter. The analysis and interpretation of data acquired by questionnaire and interview in support of the quantitative results are presented in the second section, which is the primary component of the study. The findings were presented in each section in the order of the thesis's basic research questions. The study's descriptive and inferential analyses were provided separately. The data for this study were collected using questionnaire and semi-structured interview guide to identified sample respondents of management bodies, employees, category 1and 2 contractors and consultants. The data was analyzed using Statistical Package for Social Science (SPSS v.20). Data was obtained from 116 respondents using the proposal's techniques, research design, and instruments. Only 116 of the 142 questionnaires issued were returned, with the remainder not returned. As a result, 116 were used for analysis, with 81.69 percent response rate. This is a good response rate; according to Fowler (2002), a response rate of more than 75% is considered appropriate. The following subheadings present the data analysis, discussion, and interpretation of the results: presentation of demographic data and frequency of respondents, analysis of mean, analysis of correlation, and regression coefficient

Research Reliability Test

The ability of an instrument to measure consistently is referred to as reliability. The value of alpha is affected by the number of test items, item interrelatedness, and dimensionality. The allowable alpha values range from 0.70 to 0.95, according to various publications. As a result, in order to assure the questionnaire's reliability, the questionnaire's dependability was tested.

Reliability Test

Case Processing Summary			
		N	%
Cases	Valid	116	100
	Excluded[a]	0	0
	Total	116	100.0
a. Listwise deletion based on all variables in the procedure.			

Reliability Statistics	
Cronbach's Alpha	N of Items
0.714	34

Source, SPSS output of own survey (2021)

The dependability was 0.714 and there was no missing value, as indicated in the above table. As a result, as described in the previous chapter, the reliability was good consistency and reliable for this particular study.

4.1 Descriptive statistics

For all variables and responses, descriptive statistics were produced in the form of frequency distribution, percentage, mean, and standard deviation. The proportion of respondents who chose each response was calculated using a computed frequency distribution and percent. Similarly, the computed mean was used to measure the central tendency on each dimension in the questionnaire, implying that the respondents' levels of agreeability and disagreeability or perceptions on numerous dimensions in the surveys. Furthermore, the standard deviation value reveals how far a result deviates from the mean.

4.1.1 Demographic profile of the respondents

The first section of the questionnaire has four questions about the respondents' demographic information, such as: sex of respondents, age of respondents, academic qualification of respondents and work experience of the respondents; this helped the researcher to understand the characteristics of respondents with in different categories and the following table summarized the demographic data of the respondents.

Table 4.1 Demographic profile of the respondents

No	Items	No=116	Frequency	Percent (%)	Rank
1	Sex of the respondents	Male	62	53.4	1
		Female	54	46.6	2
2	Age of the respondents	20-30	25	21.6	3
		31-40	48	41.4	1
		41-50	28	24.1	2
		51&above	15	12.9	4
3	Academic qualification of the respondents	Diploma	8	6.9	3
		Degree	97	83.6	1
		Masters &above	11	9.5	2
4	Work Experience of the respondents	Till 5 years	20	17.2	3
		6-10	45	38.8	1
		11-20	21	18.10	2
		21-30	17	14.7	4
		31& above years	13	11.2	5

Source; SPSS output of own survey (2021

As shown in Table 4.1, more than 62 (53.4 %) of the respondents were male and the remaining 54 (46.6%) of the respondents were female. Even though, the representation of female respondents was found to be less as compared to male respondents, this gender mix was rational and enables the researcher that there is no bias in the survey instrument related to the gender of the respondents to realize about the effect of project complexity on project success (housing development in Addis Ababa city housing development and corporation.

Regarding the age of respondents, the first group 48(41.40 %) of respondents were within the age category of 31-40 years of age. The second group had 28(24.10%) within the age category of 41-50 years. The third were 25 (21.6 %) within the age category of 20-30 years. The fourth were 15 (12.9 %) within 51& above age categories.

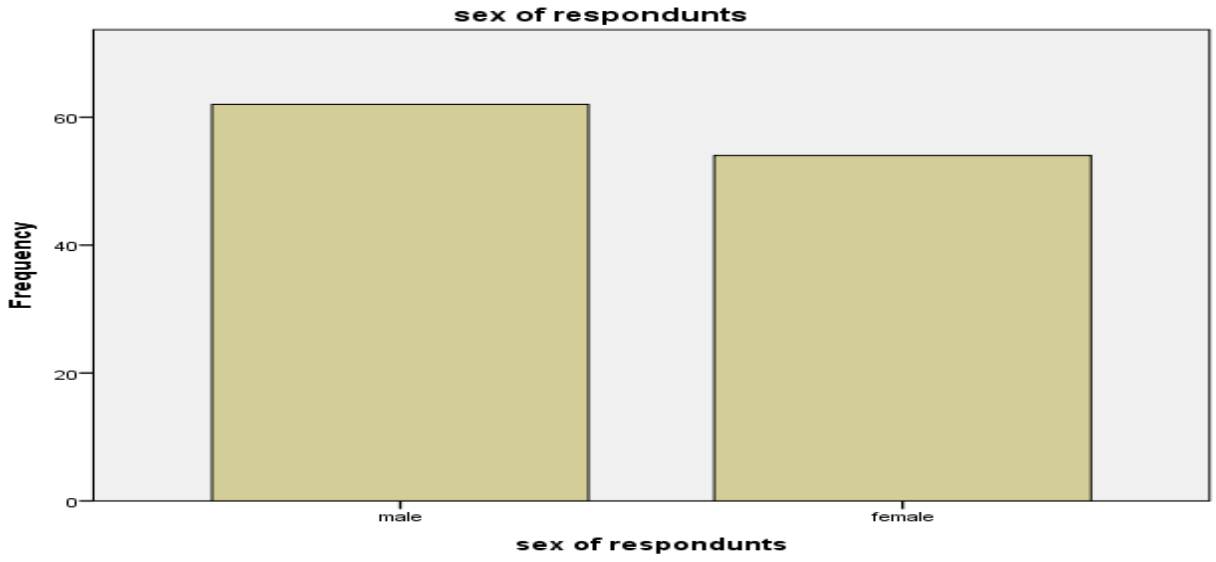
In general, the majority 73(63%) of the respondents were within the age category of 20-40 years; which implies that the majority of the respondents were young and at the active age level, or at the better work force.

With regard to academic qualification of the respondents, the majority 97(83.6%) of the respondents were first degree holders. The second group 11(9.5 %) of the respondents were holders of 2nd Degree or above. And the rest 8(4.3%) of the respondents were diploma holders. This shows that, 108(93.1%) of the respondents were first- and second-degree holders who were suitable to understand the issue of project complexity.

Regarding the work experience of the respondents, the first group of respondents 45(38.8%) had a working experience of 6 to 10 years. 21(18.10%) of respondents had served in the corporation between 11-20 years. 20(17.2%) of respondents had served in the corporation less than or equal to 5 years. 17(14.7 %) of respondents had served in the corporation between 21-30 years. And lastly, 13(11.2%) of respondents had served in the corporation 31 and above. As a whole, the majority 66(56.9%) of the respondents had served in the corporation 6-20 years. This result implies that, the selected respondents answered the survey questionnaire appropriately based on their project management experience.

Bar charts of the demographic variables: -The following bar charts clearly depict the gender of respondents, their academic qualifications, and their employment experience.

Figure 4.1 Bar chart of gender of respondents



Level of education

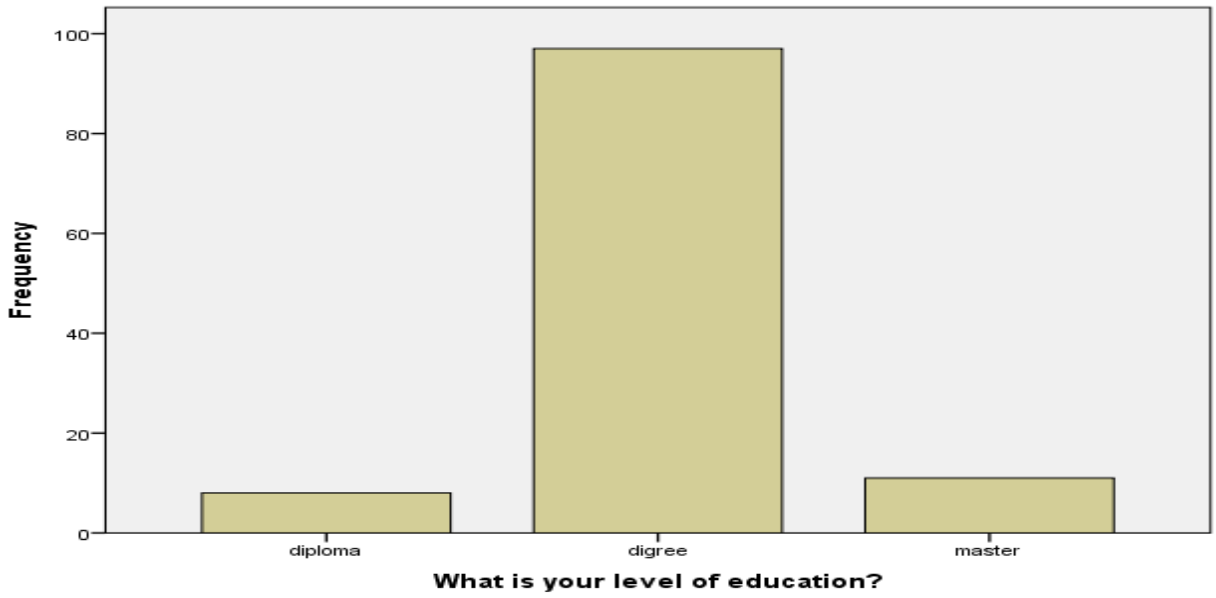


Figure 4.2 Bar chart of education level of respondents

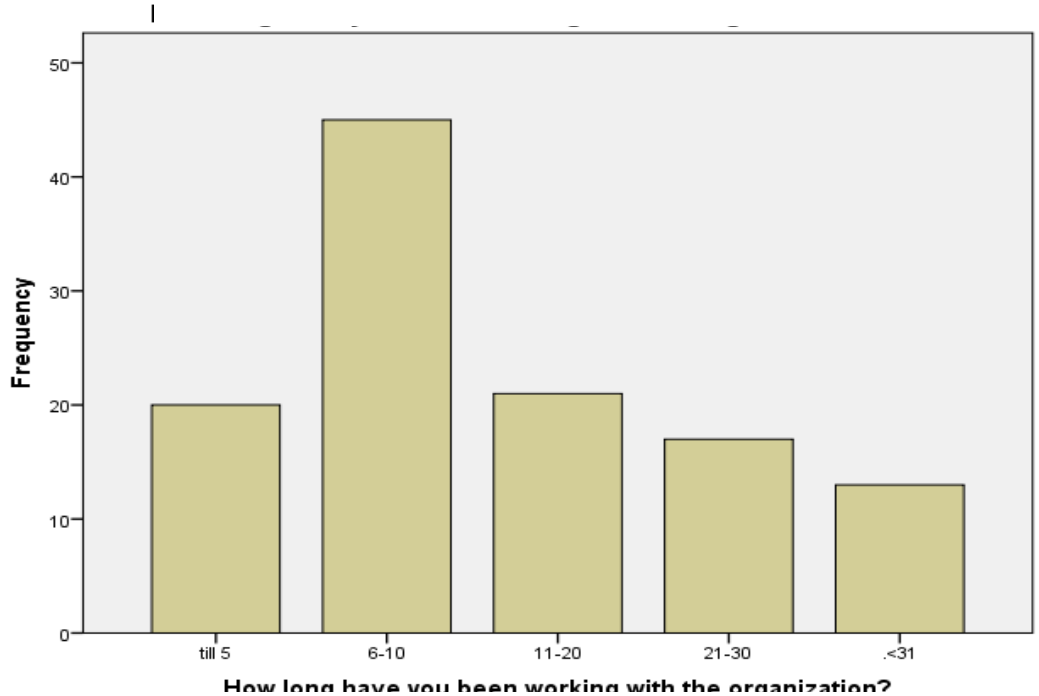


Figure 4. 3 Bar chart of working experience of respondents

4.1.2 Perception of the respondents on each items of the relationship between project complexity and project success

4.1.2.1 Information complexity

Table 4.2 perception of respondents on information complexity

No	Items	N=116	Frequency	Percent (%)	Mean	SD
1	Detailed project planning estimation and scheduling (IC1)	SDA	16	13.8	2.88	1.17
		DA	27	23.3		
		N	39	33.6		
		A	23	19.8		
		SA	11	9.5		
2	Frequent project monitoring progress meeting (IC2	SDA	11	9.5	2.94	1.02
		DA	25	21.6		
		N	46	39.7		
		A	28	24.10		
		SA	6	5.2		
3	Effective management of project meeting (IC3	SDA	20	17.2	2.66	1.11
		DA	34	29.3		
		N	30	25.9		
		A	29	25		
		SA	3	2.6		
4	Clarity of roles& responsibility (IC4)	SDA	6	5.2	2.88	1.14
		DA	30	25.9		
		N	40	34.5		
		A	22	19		
		SA	18	15.5		
5	Establishing effective document control system (IC5)	SDA	14	12.10	3.14	1.13
		DA	33	28.4		
		N	30	25.9		
		A	31	26.7		
		SA	8	6.9		
Overall information complexity assessment score					2.94	.54

Table 4.2 presents the perceptions of the respondents on information complexity assessment. Items were measured in terms of the calculation of their frequency distribution, percent, mean and standard deviation. Based on the result each item is discussed in detail as follows.

As indicated in table 4.2 for the statement of detailed project planning estimation and scheduling (IC1),39(33.6%) of the respondents neither agreed nor disagreed and the lowest amount

11(9.5%) of the respondents strongly agreed. Likewise, 16 (9.5%) of the respondents expressed their strong disagreement. The rest 27(23.3%) and 23(19.8%) of the respondents disagreed and were agreed respectively. As well, the mean (±SD) of detailed project planning estimation and scheduling (IC1) was 2.88(±1.17). This result implies that detailed project planning estimation and scheduling was not implemented properly by the corporation.

As shown in table 4.2 for the statement. Frequent project monitoring and progress meeting (IC2), 46(39.7%) of the respondents neither agreed nor disagreed and the lowest amount 6(5.2%) of the respondents strongly agreed.

On the other hand 11(9.5%) of the respondents expressed their strong disagreement. The remaining 28(24.10%) and 25(21.6%) of the respondents agreed and were disagreed respectively. Also, the mean (±SD) of Frequent project monitoring and progress meeting (IC2) assessment score was 2.94(±1.02). From this result the researcher understood that the corporation doesn't have frequent project monitoring and progress meeting.

As mentioned in table 4.2 for the statement effective management of project meeting (IC3),34(29.3%)of the respondents answered disagree, followed by 30(25.9%)of the respondents who said neither agreed nor disagree.29(25%),20(17.2%)and 3(2.6%)of the respondents choose agree, strongly disagree, and strongly agree respectively. Nearly half 54(46.5%) of the respondents were in the position of disagree. The mean (±SD) of management of project meeting (IC3) was 2.66(±1.11). This finding implies that there was inefficient management of project meeting at the corporation.

As pointed in table 4.2 for the statement Clarity of roles &responsibility (IC4) ,40(34.3%) of the respondents neither agreed nor disagree followed by 30(25.9%) of the respondents who said disagree. The response rates 22(19%),18(15.5%)and 6(5.2%)of the respondents revealed agree, strongly agree and strongly disagree respectively .Likewise, the mean (±SD) of Clarity of roles & responsibility (IC4) was 2.88(±1.14) .This finding also suggests that there was no Clarity of roles & responsibilities at the corporation .

Table 4.2presents also the perception of respondents on Establishing effective document control system (IC5), 33(28.4%) of the respondents disagree followed by 31(26.7%) of the respondents who said agree. and the response rates, 30(25.9%), 14(12.10%) and 8(6.9%) of the respondents

revealed neutral, strongly disagree and strongly agree respectively. The mean (±SD) of effective document control system (IC5) was 3.14(±1.13).

In sum, as illustrated in table 4.2 all information complexity (IC) dimensions mean assessment score was 2.94(±.54). This finding shows that the understanding and implementation of information complexity at the corporation was not fully addressed.

4.1.2.2 Task complexity

Table 4.3 perception of respondents on task complexity

No	Items	N=116	Frequency	Percent (%)	Mean	SD
1	Top management support and commitment to the project (TAC1)	SDA	32	27.6	2.45	1.27
		DA	38	32.8		
		N	17	14.7		
		A	20	17.2		
		SA	9	7.8		
2	Effective project risk management system or process (TAC2)	SDA	45	38.8	2.32	1.35
		DA	27	23.3		
		N	15	12.9		
		A	20	17.2		
		SA	9	7.8		
3	Effective site management control and coordination (TAC3)	SDA	42	36.2	2.52	1.27
		DA	0	0		
		N	54	46.6		
		A	12	10.3		
		SA	8	6.9		
4	Contractors experience (TAC4)	SDA	32	27.6	2.49	1.31
		DA	33	28.4		
		N	27	23.3		
		A	10	8.6		
		SA	14	12.10		
5	Administrative and bureaucracy (TAC5)	SDA	48	41.4	2.29	1.37
		DA	25	21.6		
		N	15	12.9		
		A	18	15.5		
		SA	10	8.6		
6	Availability of resources as planned throughout the project (TAC6) for the statement of	SDA	50	43.10	2.23	1.35
		DA	23	19.8		
		N	19	16.4		
		A	14	12.10		
		SA	10	8.6		
Overall information complexity assessment score					2.94	.543

Table 4.3 presents the perception of respondents on task complexity dimensions of project complexity, items were measured in terms of the calculation of their frequency distribution, percent, mean and standard deviation. Based on the result each item is discussed in detail as follows.

As shown in table 4.3 for the statement top management support and commitment to the project (TAC1), 38(32.8%) of the respondents answered disagree followed by 32(27.6%) of the respondents who said strongly disagree. And the response rates,20(17.2%),17(14.7%) and 9(7.8%) of the respondents tells their agreement, neither agreed nor disagree and strongly agree respectively. In addition, the mean (±SD) of top management support and commitment to the project (TAC1) was 2.45 (±1.27). This finding implies that there was no or in adequate top management support and commitment to the project (TAC1).

As indicated in table 4.3 for the statement of effective project risk management system or process (TAC2),45(38.8%) of the respondents answered strongly disagree followed by the response rate 27(23.3%) of the respondents choose disagree. And the rest 20(17.2%),15(12.9%)and 9(7.8%) response rate of the respondents agreed, neither agreed nor disagreed and strongly agree respectively .The mean(±SD) of effective project risk management system or process (TAC2) was 2.32(±1.35) which implies there was no or in adequate project risk management system or process in the corporation.

As pointed in table 4.3 for the statement of effective site management control and coordination (TAC3),54(46.6%) of the respondents answered neither agreed nor disagreed followed by the response rate 42(36.2%) of the respondents choose strongly disagree:And the response rates, 12(10.3%) and 8(6 .9%). Of the respondents tells agree and strongly agree and no one choose disagree. The mean (±SD) of effective site management control and coordination (TAC3) was 2.32 (±1.35). This finding implies that there was no or inefficient site management control and coordination in the corporation.

As shown in table 4.3 for the statement of Contractors experience (TAC4), 33(28.4%) of the respondents answered disagree followed by 32(27.6%) of the respondents choose strongly disagree. And the response rates, 27(23.3%),14(12.10%) and 10(8.6 %) of the respondents revealed neutral, strongly agree and agree respectively.

The mean (±SD) of Contractors experience (TAC4) was 2.49(±1.31). This finding implies that there wasn't adequate Contractors experience.

As pointed in table 4.3 for the statement of Administrative and bureaucracy (TAC5), 48(41.4%) of the respondents answered strongly disagree followed by 25(21.6%) of the respondents choose disagree. And the response rates, 18(15.5%),15(12.9%) and 10(8.6 %) of the respondents revealed agree, neutral and strongly agree respectively. The mean (±SD) of Administrative and bureaucracy (TAC5) was 2.29(±1.37). This finding implies that there was no Administrative and bureaucracy.

In table 4.3 for the statement of availability of resources as planned throughout the project (TAC6) ,50(43.10%) of the respondents answered strongly disagree followed by23(19.8%) of the respondents choose disagree. And the rest response rates 19((16.4%),14(12.10%) and 10(8.6%) of the respondents revealed, neutral, a gree and strongly agree respectively. The mean (±SD) of the availability of resources as planned throughout the project (TAC6) was 2.23(±1.35). This finding implies that there were no adequate resources as planned throughout the project.

In total, as presented in Table 4.3, the overall task complexity assessments mean score was 2.94(± 0.543).

4.1.2.3 Technological complexity

Table 4.4 perception of respondents on Technological complexity

No	Items	N=116	Frequency	Percent (%)	Mean	SD
1	Availability of experienced professionals and skill full work force /staff (TEC1)	SDA	44	37.9	2.22	1.26
		DA	33	28.4		
		N	17	14.7		
		A	14	12.10		
		SA	8	6.9		
2	Clear and detailed procurement process and strategy(TEC2)	SDA	30	25.9	2.34	1.28
		DA	48	41.4		
		N	12	10.3		
		A	14	12.1		
		SA	12	10.3		
3	Team leader project management knowledge ,experience and skills (TEC3)	SDA	42	36.2	2.17	1.14
		DA	32	27.6		
		N	27	23.3		
		A	10	8.6		
		SA	5	4.3		
4	Adequacy of designed details and specification (TEC4)	SDA	16	13.8	2.88	1.17
		DA	27	23.3		
		N	39	33.6		
		A	23	19.8		
		SA	11	9.5		
5	Level of usages of IT (TEC5)	SDA	40	34.5	2.41	1.4
		DA	30	25.9		
		N	20	17.2		
		A	10	8.6		
		SA	16	13.6		
6	Availability of advanced technologies /construction equipment's (TEC6)	SDA	38	32.8	2.38	1.23
		DA	27	23.3		
		N	25	21.6		
		A	21	18.1		
		SA	5	4.3		
7	Adequate technological knowledge and transfer (TEC7)	SDA	58	50	1.72	.92
		DA	42	36.2		
		N	11	9.5		
		A	5	4.3		
		SA	0	0		
8	Adequate training and skill development program (TEC8)	SDA	24	20.7	2.26	0.92
		DA	49	42.7		
		N	35	30.2		
		A	5	4.3		
		SA	3	2.6		
Overall technological complexity assessment score					2.97	0.54

Table 4.4 presents the perception of respondents on technological complexity dimensions of project complexity, items were measured in terms of the calculation of their frequency distribution, percent, mean and standard deviation. Based on the result each item is discussed in detail as follows.

As pointed in table 4.4 for the statement of Availability of experienced professionals and skill full work force /staff (TEC1), 44(37.9%) of the respondents answered strongly disagree followed by 33(28.4%) of the respondents choose disagree. And the response rates, 17(14.7%),14(12.10%) and 8(6.9 %) of the respondents revealed neutral, agree and strongly agree respectively. The mean (±SD) of the availability of experienced professionals and skill full work force /staff (TEC1) was 2.22(±1.26). This finding implies that there was no or inadequate availability of experienced professionals and skill full work force /staff.

As mentioned in table 4.4 for the statement Clear and detailed procurement process and strategy(TEC2) , 48(41.4%)of the respondents answered disagree, followed by 30(25.9%)of the respondents who said strongly disagree .14(12.10%),12(10.3%)and 12(10.3%)of the respondents choose agree and they similarly choose neutral and strongly agree .

The mean (±SD) of Clear and detailed procurement process and strategy (TEC2) was 2.34(±1.28). This finding also implies that there was lack of Clear and detailed procurement process and strategy at the corporation.

As pointed in table 4.4 for the statement of Team leader project management knowledge, experience and skills (TEC3)), 42(36.2%) of the respondents answered strongly disagree followed by 32(27.6%) of the respondents choose disagree. And the response rates, 27(23.3%), 10(8.6%) and 5(4.3 %) of the respondents revealed neutral, agree and strongly agree respectively. The mean (±SD) of the team leader project management knowledge, experience and skills was 2.17(±1.14). This finding implies that there was no team leader project management knowledge, experience and skills.

As indicated in table 4.4 for the statement of Adequacy of designed details and specification (TEC4), 39(33.6%) of the respondents answered neither agreed nor disagree followed by the response rate 27(23.3%) of the respondents choose disagree. And the rest 23(19.8%),16(13.8%)and 11(9.5%) response rate of the respondents agreed, strongly disagree

and strongly agree respectively .The mean (±SD) of Adequacy of designed details and specification was 2.88(±1.17) which implies there was no or in adequate designed details and specification in the corporation.

As mentioned in table 4.4 for the statement Level of usages of IT (TEC5), 40(34.5%) of the respondents answered strongly disagree, followed by 30(25.9%)of the respondents who said disagree.20(17.2%),16(13.6%)and 10(8.6%)of the respondents choose neutral, strongly agree and agree respectively . The mean (±SD) of Level of usages of IT was 2.41 (±1.4). This finding also implies that there was low Level of usages of IT at the corporation.

In table 4.4 for the statement availability of advanced technologies /construction equipment's (TEC6), 38(32.8%)of the respondents answered strongly disagree, followed by 27(23.3%)of the respondents who said disagree.25(21.6%),21(18.10%)and 5(4.3%)of the respondents choose neutral, agree and strongly agree respectively . The mean (±SD) of advanced technologies /construction equipment's was 2.38 (±1.23). This finding also implies that there was no availability of advanced technologies /construction equipment's at the corporation.

As pointed in table 4.4 for the statement of adequate technological knowledge and transfer (TEC7), more than half 58 (50 %) of the respondents answered strongly disagree followed by 42(36.2%) of the respondents choose disagree. And the response rates, 11(9.5 %) and 5(4.3 %) of the respondents choose neutral and agree.

And no one select strongly agree measurement scale. The mean (±SD) of the adequate technological knowledge and transfer was 2.26(±.92). This finding tells there was no adequate technological knowledge and transfer at the corporation.

As pointed in table 4.4 for the statement of Adequate training and skill development program (TEC8), 49(42.7%) of the respondents answered disagree followed by 35(30.2%) of the respondents were neither agreed nor disagreed. And the response rates, 24(20.7%),5(4.3%) and 3(2.6 %) of the respondents revealed strongly disagreed, agree and strongly agree respectively. The mean (±SD) of adequate training and skill development program was 2.26(±.92). This finding implies that there was no or inadequate training and skill development program in the corporation.

In general, as presented in Table 4.4, the overall technological complexity assessment mean score was 2.97(± 0.54).

4.1.2.4 Organizational complexity

Table 4.5 perception of respondents on Organizational complexity

No	Items	N=116	Frequency	Percent (%)	Mean	SD
1	Developing an appropriate organizational structure(0C1)	SDA	10	8.6	3.07	.99
		DA	20	17.2		
		N	41	35.3		
		A	42	36.2		
		SA	3	2.6		
2	Effective allocation and control of man power(OC2)	SDA	10	8.6	2.86	1.12
		DA	41	35.3		
		N	30	25.9		
		A	25	21.6		
		SA	10	8.6		
3	Effective project team formation (OC3)	SDA	13	11.2	2.85	1.11
		DA	30	25.9		
		N	45	38.8		
		A	17	14.7		
		SA	11	9.5		
4	Man power or labor productivity (OC4)	SDA	10	8.6	3.35	1.26
		DA	25	21.6		
		N	18	15.5		
		A	40	34.5		
		SA	23	19.8		
5	Adequate carrier development program(0C5)	SDA	21	18.10	2.72	1.16
		DA	30	25.9		
		N	32	27.6		
		A	27	23.3		
		SA	6	5.2		
Overall Organizational complexity assessment score					3.02	.58

Table 4.5 presents the perception of respondents on organizational complexity dimensions of project complexity, items were measured in terms of the calculation of their frequency distribution, percent, mean and standard deviation. Based on the result each item is discussed in detail as follows.

As illustrated in table 4.5 for the statement developing an appropriate organizational structure(0C1),42(36.2%) of the respondents answered strongly disagree, followed by 41(35.3%)of the respondents who said neither disagreed nor agreed .20(17.2%),10(8.6 %)and 3(2.6%)of the respondents choose disagreed , strongly disagree and strongly agree respectively . The mean (±SD) of developing an appropriate organizational was 3.07(±1.99). This finding implies that there was no an appropriate organizational structure at the corporation.

As indicated in table 4.5 for the statement of effective allocation and control of man power (OC2), 41(35.3%) of the respondents choose disagreed followed by the response rate 30(25.9%) of the respondents answered neutral. 25(21.6%) agreed, whereas, the remaining equally 10 (8.6 %) strongly disagreed and strongly agreed. The mean (±SD) of effective allocation and control of man power was 2.86(±1.12).Which implies there was no effective allocation and control of man power within the corporation.

As pointed in table 4.5 for the statement of effective project team formation (OC3), 45(38.8%) of the respondents answered neither disagree nor agree followed by 30(25.9%) of the respondents disagreed .And the response rates, 17(14.7%), 13(11.2%) and 11(9.5 %)of the respondents revealed agreed ,strongly disagreed and strongly agree respectively. The mean (±SD) of effective project team formation was 2.85(±1.11). This finding implies that there was inefficient project team formation in the corporation.

As illustrated in table 4.5 for the statement man power or labor productivity (OC4), 40(34.5%) of the respondents answered agree followed by 25(21.6%) of the respondents were disagreed. And the response rates,23(19.8%),18(15.5%) and 10(8.6%) of the respondents revealed, strongly agreed, neither disagreed nor agree and strongly disagree respectively. The mean (±SD) of man power or labor productivity was 3.35(±1.26). This finding implies that there was man power or labor productivity but the corporation did not utilize it well.

In table 4.5 for the statement of adequate carrier development program (0C5),32(27.6%) of the respondents answered neither disagree nor agree followed by30(25.9%) of the respondents choose disagree. And the rest response rates 27((23.3%), 21(18.10%) and 6(5.2%) of the respondents revealed, agree, strongly disagree and strongly agree respectively.

The mean (±SD) of adequate carrier development program was 2.72(±1.16). This finding implies that there were no or inadequate carrier development program in the corporation.

In general, as presented in Table 4.5, the overall organizational complexity assessment mean score was 3.02(±0.58).

4.1.2.5 Goal complexity

Table 4.6 perception of respondents on goal complexity

No	Items	N=116	Frequency	Percent (%)	Mean	SD
1	Clearly defined scope, goal and objective (GC1)	SDA	12	10.3	2.97	1.13
		DA	26	22.4		
		N	45	38.8		
		A	20	17.2		
		SA	13	11.2		
2	Managing and control of subcontractor's work/(GC2)	SDA	43	37.10	2.19	1.11
		DA	27	23.3		
		N	27	23.3		
		A	19	16.4		
		SA	0	0		
3	Effective contract management system (GC3)	SDA	9	7.8	3.56	1.24
		DA	17	14.7		
		N	20	17.2		
		A	40	34.5		
		SA	30	25.9		
4	Team member commitment (GC4)	SDA	4	3.4	3.39	.91
		DA	17	14.7		
		N	30	25.9		
		A	60	51.7		
		SA	5	4.3		
Overall Organizational goal complexity assessment score					2.97	.54

Table 4.6 presents the perception of respondents on goal complexity dimensions of project complexity, items were measured in terms of the calculation of their frequency distribution,

percent, mean and standard deviation. Based on the result each item is discussed in detail as follows.

As pointed in table 4.6 for the statement of clearly defined scope, goal and objective (GC1), 45(38.8%) of the respondents answered neither agreed nor disagree followed by 26(22.4%) of the respondents choose disagree. And the response rates, 20(17.2%), 13(11.2%) and 12(10.3 %) of the respondents revealed, agree, strongly agree and strongly disagree respectively. The mean (±SD) of clearly defined scope, goal and objective was 2.97(±1.13). This finding implies that there was lack of clearly defined scope, goal and objective in the corporation.

As indicated in table 4.6 for the statement of managing and control of subcontractors work (GC2), 43(37.10%) of the respondents answered strongly disagree followed by the response rate 27(23.3%) of the respondents choose disagree. And the remaining 27 (23.3%) and 19 (16.4%) response rate of the respondents neither disagreed nor agreed and agree. The mean (±SD) of managing and control of subcontractor's work was 2.19(±1.11) which implies there was lack managing and control of subcontractors work in the corporation.

As mentioned in table 4.6 for the statement of effective contract management system (GC3) , 40(34.5%)of the respondents answered agree followed by 30(25.9%)of the respondents who said strongly agree. 20(17.2%),17(14.7%) and 9(7.8%) of the respondents choose neutral, disagree and strongly disagree respectively. The mean (±SD) of effective contract management system was 23.56 (±1.24). This finding also implies that there was inefficient contract management system at the corporation.

In table 4.6 for the statement team members commitment (GC4), more than half 60(51.7%) of the respondents answered agree followed by, 30(25.9%) of the respondents who said neither agreed nor disagree. 17(14.7%), 5(4.3%) and 4(3.4%) of the respondents choose disagree, strongly agree and strongly disagree respectively. The mean (±SD) of team members commitment was 3.3 (±0.91).This finding indicates that there was proportional team members commitment but the corporation did not utilize well.

In Table 4.6, the overall goal complexity assessments mean score was 2.97(±0.54).

4.1.2.6. Environmental complexity

Table 4.7 perception of respondents on Environmental complexity

No	Items	N=116	Frequency	Percent (%)	Mean	SD
1	Implementing an effective health and safety program(EC)	SDA	5	4.3	3.31	.99
		DA	18	15.5		
		N	40	34.5		
		A	42	36.2		
		SA	11	9.5		
Overall Organizational Environmental complexity assessment score					3.31	.99

As illustrated in table 4.7 for the statement implementing an effective health and safety program (EC), 42(36.2%) of the respondents answered agree followed by 40(34.5%) of the respondents were neither agreed nor disagreed. And the response rates, 18(15.5%), 11(9.5%) and 5(4.3%) of the respondents revealed, disagreed, strongly agreed and strongly disagree respectively. The mean ($\pm$SD) of implementing an effective health and safety program was 3.31($\pm$0.99). This finding implies that there was no implementation an effective health and safety program in the corporation.

4.1.3. Project Success

Table 4.8 perception of respondents on Project Success

No	Items	N=116	Frequency	Percent (%)	Mean	SD
1	Effective quality assurance programme (PS1)	SDA	8	6.9	3.27	1.02
		DA	15	12.9		
		N	41	35.3		
		A	42	36.2		
		SA	10	8.6		
2	Adequate funds /cash flows management (PS2)	SDA	28	24.1	2.64	1.33
		DA	33	28.4		
		N	21	18.1		
		A	21	18.1		
		SA	13	11.2		
3	Adequate communication among all project participants (PS3)	SDA	30	25.9	2.52	1.34
		DA	39	33.6		
		N	20	17.2		
		A	11	9.5		
		SA	16	13.8		
4	High degree of trust shared by project participants (PS4)	SDA	8	6.9	3.33	1.04
		DA	15	12.9		
		N	35	30.2		
		A	47	40.5		
		SA	11	9.5		
5	Employee (staff) motivation and satisfaction (PS5)	SDA	3	2.6	2.93	.98
		DA	45	34.5		
		N	40	38.8		
		A	18	15.5		
		SA	10	8.6		
Overall project success assessment score					3.04	.58

Table 4.8 presents the perception of respondents on project success; items were measured in terms of the calculation of their frequency distribution, percent, mean and standard deviation. Based on the result each item is discussed in detail as follows.

As indicated in table 4.8 for the statement of effective quality assurance programme (PS1), 42(36.2) of the respondents answered agreed followed by the response rate 41(35.3%) of the respondents choose neither agreed nor disagree.

And the rest 15(12.9%), 10(8.6%) and 8(6.9%) response rate of the respondents disagreed, strongly agree and strongly agree respectively. The mean (±SD) of effective quality assurance program was 3.27(±1.02) which implies there was no effective quality assurance programme in the corporation.

As mentioned in table 4.8for the statement adequate funds /cash flows management (PS2), 33(28.4%)of the respondents answered disagree, followed by 28(24.10%)of the respondents who said strongly disagree.21(18.10%), similarly choose neutral and agree whereas,13 (11.2%) of the respondents choose strongly agree. The mean (±SD) of adequate funds /cash flows management was 2.64 (±1.33). This finding also implies that there was low or inadequate funds /cash flows management at the corporation.

In table 4.8 for the statement adequate communication among all project participants (PS3), 39(33.6%) of the respondents answered disagree, followed by 30(25.9%) of the respondents who said strongly disagree. The response rates 20(17.2%), 16(13.8%) and 11(9.5%) of the respondents choose neutral, strongly agree and agree respectively. The mean (±SD) of adequate communication among all project participants was 2.52(±1.34). This finding also implies that there was no or inadequate communication among all project participants at the corporation.

As pointed in table 4.8for the statement of high degree of trust shared by project participants (PS4)), 47(40.5 %) of the respondents answered agree followed by 35(30.2%) of the respondents choose neutral. And the response rates, 15(12.9%), 11(9.5%), and 8(6.9%) of the respondents choose disagree, strongly agree and strongly disagree respectively. The mean (±SD) of the adequate technological knowledge and transfer was 3.33(±1.04). This finding tells there was lack trust shared by project participants at the corporation.

As pointed in table 4.8 for the statement of employee (staff) motivation and satisfaction (PS5), 45(38.8%) of the respondents answered disagree followed by 40(34.5%) of the respondents were neither agreed nor disagreed And the response rates, 18(15.5%), 10(8.6%) and 3(2.6 %)of the respondents revealed agreed ,strongly agree and strongly disagree respectively. The mean

(±SD) of employee (staff) motivation and satisfaction was 2.93(±0.98). This finding implies that there was no employee (staff) motivation and satisfaction in the corporation.

In general, as presented in Table 4.9, the overall project success assessment mean score was 3.04(± 0.58).

4.2 Results of Inferential Statistics

4.2.1 Correlation analysis

As envisaged in the framework, correlation was employed to determine the link between independent factors (project complexity) and dependent variables (project success). The amount and direction of a linear relationship between variables are expressed quantitatively by a correlation coefficient. The Pearson correlation coefficient shows the magnitude and direction of (either positive or negative) and the strength of the relationship (-1 to +1).The researcher used one of the most commonly used types of correlation coefficient, I, e Pearson correlation coefficient methods because of the statistical accuracy that usually results from this method .The strength of correlation would be interpreted through suggestion bay Evans (1996) as shown in the following pattern.

0.00 - 0.19 very weak

0.2 - 0.39 weak

0.4 - 0.59 Moderate

0.6 - 0.79 strong

0.8 -1.0 very strong.

Table 4.9 Pearson's correlation analysis

	Project success	Project complexity
Project success - Pearson correlation	1	.922
Sig (2 –tailed)		0.000
N	116	116
Project complexity -Pearson correlation	0.922	1
Sig (2 –tailed)	0.000	
N	116	116
**correlation is significant at the 0.01 level (2-tailed)		

Source- SPSS output of own survey (2021).

As indicated in table 4.9 the result tells that a very strong and positive linear correlation exists among project complexity and project success (r -0.922 p= 0.000 < 0.01) which is significant. This means strategic understanding of project complexity has positive effect on project success.

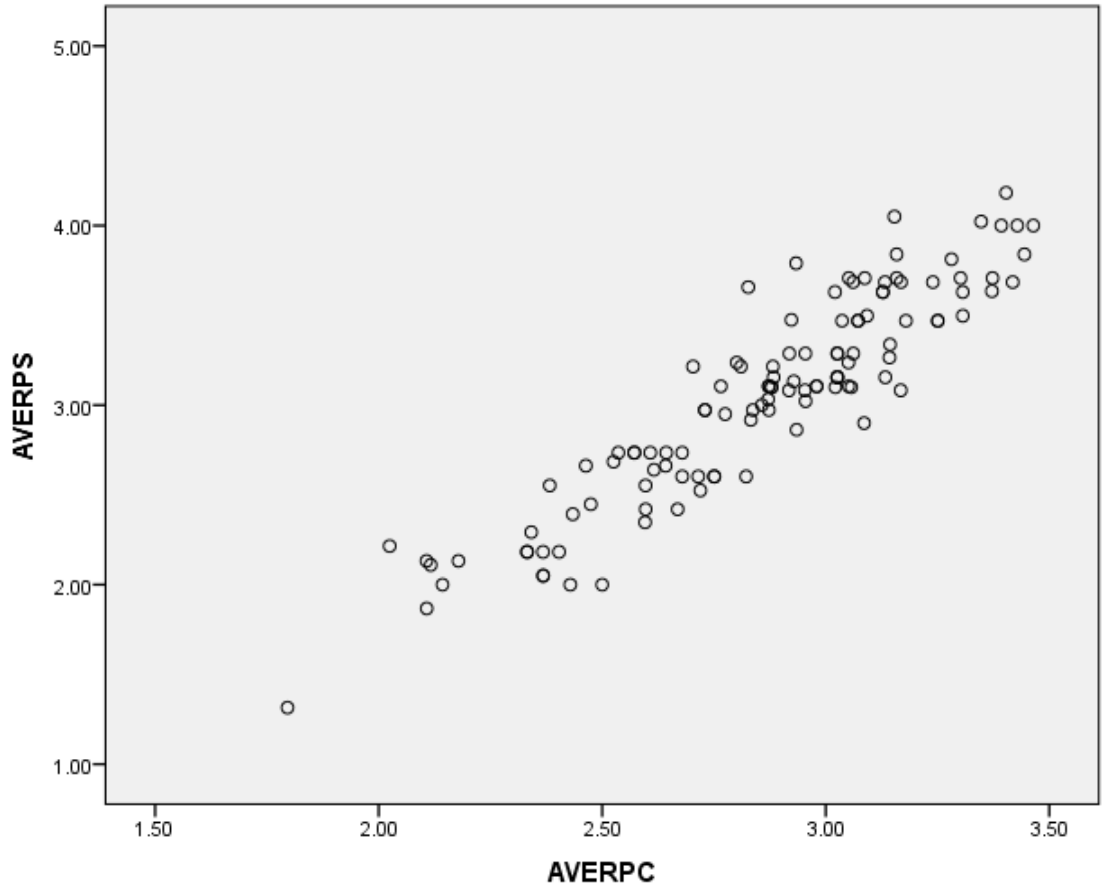
4.2.2 Regression Analysis

This section investigates how the variation of the dependent variable (project success) is explained by a portion variation of the independent variation project complexity. Moreover, linear regression analysis was used to examine the effect of the independent variable (project complexity) on the dependent variable (project success). To achieve this, the researcher found the coefficient of determination and test its significance and to determine the regression line and test its slope. The coefficient of determination R^2 (a square of the correlation coefficient between dependent variable) shows how much of the variation of the dependent variable (project success) can be explained by a portion variation of the independent variable (project complexity). Before directly go to the application of regression analysis let's see basic assumptions. These are normality of the distribution, **;** Homoscedasticcity & Heteroscedasticity; linearity of the relationship between the independent and dependent variables and multicollinearity tests which have shown below:

Assumption 1; linearity of the relationship test

The linearity test shows that there is a linear relationship between project complexity and project success based on the scatter plot. The test results reveal that the scatter plot has a significant linear relationship in this study.

Figure 4.4 scatter plot to show linearity of the relationship



AVERPC= Average project complexity, AVERPS=Average project success

Source; SPSS output of own survey (2021)

Assumption 2; Homoscedasticcity & Heteroscedasticity

The test for the assumptions of homoscedasticity which shows that is generally assumed to have an unknown but finite variance that is constant across all predictor variables (Williams, Grajales, & Kurkiewicz, 2013) in project complexities.

The presence of heteroscedasticity assumption was also checked by plotting standardized residuals against the predicted value (project success) ,which means if there are any outlier, the standardized residuals from each participant group regression were plotted against the standardized value (warner,2012). The visual observation of the plots in the above figure shows residuals were not equally scattered around 0.due to this it can be concluded that there was no indication of pattern (heteroscedasticity) as shown in the above figure.

Assumption 3; normality distribution test

The independent variable (project complexity) dimensions must be regularly distributed in regression analysis. Skewness and kurtosis are statistical methods that can be used to determine whether or not data is normally distributed. According to Smith and Wells (2006), kurtosis is defined as property of a distribution that describes the thickness (peachiness) of the tails. The amount of scores falling at the extremes of the normal distribution contributes to the tail's thickness. Skewness is a symmetry/balance metric. The Skewness and Kurtosis test findings for this study are within the permitted range (-1.0 to +1.0), hence the data for all variables are normally distributed.

Table 4.10 normality distribution test

independent variable	N valid statistic	Skewness		Kurtosis	
		Statistic	Std error	Statistic	Std error
Information complexity	116	-0.006	0.225	-1.57	0.446
Task complexity	116	-0.006	0.225	-1.57	0.446
Technological complexity	116	-0.225	0.225	-0.204	0.446
Organizational complexity	116	-0134	0.225	-0.176	0.446
Goal complexity	116	-0.095	0.225	-0.176	0.446
Environmental complexity	116	-0.332	0.225	-0.276	0.446

Source; SPSS output of own survey (2021)

Assumption 4: Multicollinearity Test

It refers to the situation in which the independent variables (project complexity) are highly correlated. Multicollinearity was tested in this study using tolerance and variance inflation factor (VIF) statistics. According to Andy (2006), a tolerance value of less than 0.1 nearly often indicates a major co linearity problem. According to Burns and Burns (2008), VIF values larger than 10 have a problem with normalcy concerns.

Table 4.11 multicollinearity test result

Coefficient[sa]		
Model	Collinearity statistics	
1	Tolerance	VIF
Information complexity	0.483	2.072
Task complexity	0.393	2.547
Technological complexity	0.479	2.087
Organizational complexity	0.149	6.713
Goal complexity	0.118	8.492
Environmental complexity	0.550	1.818

Table 4.11 indicates the coefficient of determination $R^2$for the linear regression between project complexity and project success.

Table 4. 12 analysis model summary of R and R^2

Model summary

Model	R	R^2	Adjusted R^2	Std error of the estimate
1	0.922	.851	0.849	0.22
a. dependent variable average project success b. predictor :constant , project complexity				

Source, SPSS output of own survey (2021)

From the above model summary in table 4.12, it can be shown that R is 0.922. This shows that there is a positive relationship between project complexity and project success and R^2 is 0.851 which indicates that about 85.1% of the variance of a project success (dependent) variable. The

remaining 14.9% of the variance is explained by other variable which are not included in this study.

Table 4.13 (coefficients) project complexity (PC) as predictor to project success (PS)

MODEL 1	unstandardized coefficient		St coefficient Beta	t	Sig
	B	Std error			
(constant)	1.130	0.265		6.135	0.000
Information complexity	0.018	0.086	0.025	0.210	0.834
Task complexity	0.214	0.122	0.226	1.744	0.085
Technological complexity	0.519	0.312	0.486	1.315	0.097
Organizational complexity	0.250	0.015	0.253	1.02	0.004
Goal complexity	0.315	0.111	0.353	2.828	0.006
Environmental complexity	0.231	0.132	0.396	1.876	0.009

a. dependent variable project success

Source; Source, SPSS output of own survey (2021)

From the above coefficient table 4.13, the positive B(beta) coefficient values indicated that there is a positive relationship exists between project complexity and project success. And this result is significant as p -value is equal to .000 < 0.01, which means changes in the predictor value is related to changes in the response variable. The data findings analyzed also shows that taking all other independent variables at zero, i.e. for every Information complexity we expect 01.8%units increase in project success , for every Task complexity we expect 21.4% units increase in project success , for every Technological complexity we expect 51.9%units increase in project success, for every Organizational complexity we expect 25% units increase in project success, for every Goal complexity we expect 31.5% units increase in project success and for every environmental complexity we expect 23.1% units increase in project success. On the other hand, if no project complexity understanding undertaken, the project success is 1.719 units. And Technological complexity was the most important contributing variable to project success,

followed by goal complexity. To summarize, the equation of the regression line is defined as follows.

$PS = \beta+\beta1X1+\beta2X2+\beta3X3+\beta4X4+\beta5X5_{+}\beta\ 6X6+Ɛ$

$PS = 1.130+.018X1 +.214X2+.519X3+.250X4+.315X5+0.231X6+Ɛ$

Where: PS is the dependent variable (project success),

X1: is Information complexityX2: is Task complexity

X3: is Technological complexityX4: is Organizational complexity

X5: is Goal complexity X6: is Environmental complexity and

Ɛ -standard error term

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The study's main goal was to determine the impact of project complexity on housing construction project success in Addis Ababa city administration. The study's specific objectives were to determine the impact of project complexity dimensions on housing construction projects. The study was conducted based on the collection of primary data. Primary data was collected through the use of well-structured and self-administered questionnaire that contains relevant questions on the effect of project complexity on project success. This chapter contains the study's summary, conclusions, and recommendations.

5.2 Summary of findings

The research investigated the relationship between project complexity and project success, which is helpful for achieving project success in complex construction projects for project managers, contractors and consultants. The majority of respondents said that clearly understanding project complexity for project teams increases project success, which is heavily influenced by the project team entrusted with delivering it. Understanding and implementing project complexity concerns were closely linked to project success.

The results have many practical implications. This means that the organization (housing Administration Corporation) should pay attention to manage those project complexity issues .i.e.

- Lack detailed project planning estimation and scheduling
- In effective management of project meeting
- Lack of effective document control system
- Week top management support and commitment to the project
- Poor project risk planning practice
- In effective site management ,control and coordination
- Poor administrative and bureaucracy
- Lack of clear and detailed procurement process and strategy

- Low level of usages of information technology
- In adequate technological knowledge and transfer
- In adequate training and skill development program
- Lack of developing an appropriate organizational structure
- In effective project team formation
- Poor man power or labor productivity
- Lack of clearly defined scope ,goal and objective
- In effective contract management system
- Low level of team member commitment
- In effective health and safety programme.

To solve technical and other complexity issues the corporation should pay more attention for communication and flexible learning.

5.3 Conclusions

The main objective of this study was to examine the effect project complexity on project success in Addis Ababa City Administration Housing Development And Administration Corporation. The evaluation of mean score for each independent and dependent variables implies that, overall mean score for information complexity 2.94(± 0.54), overall mean score for task complexity 2.94(± 0.543), overall mean score for technological complexity 2.97(± 0.54), overall mean score for organizational complexity 3.02(± 0.58), overall mean score for goal complexity 2.97(± 0.544), and overall mean score for environmental complexity was 3.31(± 0..99). In addition to these, the overall mean score for project success was 3.04(± 0.58). This finding shows that the understanding and implementation of project complexity was not fully addressed and it affects the overall project success. More over the result tells that a very strong and positive linear correlation exists among project complexity and project success (r -0.922 p= 0.000 < 0.01) which is significant. This means strategic understanding of project complexity has positive effect on project success.

The study made the following conclusions based on the findings. The success of any project is highly influenced by the project team tasked with delivering it. Wanda Curlee & Robert Gordon (2011) also argue that, complexity theory and the application of project complexity is a new,

untapped reservoir of potential in the management field and project management in particular. Understanding project complexity means dynamically managing the situation. Even if, there are so many controllable unknowns we can solve them through flexible process rather than rigid contingency.

This study concluded that; the formality of communication between the project teams contributes to the project's success. Accurate, useful, timely, and credible communication is crucial to maintaining a cohesive team environment and achieving project success. All project information should be communicated consistently throughout each stage of the process, so all team members should be equally informed. Open sharing of information should be encouraged, and a no-surprises attitude must be adopted to create a trusting work environment. A variety of communication mediums should also be used. For instance, the arteries in our body system caries and transports blood, any blockage in an artery will have a catastrophic effect. The flow of information or communication blockage can represent this catastrophic effect because command and control in virtual projects can be transmitted through it.

The study also concluded that the proper allocation of project equipment facilitates smooth operations and successful project completion. Proper allocation of resources ensures no project activity stalls due to lack of equipment and facilities; hence the project undertaken can be completed within the shortest time and as scheduled.

In light of the Addis Ababa city administration previously uncoordinated and inefficient housing sector, the Integrated Housing Development Programme has proved to be a highly successful tool for affordable housing delivery at a large scale. Importantly, the programme is not only a housing programme but a wealth generation programme for low-income households. Its success lies in its integrated nature - understanding housing as part of an integrated social, economic, and political system - which has the opportunity to greatly improve the living conditions and economic capacity of all sectors of society.

Lastly, the study concluded that the use of appropriate monitoring tools contributes to effective project time and cost management. The monitoring process is fundamental to the process and project identification as well as a crucial addition to the organizational learning and feedback.

5.4 Recommendations

The study made the following recommendations. Project managers, contractors, consultants and employees in housing Administration Corporation should have clear understanding and stakeholders need assessment and analysis to implement project complexity that contributes to the success of the project.

- Even if project management bogy of knowledge (PMBOK) and project management institute (PMI, 2008) was applicable to manage projects based on standards they cannot give appropriate considerations to external issues, the modern project managers must examine other materials in order to find appropriate solutions for complex projects. Because complexity is a complete system to manage complex projects by which the project manager can leverage and control anticipated and specific human interactions in order to maximize project effectiveness.
- The level of stakeholder involvement is low while preparing the project plan as well as implementation in Addis Ababa housing projects. Stakeholders should be involved in the planning stage of the project. Involving stakeholder's in the planning stage helps to see the project from different points of view. So attention should be given to the importance of preparing a participatory project plan.
- Both of the complexity dimensions are important because understanding nonlinear process is necessary for project success. Because these complexity dimensions enable to control or anticipate specific human interactions.
- Everyone should utilize all the available project management information system in order to be successful, but it does not offer a clear path, simply repeating a known strategy and hoping that it will be successful is not best course of action.
- Understanding and implementing project complexity is equivalent to the implementation and application of transformational leadership. Because all activities encourage flexible learning and innovation.
- Project leaders must ensure that all team members are treated fairly to enable better understanding with time, cost, quality, health and safety, environmental performance, participants' satisfaction, user satisfaction, and commercial value.

- Project leaders must identify and classify their team members in to a hierarchy that can support the team goal to enable better understanding with time, cost, quality, health and safety, environmental performance, participants' satisfaction, user satisfaction, and commercial value. .
- Understanding the experience level of each team member will assist in the project leader to allocate time and all other project success factors with each team member.
- The project manager should establish project success (time, cost, quality, health and safety, environmental performance, participants' satisfaction, user satisfaction, and commercial value) measurement metrics that measure individual as well as team performance.
- As the project team becomes familiar with the team expectations and the performance metrics, the amount of undesirable conflict should reduce and project success will be ensured.

5.5 Further studies

This study concluded that the presence of relationship between project complexity and project success. However, still many other variables might have role in terms of affecting project success. So, other researchers may perform study in this area in the future, adding more moderating and mediating variables to provide more convincing results. In addition to this, the study conducted based on small sample size of just 142 people was one of the biggest limitations; too small sample size can't be perfect for making adequate prediction. Moreover the data was not taken in time lags to monitor the changing's hampering the generalize ability of the findings. In certain organizations people are habitual of organizational culture some welcomes new changes and some are ok with the ongoing process. Collecting data from sub cities and from inhabitants with a larger sample size would not only help overcome the foresaid limitation; it would also provide a clearer and a bigger picture which would raise the understanding of project complexity for project success.

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Appendix 1; QUESTIONNAIRE (INSTRUMENTS)

FACULTY OF BUSINESS AND ECONOMICS

DEPARTMENT OF MANAGEMENT

RESEARCH TITLE: "THE EFFECT PROJECT COMPLEXITY FOR HOUSING DEVELOPMENT /PROJECT SUCCESS".

Dear respondent, the purpose of this questionnaire is to collect information for the study that explains the effect of project complexity for housing development or project success. The study is a requirement for achieving master degree. Your response to each question is indispensable for the effectiveness of this study. The student /researcher /would like to assure you that your response to the questionnaire would be kept confidential and it has no intention except for academic purpose.

Please don't write your name or any personal identifier on the questionnaire.

Instructions: Please refer/consider/ the housing development and housing administration practice in Addis Ababa housing administration that you are participated and answer the following question. For each of the questions, please tick[x] in the provided space the most suitable answer using the given scale. Please also answer all the questions to enhance the objectivity of the research.

PART I: PERSONAL DETAILS OF THE RESPONDENT

1. Sex: Male ☐ female ☐

2. Age: 20-30 ☐ 31-40 ☐ 41-50 ☐) and above ☐

3. What is your level of education? Diploma 1ST Degree ☐ Master's Degree ☐ others (specify)…… ☐

4. How long have you been working with the organization? 5 years ☐

6-10 years ☐ 11-20 years ☐ -30 years ☐ ears and above ☐

PART II: Questions on assessment of perceptions project complexity for project success in Addis Ababa housing projects.

Please put the << x. >> mark on each factor /question/ based on your perceptions among four measurement scales.

no	**Description/questions**	**Strongly Disagree/ SDA/(1)**	**Disagree/DA/(2)**	**Neutral /no opinion /N/(3)**	**Agree/ A/(4)**	**Strongly agree /SA/(5)**
	Information complexity/IC/					
1	Detailed project planning estimation and scheduling /IC/					
2	frequent project monitoring progress meetings /IC/					
3	Effective management of project meeting /IC/					
4	Establishing effective document control system /IC/					
5	Clarity of roles and responsibility /IC/					
	Task complexity/TAC/					
6	Top management support and commitment to the project /TAC/					
7	Effective project risk management system or process/TAC/					
8	Effective site management ,control and coordination /TAC/					
9	Contractors experience /TAC/					
10	Administrative and bureaucracy /TAC/					
11	Availability of recourses as planned throughout the project /TAC/					
	Technological complexity /TEC/					
12	Availability of experienced professionals and skill full work force /staff /TEC/					
13	Clear and detailed procurement process and strategy/TEC/					
14	Team leader project management knowledge ,experience and skills /TEC/					
15	Adequacy of designed details and specification /TEC/					
16	Level of usages of IT /TEC/					
17	Availability of advanced technologies /construction equipment's /TEC/					
18	Adequate technological knowledge and					

	transfer/TEC/					
19	Adequate training and skill development program /TEC/					
	Organizational complexity/OC/					
20	Developing an appropriate organizational structure/0C/					
21	Effective allocation and control of man power/ OC/					
22	Effective project team formation /OC/					
23	Man power or labor productivity/OC/					
24	Adequate carrier development program/0C/					
	Goal complexity/GC/					
25	Clearly defined scope ,goal and objective /GC/					
26	Managing and control of subcontractors work/ GC/					
27	Effective contract management system/GC/					
28	Team member commitment (GC)					
	Environmental complexity/EC/					
29	Implementing an effective health and safety programme/EC/					
	Project success/PS/					
30	Effective quality assurance programme/ PS/					
31	Adequate funds /cash flows management /PS/					
32	Adequate communication among all project participants/PS/					
33	High degree of trust shared by project participants /PS/					
34	Employee (staff) motivation and satisfaction /PS/					

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