Title: Assessment of performance of high rise buildings project, the case of AddisAbaba

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A Thesis Submitted to the Department of Civil Engineering

Specialization in Construction Engineeringand Management

School of Civil Engineering and Architecture Office of Graduate Studies

Adama Science and Technology University

January, 2024

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DECLARATION

I hereby declare that this Master Thesis entitled**'' Assessment of performance of high rise buildings project the case of Addis Ababa''** is my original own work. That is, it has not been submitted for the award of any academic degree, diploma or certificate in any other university. degree or examination in any other university. All sources of materials that are used for this thesis have been duly acknowledged through citation. It is being submitted for the partial fulfillment for the award of the degree of Master of Science in Construction Engineering and Management at Adama Science and Technology University School of Civil Engineering and Architecture

Name of student	Signature	Date

I hereby certify that I have read and evaluated this thesis entitled: **Assessment of performance of high rise buildings project the case of Addis Ababa** prepared under my guidance by Fitsum Hailu Bekele. submitted in partial fulfillment of the requirements for the degree of Masters of Science in Construction Engineering and Management. Therefore, I recommend that the candidate has fulfilled the requirements and hence he can submit the thesis to the department.

Major Advisor/Supervisor	Signature	Date
Co-advisor/Co-supervisor	Signature	Date

APPROVAL PAGE

I hereby certify that all the correction and recommendation suggested by the board of examiners are incorporated into the final thesis entitled ‘’**Assessment of performance of high rise buildings project the case of Addis Ababa’’** by Fitsum Hailu Bekele

Major Advisor/Supervisor	Signature	Date
Co-advisor/ Co-supervisor	Signature	Date

We, the undersigned, members of the Board of Examiners of the thesis open defense by Fitsum Hailu Bekele have read and evaluated his/her thesis entitled ’***Assessment of performance of high rise buildings project the case of Addis Ababa’’*** and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirement of the degree of Master of Science in Civil Engineering Specialization in Construction Engineering and Management

Chairperson	Signature	Date
Internal Examiner	Signature	Date
External Examiner	Signature	Date

Finally approved and acceptance of the thesis is contingent upon submission of its final copy to the Office of Postgraduate Studies(OPGS) through the candidate ‘s Department Graduate Council (DGC) and School Graduate Committee(SGC).

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School Dean	Signature	Date
Office of Postgraduate Studies, Dean	Signature	Date

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LIST OF ABBREVATIONS/ACRONYMS

AU	African Union
UN-ECA	United Nation Economic Commission for Africa
UNDP	United Nation Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
EE	European Economic Commission
RII	Relative Importance Index
SPSS	Statistical Package for the Social Sciences
EDC_S	Ethiopian Domestic Contractors
$SSEC_S$	Small Scale Emerging Contractors
CVI	Content Validity Index
TSM	Total Safety Management
BIM	Building Information Modeling
CQ	Cultural Intelligence

ABSTRACT

The aim of this study was to assess the performance of high rise buildings construction project in Addis Ababa.The objectives of the study were to identify the performance level of high rise buildings construction projects, to determine the major factors that adversely affect the performance of high rise buildingsconstruction projects ,and to propose ways of improving the performance of high rise buildings construction projects in Addis Ababa. Quantitative approach of research was used in this study. Primary and Secondary data was gathered by derived questionnaires, and several works of literature respectively. In data analysis Relative Importance Index (RII) method was adopted to establish the relative importance of the factors affecting the performance of local contractors and additionally the collected data was analyzed using SPSS. Findings of this research shows that the performance level of high rise building projects with respect to time, cost, quality and safety was low. The top five factors which adversely affect time performance of high rise building projects were: noncompliance to the approved schedule ,late submittal of revised schedules, payment certificates, reports and claims,use of old equipment ,inefficiency in planning, management skills and decision making and not purchasing and stock construction materials ahead of schedule;The top five factors which adversely affect cost performance of high rise building projects were inadequacy of finance of the contractor to run the project, ineffectiveness in financial planning and scheduling,inability to foresee and budget for potential inflation,offering low price to win a bid, and Poor management of man power, material and equipment on site; The top five factors which adversely affect quality performance of high rise building projects were inappropriate storage of materials,inadequacy of contractor's quality control plan and lack of implementation, fail to identify and correct defective works in a timely manner, not investing on quality training's and Poor quality of workmanship (Experience, skills, ability and competences) of the project team; The top five factors which adversely affect safety performance of high rise building projects were lack of budget for safety, lack of safety and health training, lack of safety and health motivation, lack of safety and health policy and lack of employing safety officer. This study also proposed top five strategies to increase the performance level of high rise building projects namely establishing partnerships between local contractors and more experienced contractors, adopting innovative and efficient construction methods, providing technical training programs for local contractors, improving the quality of materials supplied to local contractors and providing access to modern construction equipment for local contractors. Finally based on the data analysis interpretation results the conclusion and recommendation are drawn in addition for the points to be studied in the future.

***Keywords**: Addis Ababa, Performance, High rise, RII, SPSS*

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CHAPTER ONE

1. INTRODUCTION

1.1. General Background

The construction industry is an important element for the development of a country. It contributes to job creation and the large employment of human resources. The construction industry can be used as a measure of a country's growth since it plays an important role in the social, economic, and political development of the country(Tafesse, 2019). The construction sector plays an important role in the economy. It comprises enterprises primarily engaged in the construction, renovation, maintenance, and demolition of buildings and in civil engineering projects. It creates value by transforming source materials into capital assets that are essential for economic activity and the delivery of infrastructure services, and consequently has a high impact on poverty reduction and income generation(Geneva, 2015). There is no doubt that large-scale development in the built environment and its physical infrastructure is needed in the so-called 'developing countries'. However, there are a number of challenges to the introduction of sustainable construction technologies and practices, and certain enablers need to be developed to help these countries adopt a more sustainable path (Shafii et al., 2006).

Africa is facing challenges in the construction industry despite being the fastest-developing continent. The construction industry is an area of focus and has been drawing positive attention, and top heavyweight companies are now fully focusing on the African construction industry (Bonface, 2015). The government of Ethiopia has opened the door for foreign contractors to take part in the Ethiopian construction sector. Foreign contractors are drawn to Ethiopia for its political stability, predictable development, and relatively good legitimate framework when compared to other African nations. This fact has also resulted in the development of the construction sector, with many contractors now engaged in a variety of construction projects. These works are, however, not considered to be large due to the local contractors lack of capacity and international experience to engage in the management of mega projects. Therefore, it has become a given that most mega projects are sourced out to foreign contractors (Esaiyas & Kahssay, 2020).

The construction industry is dynamic in nature as it changes constantly with the developments of new business methods and technologies. This constant change increases the uncertainties in technology, budgets, and development process. The main characteristics of the construction industry are the complexity of the construction process, the long time period taken by the project to be completed, the involvement and integration of different specialties, the uncertainty and risk involved in the construction industry and also the production of unique projects that is witnessed widely in the past years due to globalization(Fango, 2019).

The construction industry is vital for the development of any nation. In many ways, the pace of the economic growth of any nation can be measured by the development of physical infrastructures, such as buildings, roads, rail ways, hydro-power stations and bridges. Construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion (Tafesse, 2019). Asthe national capital, Addis Ababa remains the economic, political and administrative hub of Ethiopia. In the last 50 years, the city has gained international significance as the headquarter of the African Union (AU), UN Economic Commission for Africa (UN-ECA) and a regional office for a number of international organizations including UNDP, UNESCO and the European Economic Commission (EEC). However, like many cities in the developing world, Addis Ababa is facing a number of problems related to population growth, lack of economic opportunities, inadequate infrastructure, shortage of housing, and large areas of informaldevelopment with major environmental problems(Wubneh, 2013).

High rise buildings signify an element of the country's economic power and a sign of advantage to the country and also consumes a large number of people with a piece of land. Addis Ababa city is witnessing huge demographic expansion due to migration from surrounding rural areas, leading to urban stretch, housing demand, rise in the cost of land. Given this demand, though high rise structures have become a solution (Mosie, 2022).

1.2. Statement of the Problem

The problem of poor performance in construction projects is a global phenomenon and it affects Cost, time and quality which are the prime factors for project management success(Mahamid, 2016).Factors affecting scope, quality, cost and time, safety and risk of high rise building project should be minimized for the achievement of desired building

standards and Proper control mechanism is required to overcome challenges faced by the construction industry for high-rise building construction (Chauhan et al., 2022).The government of Ethiopia has been working to enhance the capacity of Ethiopian domestic contractors (EDCs) over the past three decades. This has enabled the development of several private and public construction firms. However, the performance of EDCs is still a matter of concern(Wubet et al., 2021).

Building projects in Addis Ababa are suffering a wide range of performance challenges and failure factors related to the "performance" of the contractor, the "capability" of the owner, the"project design-procurement process," and project contract management which contribute to the poor performance of public construction projects in Ethiopia(Gadisa & Zhou, 2020).The performance of Ethiopian construction industry with respect to construction project management practices in terms of adapting general project management procedures, project management functions, tools & techniques is unsatisfactory. Particularly, the level of practice in terms of safety, risk and time management was found to be very low(Ayalew et al., 2016).

As a result, further investigation should be conducted in order to increase the performance of local contractors and to enable the development of several private and public construction firms. This study will address the problems related with performance of local contractors in construction of high rise buildings project in the case of Addis Ababa city by identifying the performance level of local contractors and by examining factors that adversely affect local contractor's performance and tries to develop a suitable remedial solution.

1.3. Objectives of the Study

1.3.1. General Objectives

The general objective of this study is to assess the performance of high rise buildings construction project in Addis Ababa

1.3.2. Specific Objectives

The specific objective of this study is :

- To identify the performance level of high rise buildings construction project in Addis Ababa

- To determine the major factors that adversely affect the performance of high rise buildings construction project in Addis Ababa
- To Propose possible ways of improving the performance of high rise buildings construction project in Addis Ababa

1.4. Research Questions

- What is the performance level of high rise buildings construction project in Addis Ababa?
- What are the major factors that adversely affect the performance of high rise buildings construction project in Addis Ababa?
- What are the possible ways of improving the performance of high rise buildings construction project in Addis Ababa?

1.5. Significance of the Study

The outcomes of this research is beneficial for contractors, clients and consultants participating in a high rise building projects, policy makers, and researchers. The factors that adversely affect the performance of high rise building projects can significantly contribute to the poor performance of construction projects and this study assessed the performance of high rise building project and identify the factors adversely affecting the performance of high rise building projects and propose a remedial solution to minimize their effect

1.6. Scope of the Study

The scope of this research is to assess the performance of high rise building in Addis Ababa. The research considered contractors, consultants and clients of high rise building in Addis Ababa.

1.7. Limitation of the Study

Due to limitation of resources and time the study was limited to assess the performance of high rise building projects from the perspective of time, cost, quality and safety. In addition, the performance high rise building project differs in the perspective of different stakeholders. However, this study focuses only on the overall perspective of the major stakeholders (clients, consultants and contractors) on performance of local contractors in high rise building projects under study

1.8. Organization of the Thesis

The research paper is organized into five chapters: chapter one presents general introduction and background to the study, statement of the problem, research objectives, significance of the study, scope of the study and finally organization of the study. Chapter two presents review of related literature to the study. It provides the definitions of key terms as used in this study, theoretical review, empirical review and conceptual framework of the study. Chapter three presents research methodology used in the study. It provides research design, sampling methods, data collection methods, data analysis and finally the issue of ethical consideration. Chapter four presents result, discussion and conclusion of the research. Chapter five presents conclusion and recommendation

1.9. Summery

In this chapter, the background and statement of the problem (motivation of the research) have been presented. Further, the study aim, associated objectives, scope of the study, significance of the study and the organization of the thesis to achieve these objectives have briefly been presented. In the next chapter, the literature review and the gaps in the prior research have been presented.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Introduction

To develop a better understanding of the research objective, a comprehensive literature review has been conducted to identify the performance of local contractors in high rise building the case of Addis Ababa. As part of the study process, Chapter 2 provides a literature review on the aspects of high rise building construction, high rise building construction in Ethiopia, Features of the construction of high-rise buildings ;measuring performance of contractor's, performance of local Contractors in developing countries, performance of local contractors in Ethiopia, factors affecting performance of local contractors ;parameters for measuring performance of local contractors such as quality of construction work, cost control , schedule/time management, administrative management ,labor standard, safety standard ,technological utilization, and close out. Finally, Summery and Gaps Identified from literature review were reviewed and presented in subsequent sections.

2.2 High Rise Building construction

A building is an enclosed structure that has walls, floors, a roof, and usually windows. Building works include small, medium 'high and very high construction works. Small building has no elevator or elevator that can replace any elevator or elevator and has less than five floors above the ground. Medium building is at least five storey above the ground and not more than fifteen stories high. High-rise building has at least fifteen storey above the ground and no more than forty-five storey. The tallest building is at least forty-five or more floors above the ground(Directive No-648, 2021)

"A 'tall building' is a multi-story structure in which most occupants depend on elevators [lifts] to reach their destinations. The most prominent tall buildings are called 'high-rise buildings' in most countries and 'tower blocks' in Britain and some European countries (Craighead, 2009).Conventionally, High-rise buildings served as a revelation of the power and places of identity and civic pride. Contemporary high-rise buildings are on the increase

due to the scarcity of land for development purpose owning to urban density as a result of rural-urban migration (Sanya, 2018).

The ancient Egyptians probably were the first to apply scientific knowledge to the construction of buildings; in any case, their amazing structures are the best-understood ancient large buildings. Not only did their architects use geometry and astronomy to plan the pyramids, but also they had to understand and apply much natural-science knowledge about the properties of materials to design the huge yet precisely constructed tombs that include intricate rooms and passageways (Gifford, 2007)

2.2.1. High Rise Building in Ethiopia

The number and size of building construction project that are being constructed in the city are increasing through time and most of these projects were being carried out by foreign contractors. Local contractors are also involved in those projects via a subcontracting strategy (Esaiyas & Kahssay, 2020). Addis Ababa city is witnessing huge demographic expansion due to migration from surrounding rural areas, leading to urban stretch, housing demand, rise in the cost of land. Given this demand, though high rise structures have become asolution. When accomplishing these complex and huge high rise building structures, ma problems affect the construction process (Mosie, 2022). Even though different local scholars try to assess the practice of high rise building related with safety, construction time, and construction cost for different projects still the performance of local contractors in construction of high rise buildings construction projects on the overall performance of the projects need to be assessed

Figure 2.1 :High rise buildings in Addis Ababa, Ethiopia

2.2.2. Features of the construction of high-rise buildings

High-rise buildings are construction object of high risk and engineering complexity, which indicates the need for a thorough analysis of decisions made and taking into account the results of the extensive international experience in high-rise construction. In each case, the design engineer makes a technical decision in accordance with the requirements established by international or national standards, design standards or other documents. Due to the high height, the layout, design and technical equipment of high-rise buildings are qualitatively different from buildings with lower floors(Gamayunova & Spitsov, 2020).High-rise construction has always relied on technological innovations in engineering. Technological innovations used in high-rise building construction manifest in various aspects: geometric shape, foundation, construction pit protection, vertical and horizontal construction, materials, vibration damping systems and energy efficiency(Causevic & Rustempašić, 2021).

2.3 Performance

Performance is one of the words which has very flexible definition that everyone places the concept that suits best. According to (Ismail Salaheldin, 2009) performance is defined as the degree to which an operation fulfills primary measures (performance objectives) in order to meet the needs of the customers (secondary measures). (Cazzell & Ulmer, 2009) describes performance as "outputs and outcomes from processes, products and services that permit evaluation and comparison relative to goals, standards, past results, and other organizations". Performance has been described as the valued productive output of a system in the form of goods and services or works with units of performance describing the actual fulfillment of the goods and services relating to performance and measured in terms of features of production, quality, quantity and or time(*Swanson*, 1995)

2.4. Performance Measurement

performance measurement is defined as "evaluating how well organizations are managed and the value they deliver for customers and other stakeholders" and states that there is a clear relationship between performance measurement and organizational excellence(Moullin, 2007) .Performance measurement can be expressed using the concept of the Performance Prism which addresses the shortcomings of many of the traditional measurement frameworks being used by organizations today. The Performance Prism, with its

comprehensive stakeholder orientation, encourages executives to consider the wants and needs of all the organization's stakeholders, rather than a subset, as well as the associated strategies, processes and capabilities (Neely et al., 2001).

Performance measurement can be defined as the process of quantifying the efficiency and effectiveness of action and a performance measure can be defined as a metric used to quantify the efficiency and/or effectiveness of an action(Neely et al., 1995). While these definitions provide an understanding of the performance measurement concept each one of the definitions above also has its own limitations. The purpose of performance measurement is regular assessment, which suggests that if we want to manage for results throughmanaging measures, then, we should consider performance measurement not just as a rear-view mirror to evaluate our past performance but as a tool to support day to day decision making process.

Takim defined performance measurement as the "regular collecting and reporting of information about the inputs, efficiency and effectiveness of construction projects". The researcher of this study agrees with this definition given by (Takim et al., 2003)because the definition provides the opportunity for a day to day decision to be taken concerning the efficiency and effectiveness of the inputs applied which is a vital component of any effort at managing for results.

According to (Al-Turki & Duffuaa, 2003) Performance measures should be clearly defined qualitatively and quantitatively and communicated to all concerned. Therefore, the characteristics of performance measures can be summarized as follows:

Relevance: Include data that are essential to provide a basis for understanding the accomplishments of goals and objectives of the organization.

Interpretability: Communicate in a readily understandable manner that is concise, yet comprehensive.

Timeliness: Report in a timely manner so that it will be available to users before it loses its value in making decisions.

Reliability: Report consistency from period to period.

Validity: The measure should measure the intended quality indicator.

2.5. Importance of Performance Measurement

Performance measures can be used for multiple purposes. Moreover, different people have different purposes. Legislators have different purposes than journalists. Stakeholders have

different purposes than public managers. Performance measurement supports Ministers and State sector leaders in at least three ways(ISBN, 2008):

Informing strategy and policy development. Performance measurement is used to inform overall strategic planning and direction-setting as well as the ongoing development and implementation of policy and plans. Evidence gained about the difference your agency made through the services it provided, and the interventions chosen can be used to make informed, targeted changes to policies and plans.

Informing capability and service development. Performance measures are used to identify areas where capabilities and services need to be developed to enhance core outcomes. For instance, your agency should use performance measurement information to inform workforce planning, recruitment, HR development and organizational planning, which all contribute to enhancing the design, delivery and impact of core services.

Reporting achievements. Performance measurement should also be used by agencies to report coherently and concisely on their achievements. If you follow the performance measurement process your agency will be able to produce clear, coherent performance stories around the ministerial priorities it is aiming to achieve. These stories can clearly explain how your agency is progressing towards achieving its outcomes.

2.6. Key Performance Indicators (KPIs)

Key performance indicators (KPIs) are the vital navigation instrument used by managers to understand whether their business is in a successful voyage or whether it is veering off the prosperous. The right set of indicators will shine light on performance and highlights that needs attention and without the right KPIs managers are sailing blind (Marr, 2012)

Key Performance Indicators (KPIs) are important for monitoring the performance in the industry. They can be used to identify poor performance and the improvement potential. KPIs can be defined for individual equipment, sub-processes, and whole plants. Different types of performances can be measured by KPIs, for example energy, raw-material, control & operation, maintenance, etc. Bench marking KPIs with KPIs from similar equipment and plants is one method of identifying poor performing areas and estimating improvement potential. Actions for performance improvements can then be developed, prioritized and implemented based on the KPIs and the bench marking results(Lindberg et al., 2015).

Effective performance measurement is critical to project success. Unfortunately, common

measures do not exist for the assessment of the performance of contractors. A set of nine (9) KPIs has been developed for Ghanaian contractors as follows: Client Satisfaction, Cost, Time, Quality, Health and Safety, Business Performance, Productivity, People and Environment. These KPIs present a set of common criteria which can be used by Ghanaian contractors to measure and benchmark their performance and by client groups to compare contractor performance(Ofori-Kuragu et al., 2016a).

The importance of performance-based bench marking has become a necessity in a modern construction company and presents a constant challenge for the construction industry. According to (Radujković et al., 2010) the top ten KPI's are: Quality, Cost, Number of investor interferences, Changes in project support, Time increase, Client satisfaction, Employees' satisfaction, Innovation and learning, Time and Identification of client's interest.

2.7. Performance Measures (PMs)

The performance measurement revolution started in the late 1970s with the dissatisfaction of traditional backward looking accounting systems. Since then, the literature in this field is emerging. Most of the focus was on designing performance measurement system (PMS), with few studies illustrating the issues in implementing and using PMS(Nudurupati et al., 2011).

In the construction industry particularly in developing countries, minimal attention has been given to the application of Performance Measurement Systems [PMS], despite being one of the most important factors for assessment of project success. The application of performance measurement systems in the construction sector has tended to rely on three basic criteria: time, cost and quality, which can be applied to determine the extent of project success. At organizational level, performance measurement systems are largely based on financial measures which are almost always lagging indicators. In response to the Egan Report, the UK construction industry developed specific Key Performance Indicators (KPIs) which include construction cost and time, cost predictability and time predictability, defects, client product and service satisfaction, safety, profitability and productivity(Alsulamy et al., 2012).

2.8. Performance of local contractors

The term "performance" denotes the degree to which an operation fulfills primary measures in order to meet the needs of the customers. Units of performance describe the actual fulfillment of the goods and services relating to performance and are measured in terms of

the features of production, quality, quantity and or time(Robson, 2004). Performance measurement is of increasing interest to managers due to the changing nature of work, increasing competition, specific improvement initiatives ,national and international awards, changing organizational roles, changing external demands, and the power of information technology(Neely, 1999)

Construction is a multi-stakeholder process, the efficiency of which is influenced by clients, project managers, designers and contractors. The type of procurement system (PS) used on a project: provides the framework within which a project is executed; regulates multi-stakeholder contributions, and either engenders or marginalizes the integration of design and construction. Traditionally, the performance of contractors has been evaluated in terms of cost, quality and schedule. However, international research indicates that performance relative to cost, quality and schedule is influenced by: health & safety; productivity; performance relative to the environment, and worker satisfaction. Health & safety is also the catalyst for the synergy between the aforementioned project parameters. Although contractors are often perceived to be inefficient and a percentage are, the reality is that the priorities and performance of the other stakeholders and the type of PS used often marginalizes the performance of contractors(Smallwood & Venter, 2001).

2.8.1. Performance of local Contractors in developing countries

In South Africa, the development of Small scale emerging contractors (SSECs) has become vital to bring about economic prosperity and the government has prioritized the advancement of SSECs as the vehicle towards achieving economic growth, development and job creation for previously disadvantaged people(Hove, 2016). The market for major projects in developingcountries tends to be dominated by foreign contractors. In a study on contractor development in Nigeria, in which 69 indigenous contractors and 71 professionals responded found thatmajor projects in most developing countries are carried out by foreign contractors because of deficiencies in indigenous construction capacity (Laryea, 2010).

2.8.2. Performance of local contractors in Ethiopia

According to the information obtained from the Ministry of Construction of Ethiopia, there aretotally 6800 contractors registered for 2009 budget year. These contractors have different grades, capacities, organizational characters, and performances depending on many factors. The capacity, performance and competitiveness of these contractors have a major impact on

their overall well-being, development and progress from smaller grades to upper ones. Among these numbers of contractors, 50% of them (i.e. 3396) are from grade 7 up to grade 10. Construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion (Tafesse, 2019).

2.9. Factors Affecting performance of local contractors

In the Ethiopian construction industry, contractors have many challenges on their progress and performance while on the other hand opportunities that lead them for success as well. Such comparatively small contractors stay and function actively while others stay in the industryand do not function actively and are dominated then forced to leave eventually due to different reasons. Since the contribution of each contractor is vital for feeding the constructional industry of a country, contractors need to understand what challenges they are going to face, factors affecting their progress and how to overcome them in order to be successfully integrated (Tafesse, 2019).

The significant challenges relating to building and civil engineering works related to financial issues, design, contractor classification system, bribery and corruption, personnel and supervision and managerial aspect of contracts(Laryea, 2010).

Financial: The contractors explained that the biggest problem on contracts was payment. Payment-related delays meant that a contractor cannot predict cash flow. The difficulty in predicting cash flows means that banks consider contractors as a higher risk, thus the interest on money to construction firms is higher. Thus, the cost of contractors acquiring capital is high.

Design: The contractors indicated that most designs are often inadequate and poorly articulated to enable contractors to clearly understand what to build without several meetings with designers. Drawings do not often have sufficient details. Right from the beginning, the client's requirements are not captured in the tender documents. As a result, there are a lot of variations in the construction phase and naturally that impacts on cash flow, workflow, and duration/programmer. Ultimately, design-related problems impact on profitability of firms (Laryea, 2010).

Contractor classification: Many of the contractors explained that those who classify firms do not ensure that firms in the same category have the minimum requirements in practice. This does not create real competition. The interviews indicated that the process of registering construction firms in Ghana needs review. It is important for government ministries to ensure that people who register firms actually possess the personnel, capital and equipment required for classification into a particular category.

Bribery and corruption: Bribery and corruption is a big problem for both contractors and consultants in Ghana. Contractors often have to pay kickbacks to the people involved in a project. The total kickback amount was generally expressed around 10%. However, most of the contractors try to negotiate this down to about 5%. In effect, they have accepted it as partof normal business practice and may even build this into the price structure of a job.

Personnel: The contractors explained that there was a lack of qualified construction professional with basic knowledge in construction works. There is also a problem with supervision and managerial aspects of construction work in Ghana. Contractors complained that many workmen (artisans) lack the necessary training for carrying out their work.

Workflow: Some contractors complained about low workload. The volume of construction work has slumped in recent years because of lack on finance and sometimes it takes up to halfa year to win a job.

Winning Tender of construction project: Foreign contractors are well experienced and able to meet the requirements for participation in donor financed projects; local contractors are less experienced as compared to foreign contractors. Therefore, local contractors are mostly involved in projects financed by the government of Ethiopia(Fango, 2019).

construction project management practice: in terms of adapting general project management procedures, project management functions, tools & techniques to be unsatisfactory. Particularly, the level of practice in terms of safety, risk and time management was found to be very low (Ayalew et al., 2016).

Construction Materials: Currently, tall buildings are increasingly preferred to be made of reinforced concrete, since this material has the highest fire resistance, and its strength characteristics are close to the strength of steel. The requirements for concrete as a structural building material for high rise buildings have become especially stringent. Therefore, without modern technologies for the modification of monolithic concrete, which provide the

necessary frost resistance, fire resistance, impact resistance and durability under aggressive influence, high-rise buildings cannot do. Additionally, the specificity of the loads, the technology of construction, operation of high-rise buildings causes a number of additional difficulties in construction of high rise buildings (Gamayunova & Spitsov, 2020).

2.10. Parameters for assessing local contractor's performance

In a time of globalization and an increasingly competitive environment, assessing performance has become critical to business success. The performance measurement revolution has spread to many industries, including the construction industry. Reports on the performance of the industry have identified many areas of improvement and emphasized the need for performance measurement

Effective performance measurement is critical to project success. Unfortunately, common measures do not exist for the assessment of the performance of local contractors (Ofori-Kuragu et al., 2016b). Performance measurement has been subject to a considerable amount of research and attention. The inadequacy of traditional financially based performance measurement systems and the introduction of non financial measures have been the triggers for much of researches. The main performance measurement frameworks and their application by U.K. construction firms and to identify gaps in knowledge and practice that suggest future research. Successful performance in a construction project helps to deliver good products to the client. At present, there is no standard approach used by clients to evaluate project performance as project success carries different definitions to different people. Some used the traditional project performance measures of cost, quality and time while others used additional non-traditional measures such as the environment, health and safety, level of technology and contractor planning (Idrus et al., 2011).

2.10.1. Quality of construction work

The success of construction projects is a fundamental issue for most governments, users and communities. the impact of contractors' attributes on project success from a post construction evaluation perspective of critical success factors (CSFs) that greatly impact the success of project are: safety and quality, past performance, environment, management and technical aspects, resource, organization, experience, size/type of previous projects, and finance. project success is repeatable, that shows a clear understanding of contractors' performance(Alzahrani & Emsley, 2013)

construction flow index (CFI) is a composite measure that reflects the quality of production flow in repetitive construction projects. It incorporates measures of work continuity for crews, processing continuity for locations, production rate variation, amounts of work in progress, interference and operation sequence logic. Project managers can use the CFI to evaluate the quality of their construction plans and to measure and communicate production flow quality status to trade crews, enabling management and improvement of production flow(Sacks et al., 2017).

2.10.2. Cost Control

Despite the availability of various control techniques and project control software many construction projects still do not achieve their cost and time objectives. The common factors that inhibit both time and cost control during construction projects were design changes, risks/uncertainties, inaccurate evaluation of project time/duration, complexities and non-performance of subcontractors(Olawale & Sun, 2010).

The challenges of project cost control practice in the construction industry are using obsolete methods and concepts, lack of knowledge on the use of available tools and technology, overemphasizing on results while ignoring the cost control process, lack of project cost control processes and systems suitable to the enterprise, abandonment of complicated strategies, lack of consistency in cost management by managers, serious decision failure, exorbitant marketing expenses, poor attitude towards information communication technology (ICT) usage, difficulty in monitoring different sources of day-to-day cost data, variations in contract and lack of financial commitment in projects. It was realized that the challenges can be grouped under managers' personal characteristics, knowledge of cost control process and technology used in the practice of cost control(Adjei et al., 2018).

Construction project cost control (PCC) practice is one of the difficult tasks in the current project cost management faced by most contractors and have not fully enjoyed its benefits. The practice of cost control is a required task for the survival and growth of every construction organization in every nation. The practice of PCC assists organizations to eliminate and/or reduce unnecessary wastage of resources in the execution of construction projects Contractors seem to adopt the strategy of conservatism as far as cost control is concerned and are comfortable with the conventional method of cost control with limited involvement in information technology(Bahaudin et al., 2012).

2.10.3. Schedule/Time management

Time management is the process of organizing and planning through consciously dividing a time between activities with the ultimate goal of increasing effectiveness and efficiency. Time management is therefore the way that we organize and plan how much time must be spent on specific activities. Time management techniques can improve our time management skills and improve our ability to function more effectively but it needs a conscious effort to shift our focus from activities to results(Jackson, 2009).

The construction schedule management in the traditional mode will be affected by the natural environment, the objective environment and the subjective environment, leading to the interruption or obstruction in the construction process. But in the actual construction process, through assisting the BIM model and BIM5D software in the construction schedule management, not only ahead of schedule can be aware of the next step schedule of the required resource requirements, equipment demand and capital requirements; but also in the actual construction process(Li et al., 2017). The key determinants for construction schedule performance related to the project manager, project team, planning and control efforts are time devoted by the project manager to a specific project, frequency of meetings between the project manager and other project personnel monetary incentives provided to the designer, implementation of construction program; and project manager experience on projects with a similar scope(Kog et al., 1999).

2.10.4. Administrative Management

The issue of contract administration and performance from a variety of theoretical perspectives, each providing its own insight into how to manage contractual relationships effectively. The analysis, which is based on a unique data set of more than 400 contractual relationships, focuses on the effects of contract monitoring, competition, and trust on contracting performance (Fernandez, 2009).Contracting capacities in terms of agenda setting, contract formulation, contract implementation, and contract evaluation, relating them to three performance dimensions including cost, efficiency, and quality a manager survey from Taiwan, shows that the relationships between the capacities and the performance indicators are not always straightforward or linear, and the relationships are complicated by the role of time(Yang et al., 2009).

2.10.5. Labor Standard

labor standards are naturally diverse among nations due to cultural and historical differences. Also, developing countries are worried about binding labor standards, as the issue may be abused for protectionist purposes by richer countries. In general, core labor standards comprise (1) freedom from forced labor, in the form of compulsory labor and slavery; (2) the abolition of exploitative forms of child labor that put the safety and health of children at significant risk; (3) equal opportunity in employment; and (4) fundamental union rights like freedom of association and collective bargaining(Busse, 2004).

The construction industry is one of the largest employment providers in the developing world. It is also one of the least safe industries, with a high frequency of accidents resulting in financial losses, injuries, disabilities and deaths. Decent working conditions and resulting improved worker satisfaction are key to sustainable productivity in the industry and it is found that more legislation is not the urgent issue; incorporating existing legislation into construction contracts and making clauses operational is a priority(Cotton et al., 2005).

2.10.6. Safety Standard

Construction safety on project sites is of utmost importance due to the nature of the construction industry. Safety issues are considered only after an accident occurs at a construction site with follow up measures to improve working conditions, especially in developing countries a benchmark of construction safety should be considered across six dominant groups of factors: management commitment, management measures, implementation, project nature, individual involvement and economic investment. Management commitment is the most dominant factor that affects construction safety and consists of implementing organizational safety policies, assigning safety responsibilities at all levels(Priyadarshani et al., 2013).

The construction industry is widely regarded as one of the most significant in terms of its impact on health and safety (H&S). Recent studies suggest that in developing countries H&S awareness and performance is low. The construction industry is hindered by many challenges that adversely affect H&S performance the significant constraints or barriers to implementing good H&S practice on construction sites are grouped thematically into three classes namely: Government regulations, legislation, and policies,Management commitment and involvement, and Worker awareness(Zaid Alkilani et al., 2013).

2.10.7. Technology Utilization

Information and communication technology (ICT) is one of the important factors that support construction project performance. Various studies have concluded that by aligning the ICT utilization with organizational ICT infrastructure, better performance outcomes can be achieved from the project to organization level. A positive connection between utilization of ICT and project performance has been established(Eliwa et al., 2022). Analysis provides empirical evidence that IT is positively associated with firm performance, schedule performance, and cost performance. Firm performance is a composite score of several metrics of performance: schedule performance, cost performance, customer satisfaction, safety performance, and profit and no relationship is found between IT use and customer satisfaction, safety performance, and profitability(El-Mashaleh et al., 2006).

Computing technology in the construction industry can be broken down into automation and information and communications technology (ICT). Construction automation entails the use of computers to replace and/or enhance a variety of jobsite applications including surveying, the control of equipment, and the installation of prefabricated units using Global Positioning System (GPS) technologies and advanced robotic systems. Construction ICT entails the use of computer systems that are capable of capturing, organizing, storing, analyzing, exchanging, transmitting, and sharing information.

2.11. Strategies to Improve the Contractors Performance

2.11.1. Training Programs for Local Contractors

Training programs in developing countries should enhance indigenous construction capacity by promoting entrepreneurial and managerial skills in construction education, encouraging graduates to consider self-employment or business ownership as alternative career paths, thereby preparing them as future owner-managers of construction enterprises (Adams, 1998).

2.11.2. Providing Incentive for local Contractors

Incentives are regarded as motivational tools which can be used to propel construction workforce to achieve project objectives(Ogwueleka & Maritz, n.d.). Incentives and disincentives are common contractual tools used to influence contracting parties' behavior. The types of incentive vary based on the objectives, such as enhancing client-contractor relationships, establishing long-term relationships, or using certain business models. Other more tangible objectives include cost, performance, and time/completion on schedule.

Incentives can be monetary, such as fixed-price contracts, cost-plus-incentive fees, cost-plus-award-fees, share-in-savings incentives, or non-monetary, such as automatic contract term extension, more frequent payments, and letters of appreciation(Hughes et al., 2007).

2.11.3. Improving the quality of materials

Poor project execution and deliverable performance considered one of the most recurring problems in the construction industry. Most of the projects completed at sums much higher than the actual contract sum. This led us to analyze the factors influencing the cost variance during the construction stage

2.11.4. Concurrent engineering

The construction procurement process has been heavily criticized for its fragmented approach toward the delivery of construction projects. This has affected project effectiveness in as much as current procurement practices do not effectively encourage the integration, coordination and communication between participants. In addition, there is an ephemeral shifting coalition of participants from which divergent goals and objectives often emanate. This inhibits the scope for creativity and innovation throughout the procurement process. To overcome the difficulties often associated with procuring projects, industry practitioners and researchers have turned to the manufacturing industry as a point of reference and a potential source of innovation. Accordingly, a concept known as Concurrent Engineering (CE) has become a focal point for research. Concurrent engineering is a holistic approach to the design, development and production of a product. A multi-disciplinary team approach is required, whereby participants are brought together during the design to determine how downstream issues may be affected by design decisions(Mahamid, 2013).

2.11.5. Increasing the level of monitoring and supervision

The practice of monitoring and evaluation in the building and construction industry appears to be side-lined whereas other project management areas are given much attention in project delivery. Effective monitoring and evaluation plays a critical role in construction project implementation given the needed attention by the project implementors/team by providing adequate resources, technical capacity building and providing a conducive project environment and the involvement and participation of stakeholder in monitoring and evaluation improves project performance(Callistus & Clinton, 2018).

2.11.6. Building Information Modeling (BIM)

The construction industry is beginning to utilize building information modeling (BIM), benefiting from the improved visualization and productivity, better coordination of construction drawings, building documents that contain embedded links to virtual information, faster delivery, and lower costs. However, construction companies often find it challenging to reorganize their company's organizational structure to take full advantage of these benefits of BIM adoption and implementation(Ahn et al., 2016).

The most significant benefits of 4D BIM are better visualization of construction work,better communication between project teams and improving project time and cost performance.4D BIM allows stakeholders to visualize construction activities during project duration and identify potential spatial conflicts and schedule conflicts. Although researches related to 4D BIM has proven the benefits of 4D modeling in construction projects, these benefits are still questionable for EPC projects, whether it can compensate the initial costs and efforts to create the model. The implementation strategies across EPC project life cycle also become fundamental issue(Piselia, 2020).

2.11.7. Total Safety Management (TSM)

TSM is a performance-oriented approach that integrates all aspects of construction safety (intention, behavior, culture and process) to achieve a safe work environment that is consistent with peak performance and continuous improvement. The implementation of total safety management at the organizational level in construction companies will improve organizational performance. Team building, attitudinal, behavioral and structural modifications in construction safety management is used as a means of sustaining the gains of total safety management in the construction industry(Agwu, n.d.).

Strategies for improving the safety performance of construction contractors is crucial to determine the most effective strategies for improving the safety performance of construction contractors, and the government should introduce a special task force to conduct safety inspections at work sites to ensure that the workplace and work environment is safe and suitable and additionally construction contractors companies should evaluate safety performance regularly to identify weaknesses and try removing them or at least minimize their effects on the overall performance of projects(Ali & Omran, 2016)

2.11.8. Methodologies for construction claim management

The management of construction claims is the greatest challenge that is facing contractors in today's vacillating business environment. Construction projects are becoming increasingly susceptible to a variety of factors that give rise to time extension and cost recovery. Although the construction business environment has moved toward partnering arrangements in recent years, the number of contractual difficulties continue to rise. Thus, the construction industry needs to develop methodologies for construction claim management that should overcome their current problems(Kululanga et al., 2001).

2.11.9. Early Contractor Involvement in Design

The importance of integrating construction knowledge into the design process has long been recognized by the construction industry. Early contractor involvement in design and its impact on construction schedule performance through a combined empirical case study and theoretical simulation analysis shows that these inputs lead to improved drawing quality, material supply, information flow, and consequently improved construction schedule performance. This impact on construction schedule is illustrated using actual project data and simulation techniques Better understanding of the early contractor involvement process and its benefit can improve buy-in and help industry practitioners to reach the full potential of this concept(Song et al., 2009).

2.11.9. Network strategy for contractors' business competitiveness

Establishing a cooperative network has emerged as a strategy for contractors to improve business competitiveness, which can affect a construction business and sustain its future growth opportunities. The findings demonstrate that the key network techniques of supporting information exchange and organizing project communication are highly significant predictors of the business competitiveness attributes (BCA). The network technique of creating learning capacity is positively associated with contractors' bidding performance and competitive strategies. Interestingly, the techniques of sharing knowledge and promoting networking culture insignificantly contribute to a number of the BCA. The developed network strategy reveals that the key network techniques significantly support contractors' network performance and that the consequent network outcomes give rise to the BCA, which in turn stimulate contractors' business competitiveness. Several practical suggestions are offered for contractors to improve their business competitiveness through

inter firm cooperation between project network members(Keung & Shen, 2017).

2.11.10. Organizational Cultural Intelligence

Cultural intelligence (CQ) on the organizational level is an organization's capacity to reconfigure its capability to function and manage effectively in culturally diverse environments and to gain and sustain its competitive advantages. The findings support the contracting firms leveraging their cultural intelligence as their main cross-cultural competence for establishing and increasing the performance of international strategic alliances.

Research on performance of contractors has currently received special attention from construction researcher. Some research conducted on performance of contractors and its impact on construction industry and the gaps observed on the literature's are summarized as follow:

According to (Gadisa & Zhou, 2020) that the top five common related factors that lead to the poor performance of public construction projects in Ethiopia include inefficient contractors, improper project design and procurement processes, incompetent clients, inadequate project contract management and issues related to the supply of construction materials. The scope of this study confined to public projects in Ethiopia and the researcher suggested that further research needs to consider public and private construction from a comprehensive perspective in the developing countries.

According to (Sun et al., 2020) "Lack of coordination and communication among stakeholders", "Higher cost", "Lack of government support", "Lack of experience and expertise", "Lack of building codes and standards", "Poor supply chain integration", and "Complexity of connection" are the top barriers curbing the uptake of modular buildings. Although the researcher identified the constraints hindering the development of high-rise modular buildings further research is expected to exploit promote the performance of modular construction as well.

According to (Esaiyas & Kahssay, 2020) the study mainly relies on the Challenges Facing Local Contractors Working with Chinese Contractors in Addis Ababa Building Projects and the causes of poor performance of local contractors is not appropriately assessed and further investigation is needed. (Mosie, 2022) his study identified major challenges of high rise

building construction during construction stage but as compared to (Chauhan et al., 2022) the review study of Challenges in High-Rise Building Projects Parameters of Project Management in terms of scope of the project, quality, time and cost, safety, and risk still it needs further investigation.

(Ofori-Kuragu et al., 2016b) stated that effective performance measurement is critical to project success and a set of common key performance indicators (KPIs) for Ghanaian contractors was developed through extensive review and by conducting a survey of large Ghanaian contractors namely Client Satisfaction, Cost, Time, Quality, Health and Safety, Business Performance, Productivity, People and Environment. Despite identifying the key performance indicators, the researched did not evaluate the performance level of Ghanaian contractors which represents local contractors of developing countries

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Introduction

The literature review in the previous chapter has discussed various past studies and research gaps in relation to project delivery methods. Based on the identified research gaps, Chapter 1 outlines the research objectives set for this study. This chapter elucidates the methodology adopted to accomplish the study's objectives assessment of performance of local contractors in high rise building construction project in the case of Addis Ababa.

This part of the research deals with overall approach of the research methodology and it includes research design sample size, sampling techniques, data collection tools, source of data,and data analysis method that the study was used

3.2. Study Area

This study begins by identifying the performance level of local contractors in high rise buildings construction, then assess the cause and impact of poor performance and develop a remedial solution. This study was conducted in Addis Ababa, the capital city of Ethiopia and the capital city and the Economic, Political and Social Centre of Africa. In recent years there has been a massive infrastructure development as the government attempts to develop the city to reflect its local and international significance.

3.3. Research Design

The purpose of research design is to offer a summary of the processes that charted in the gathering and analysis of data, as well as the time frames in which the procedures accomplished

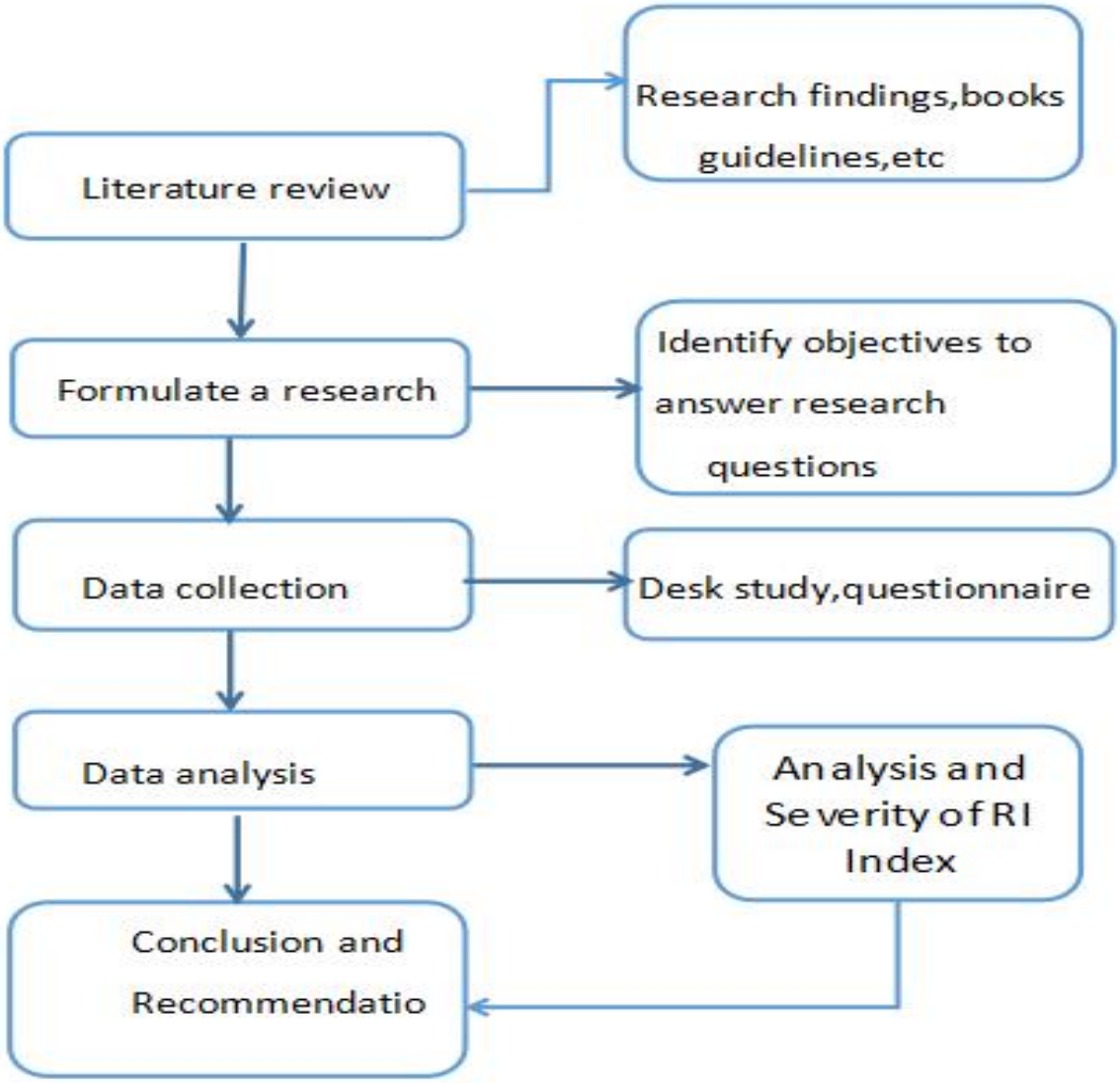

Figure 3.1: Research Flow Chart

3.4. Research population and sampling

The target population for this study includes all local contractors, consultants and client participated in construction of high rise buildings projects. A high rise building is a building that has at least fifteen storey above the ground and no more than forty-five storey construction in Addis Ababa.

Table 3.1: Target population

No	Respondents Group	Total Population
1	Local contractors	40
2	Consultants	24
3	Clients	16
		80

Since the total respondent is small in order to minimize marginal error and increase the reliability of the outcome of this study the researcher used Census or Parametric method of survey. That mean all the target population of this study are included in this investigation, based on the consent and willingness of the parties.

3.5. Sources of Data and Research Instruments

Literature on common methodology reveals that there are different types of research. By taking the type of data used, research can be classified into quantitative research, qualitative research and mixed research (a combination of quantitative and qualitative) (Creswell, 2012). In choosing the type of research to use, it is essential that a researcher situate its position among the various types of research listed above. Therefore, to determine which type of research to use, the following questions should be taken in to consideration by the researcher. The quantitative research explains the phenomenon by collecting numerical data that can be analyzed using mathematical and statistical methods. Hence, the quantitative research design was found to be appropriate for this research to assess level of performance and rank the major factors adversely affecting contractors‟ performances taking into consideration the research objectives, the type of data used and review of related studies on this topic.

3.6. Data analysis method

In this study, descriptive statistics (mean, frequency, and percentage) were used to analyze the quantitative data found from the questionnaire. A statistical program, Statistical Package for the Social Science (SPSS) version 25, was used to assist in analyzing the quantitative data.

Relative Importance Index (RII) methods of analysis were used to establish the relative importance of the factors affecting the performance of local contractor in construction of high rise building in case of Addis Ababa Building Projects. The points given by the respondents,

for each factor using the five-point Likert's scale (1, 2, 3,4 and 5), is used tocalculate the RII and MS Excel 2007 were used to rank the frequency of occurrence and severity of impact of the different factors.

The Relative Importance Index (RII) for identifying the importance of each factor was calculatedby using the following equation:

$$\mathbf{RII} = \frac{\sum_{i=1}^{i=5} \mathbf{Wi}}{\mathbf{AN}} \quad \text{.....[Eq.3.1]}$$

Where: Wi = the weight given to each factor which ranges from 1 to 5

f = frequency of response for each weight

A = the highest weight which is 5

N= the total number of respondents

The Relative Importance Index (RII) method will be adopted to establish the relative importance of the factors affecting the performance of local contractor in construction of high rise building in case of Addis Ababa Building Projects. Likert's scale of five ordinal measures of agreement towards each statement were used to calculate the RII for each factor that is used to determine the relative ranking. Additionally, the collected data was then analyzed using SPSS to deduce relationships

3.7. Reliability and Validity

In order to cope up with validity concerns a per-testing was conducted by construction experts and individuals who have good experience in the research area before conducting a final questionnaire survey.

The purpose of pre-study was to verify the adequacy and/or to determine the extent to which a measuring instrument provides adequate coverage of the topic under study and finally to improve the questionnaire in order to obtain the best possible results from the respondents. Finally, some minor modifications and additions were introduced to the questionnaire with the expert suggestions and the final Questionnaire was constructed before distributing them among the specified respondents.

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1. Introduction

This section of the research deals with the presentation of the raw data collected using questionnaires. This study assessed the performance level of a high-rise building project in the case of Addis Ababa. In this research, the four measures of performance are assessed separately so that the performance level of a high-rise building project can be individually seen from the perspectives of time, cost, quality, and safety.

Factors affecting contractors' time, cost, quality and safety performances are also studied and ranked separately according to their frequency of occurrence and severity of their impact. Identifying the rate of occurrence of each factor or severity of their impact alone could not be enough to clearly identifying the major factors affecting performance. Hence, ranking factors based on their frequency of occurrence helps to identify the most common factors frequently affecting performance based on the existing scenario.

4.1 Questionnaires Response Rate

The total number of questionnaires distributed to client, contractor and consultant respondents was 80 as discussed in section 3.4 above. Table 4.1 shows the distribution of questionnaires and the response collected from the respondents ; From the 16 questionnaires distributed to client's representatives, 14 of the questionnaires were collected and found to be complete. From the 40 questionnaires distributed to respondents of contractors 36 questionnaires were returned and and were found as valid response for the study. To the consultant's side, 16 questionnaires were distributed and 14 questionnaires were collected and were found as valid response for the study.

No	Respondent category	Distributed questionnaires	Responses collected
1	Client	16	13
2	Contractor	40	35
3	Consultant	24	20
Total		80	68

Table 4.1: Distribution of questionnaires, responses collected and response rate by respondents

4.2 Respondents Characteristics

4.2.1 Work experience of respondents

Only professional staffs of clients, contractors, consultants and owners of the construction or consultancy offices are made to participate in the questionnaires. This is due to the fact that the questionnaires need respondents with good knowledge and experience in the field in order to get relevant information.

In order to understand the respondents‟ knowledge in the field, the questionnaire included a question on their work experience. Table 4.2 shows work experience of the respondents;The assessment of work experience of individual respondents shows that out of 68 respondents, 18 respondents representing 26.5% have experience less than five years, 17 respondents representing 25.0% have experience between five and ten years and 33 respondents representing 48.5% have experience more than ten years in the construction sector.

Table 4.2:Work experience of the respondents

Respondent Experience	Client	Consultant	Contractor	Total	Experience in percent
<5 years	8	2	11	18	26.5
5-10 years	8	2	7	17	25
>10years	10	3	17	33	48.5
Total	26	7	35	68	100

It could be seen from the data that only 26.5% of the respondents had work experience less than five years. This could mean that majority of the respondents had enough knowledge and work experience about the subject matter in the questionnaire to give relevant information.

4.2.2 Respondents' Educational Background

In order to understand the respondents‟ knowledge in the field, the questionnaires ask for their educational background. Data on respondents‟ educational background was calculated and summarized.Fig 4.1 below shows educational background of the respondents and the result shows that all the consultant and client respondents are in Engineering and related field of study. Majority of the respondents, 61.8%, have Civil Engineering background, and 38.2% have Construction Technology and Management (CoTeM) background.

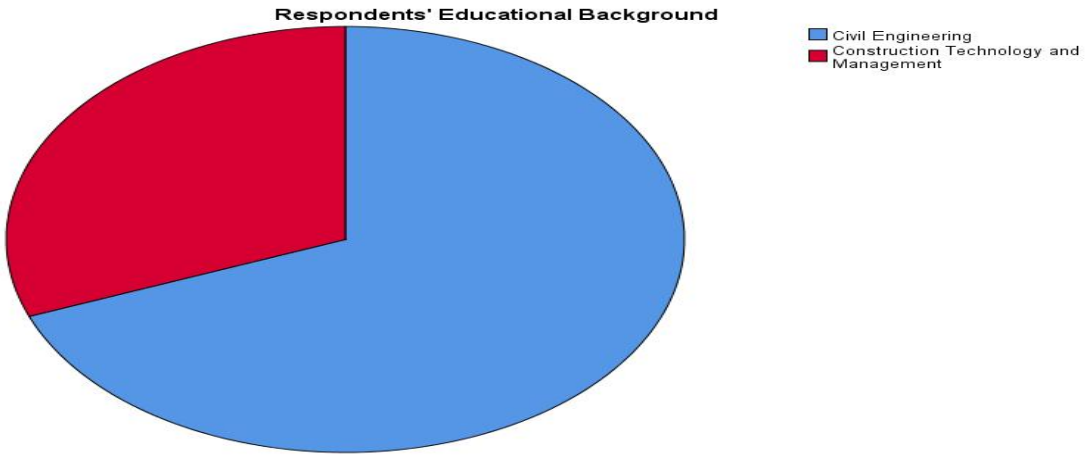

Figure 4.1: Respondent Educational Background

4.3. Performance level Assessment

4.3.1. Time Performance Assessment

Time is one of the major criteria to measure performance of high rise building projects for completing projects within contractually agreed time. Late completion of projects and breach of contract between different parties in high rise building construction projects leads to increase in cost and delays affects economy of the country.

From the questionnaire's response, as shown in table 4.3 it was found that 2.9% of the respondents answered that their projects were completed as per the agreed contract time, 29.9% of the respondents answered that they had delayed in completing their projects, whereas, 63.2% answered that they had completed their project within the extension of time granted and the remaining 4.4% answered that they terminated the project by mutual agreement. Contractors' breach of contract is widely seen to occur due to the reason that they simply try to win the tender without having sufficient resources to perform the contract and face problem afterwards(Dessa, 2003). Based on the above result it is possible to say that the time performance of high rise building projects is found to be poor.

Table 4.3 :Completion of projects in terms of the contract time

Completion of Projects	Frequency	Percent	Valid Percent	Cumulative Percent
As per agreed contract time	2	2.9	2.9	2.9

Completed with contract time + Extension of time granted	43	63.2	63.2	66.2
Delayed	20	29.4	29.4	95.6
Terminated by mutual agreement	3	4.4	4.4	100.0
Total	68	100.0	100.0	

4.3.2. Cost Performance Assessment

The data collected from the questionnaire revealed that the actual amount of work executed on the completion of the project as compared to the original contract amount shows that 20% of the project were completed with +/-10% of the original contract amount,73.5% of the project were completed above 10% of the original contract amount and 5.9% of the project were completed with less10% .From the above data majority of the project were not completed by local contractors with the estimated agreed contract amount. Based on the above result it is possible to say that the cost performance of high rise building projects is found to be poor.

4.3.3. Quality Performance Assessment

Quality is one of the major measures on evaluation of performance of high rise building construction projects. The data collected from respondents on quality performance assessment based on the checklists for major works revealed that an average of 42.96% of the local contractors major work completed meeting specification and 57.03% of the local contractors major works were completed not meeting specification. Out of which 76.24% were completed with minor defects during defect liability period, 11.23% with major defects during defect liability period, 11.04% were completed with minor defect after defect liability period and the rest 1.47% were completed with major defects after defect liability period.

The results of this study revealed that about half of the major works done in high rise building project do not meet the specification; hence high rise building projects under study have poor quality performance.

4.3.4. Safety Performance Assessment

Safety performance is one of the major measures of performance in any construction projects. Good safety practice creates safe working environment to the employees and helps them to be capable of doing their job without fear and stresses, as a result their productivity increases.

The data collected on safety performance assessment of high rise building projects revealed that 76.5 % of the participants in the survey had occupational accidents to their workers on their construction projects. As shown in the figure 7 below the degrees of injuries following the accidents revealed that the majority of the accidents (78.8 %) were reported to be resulted in light injuries, (15.4%) Partial inability, (1.9%) permanent disability and (3.8%) death were ranked at second and third places respectively. From the results of the study the safety performance of high rise building project is unsafe and dangerous to the workers in the construction site as well as the surrounding community.

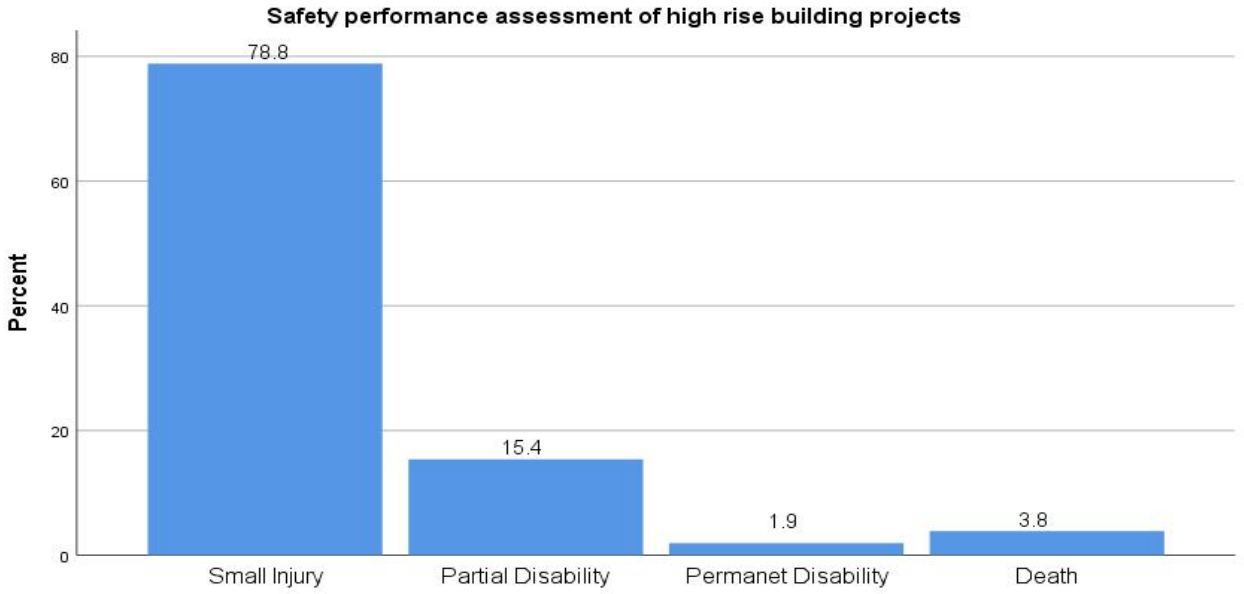

Figure 4.2: Safety performance assessment of high rise building projects revealed

In addition,61.8% of the respondents answered that the contractor ‘s company does not have written safety policy, and 33.8% of the respondent answer that their company have a safety policy. On the other hand with respect to safety and risk assessment plan, safety training's to the workers, safety representative, periodic meetings on safety issues, trained the workers for first aid, include safety as part of project performance and correction of noted deficiencies on noncompliance with safety the following data were obtained

In safety and risk assessment plan of the company during execution of the project 47.1 of the respondent said the company has and safety and risk assessment plan and 52.9% of the respondent said that the company don’t have safety and risk assessment plan; On safety and

health training of the worker's 42.6% of the respondent said the training was given for the worker and 57.4% of them answered that the training was not given for the workers.

For safety representative personnel 44.1% of the respondent said there is a safety representative in the company and 55.9% of them answered that there is no safety representative in the company; Concerning periodic meeting 39.7% of the respondent said that there is a periodic meeting and 60.3% of the respondent replied there is no periodic meeting in the company and 52.9% of the respondent said that the employees were trained for first aid in the construction site and 47.1% of the respondent said that the employees were not trained for first aid in the construction site of the company and 45.6% of the respondent replied that the company have the facilities for treatment of injured employees on the other hand 54.4 % of the respondent replied there is no facilities for treatment of injured employees in their company

50%of the respondent replied that the company include safety as a part of the project performance review and 50% of the respondent replied that the company did not include safety as a part of the project performance review.

So far, the issue of safety on construction sites could not get much attention by construction stakeholders while the problems are getting worse from time to time. This study revealed that high rise building project under study have poor safety performance.

4.4. Factors Adversely Affecting the Performance of high rise building project

4.4.1. Factors adversely affecting Time performance

In this study the factors that adversely affecting time performance of high rise building project is analyzed based on the respondents response from the questionnaires. The frequency of the factors is calculated using RII and ranked as shown in Table 4.4 below.

According to the results of the questionnaire responses, the top five ranked factors that adversely affecting time performance are found to be: Noncompliance to the approved schedule, late submittal of revised schedules, payment certificates, reports and claims, use of old equipment, inefficiency in planning, management skills and decision making and not purchasing and stock construction materials ahead of schedule

According to the information collected and analyzed in this study, noncompliance to the approved schedule has been the most frequently occurring factor (with RII of 0.535) affecting time performance of high rise building project. The second ranked frequently occurring factor

is late submittal or revised schedule has been the third ranked frequently occurring factor(with RII of 0.494).The data collected shows the third ranked frequently occurring factor to be use of old equipment's with low level of utilization (with RII of 0.488) .The fourth ranked frequently occurring factor (with RII of 0.485) is; Inefficiency in planning, management skills and decision making This could be due to lack of finance of contractor or unavailability of qualified personnel who properly follow the approved schedule for purchasing and stocking materials ahead of time. Hence, this factor adversely affects the time performance of contractors by contributing to the delay of project completion.

The above top five factors discussed above have high degree of occurrence and affect time performance of high rise building project in the case of Addis Ababa. The ranks of frequency of occurrence of other factors affecting time performance are listed in Table 4.4 as shown below.

Table 4.4:Factors adversely affecting time performance in high rise building project

No	Factors adversely affecting time performance in high rise building project	Clients, Consultants and Contractors' responses	
		RII	Rank
1	Untimeliness and poor -quality schedule submission	0.473	8
2	Noncompliance to the approved schedule	0.535	1
3	Late submittal of revised schedules, payment certificates, reports and claims	0.494	2
4	Not purchasing and stock construction materials ahead of schedule	0.482	5
5	Not deploying machinery 's/ Equipment's as per the contract and approved schedule	0.476	7
6	Not employing sufficient competent professionals with the required experience	0.441	11
7	Inadequacy of Contractors experience	0.458	10
8	Poor coordination of work	0.461	9
9	Inefficiency in planning, management skills and decision making	0.485	4

10	Poor communication	0.479	6
11	Use of old equipment	0.488	3
12	High competition of contractors in Bids leading to insufficient cost submission	0.417	12

4.4.2. Factors Adversely Affecting Cost Performance

Financial resources are so scarce in developing countries like Ethiopia that cost related issues in the Ethiopian construction industry are sensitive. Hence identifying the major factors adversely affecting cost performance of high rise building project is very essential in order to reduce or avoid (if possible) occurrence of those factors.

The analysis for degree of occurrence of factors adversely affecting cost performance of high rise building project is calculated based on the respondents‟ answer from the questionnaires. The top five most factors affecting cost performance are interrelated and ranked as shown in Table 4.5 below. The results of the study revealed that the top five ranked factors affecting cost performance are: Inadequacy of finance of the contractor to run the project, ineffectiveness in financial planning and scheduling, inability to foresee and budget for potential inflation, offering low price to win a bid and poor management of man power, material and equipment on site. In agreement with this result, a study by (Mechegiaw, 2012) revealed that, low cost bidding method has recently been criticized lately for time overrun, increasing overall cost of the project, promoting inferior quality, causing too many change orders and furthering adversarial relationships.

The first ranked factor affecting cost performance is in adequacy of finance of contractors to run the project (with RII of 0.52). Most local contractors do not have adequate finance to run their project when there is delay in payments. Delays in contractor payment create financial problems for the contractor. This result is supported by (Yigezu, 2008)which states that, delays are common as a result of loss of working capital and capacity of the contractor to persist during price increases.

The second ranked factor affecting cost performance is ineffectiveness in financial planning and scheduling (with RII of 0.517) which create significant financial risk to both contractors and owners. Most local contractors under study fail to employ competent professionals and

skilled labour due to the salary and security of employment. Hence an in effective financial planning, scheduling is frequently occurring factors affecting their cost performance.

The third ranked factors affecting cost performance is inability to foresee and budget for potential inflation (with RII of 0.488), in developing countries like Ethiopia the inflation rate has been increasing from time to time so it is important to take the inflation rate into consideration during the construction process

Offering low price to win a bid (with RII of 0.485) has been the fourth ranked factor affecting cost performance. This is due to the least bidder rule currently applicable in most building construction projects. Unless contractors offer the lowest possible construction cost, there is high tendency of losing the competition. Hence occurrence of offering low bid price keeps on increasing and affecting cost performance of local contractors in high rise building projects.

The fifth ranked factor is poor management of manpower, material and equipment (with RII of 0.476). Local contractors mostly do not have professionals and technical staff with good knowledge and experience in resource management. Hence deficiency in management skills occur frequently which as a result affects cost performance of local contractors.

Table 4.5:Factors adversely affecting cost performance

No	Factors adversely affecting cost performance/occurrence	Clients, Consultants and Contractors' responses	
		RII	Rank
1	Inadequacy of finance of the contractor to run the project	0.52	1
2	Ineffectiveness in financial planning and scheduling	0.517	2
3	Poor management of man power, material and equipment on site	0.476	5
4	Low productivity of technical staff, skilled and unskilled labor	0.414	7
5	Late submission of Payment certificates	0.423	6
6	Low Creativity in controlling cost and achieving efficiencies	0.408	8
7	Inability to foresee and budget for potential inflation	0.488	3
8	Offering low price to win a bid	0.485	4

4.4.3 Factors adversely affecting Quality performance

The analysis for the factors adversely affecting quality performance of high rise building project is calculated based on the respondents' answer from the questionnaires as shown in Table 4.6 below. According to the results of the questionnaire responses, the top five ranked factors that adversely affecting quality performance of local contractors are: Inappropriate storage of Construction materials, inadequacy of contractor's quality control plan and lack of implementation, fail to identify and correct defective works in a timely manner, not investing on Quality training's, poor quality of workmanship (Experience, skills, ability and competences) of the project team

The first ranked factor is found to be inappropriate storage of materials (with RII of 0.573). Most of the local contractors under the study did not use proper storage for construction materials based on standards and specifications. For example, they mostly stock reinforcement bars on the natural ground without preparing bed with the required standard height. Hence inappropriate storage of construction materials frequently affects the quality performance of high rise building project.The second ranked factor is found to be inadequacy of contractor's quality control plan and lack of implementation (with RII of 0.544). The third ranked factor is fail to identify and correct defective works in a timely manner (with RII of 0.535).Not investing on Quality training's (with RII of 0.529) is the fourth ranked factors affecting quality performance. The fifth ranked factor is found to be poor quality of workmanship (Experience, skills, ability and competences) of the project team (with RII of 0.526). In agreement with this study, (Samson, 2005) revealed that poor quality of workmanship strongly affects the quality performance of construction projects. Most contractors do not employ competent personnel because they don't pay much money for salary. These factors affect the quality performance of high rise building project under the study.

Table 4.6: Factors adversely affecting quality performance of high rise building projects

No	Factors adversely affecting quality Performance	Clients, Consultants and Contractors' responses	
		RII	Rank
1	Inadequacy of contractor's quality control plan and lack of implementation	0.544	2
2	Inadequacy of Quality Control testing mechanisms	0.444	11

3	Not investing on Quality training's	0.529	4
4	Not conducting Laboratory and manual material tests as per the contract	0.47	8
5	Poor analysis and record of material test results conducted in laboratory and on site	0.458	10
6	Inappropriate storage of materials	0.573	1
7	Fail to identify and correct defective works in a timely manner	0.535	3
8	Use of old machinery's	0.473	7
9	Poor quality of workmanship (Experience, skills, ability and competences) of the project team	0.526	5
10	Use of poor-quality construction materials	0.482	6
11	Lack of defect preventive measures	0.461	9
12	Excessive errors or omission	0.441	12

4.4.4 Factors Adversely Affecting Safety Performance

The analysis of factors adversely affecting safety performance of high rise building project is calculated based on the respondent's answer. In this study, the top five factors which adversely affects safety performance are: lack of budget for safety, lack of safety and health training, lack of safety and health motivation, lack of safety and health policy and lack of employing safety officer

Lack of budget for safety (with RII of 0.653) has been the first ranked factor affecting safety performance. All the local contractors involved in this study had not incorporate budget for safety during bid pricing. Hence, they had not provided personal protective equipment's which expose the workers to injury during accidents.

The second ranked factor affecting safety performance is lack of safety training (with RII of 0.635). Most contractors do not train their personnel on safety issues because they don't want to pay money since they are not obliged in the contract to do so. Hence the workers of local contractors under study are not made to have the awareness about safety

The third ranked factor is found to be lack of safety motivation (with RII of 0.606). The results of the study revealed that safety motivation was missed in all of the projects under study. All

the stakeholders had not given attention for safety issues which has great impact on safety performance.

The fourth ranked factor is lack of safety policy (with RII of 0.66). All the local private contractors under study were not including safety policy which highly affects the safety performance of the contractors. Lack of employing safety officer (with RII of 0.562) is the fifth ranked factor affecting safety performance of local contractors. All the local contractors of high rise building projects under study did not have safety officer who monitors safety of the workers.

The results of the study revealed that the local contractors are found to have poor safety performance and the five factors discussed above highly affect the safety performance of the contractors in projects under study. In line with the above factors, (Zelalem, 2015)also revealed that lack of safety and health policy, lack of personal protective equipment's, inadequate safety and health training, lack of health and safety professionals and poor risk assessments are the major constraints on safety and health. The ranked factors affecting safety performance of high rise building project is shown in Table 4.7 below in tabulated form.

Table 4.7:Factors adversely affecting safety performance of high rise building projects

No	Factors adversely affecting safety Performance	Clients, Consultants and Contractors' responses	
		RII	Rank
1	Lack of employing safety officer	0.562	5
2	Lack of safety and health policy	0.603	4
3	Lack of safety and health training	0.635	2
4	Lack of safety and health motivation	0.606	3
5	Lack of budget for safety and health	0.653	1

4.5. Possible ways to Improve the Contractors Performance

In order to increase the performance of local contractors in high rise building projects proposing an appropriate strategy is mandatory. The analysis for the selection of strategies to improve the local contractor's performance is calculated based on the respondent's answer

from the questionnaires. This study shows that the following are the five main strategies that are selected by the respondent to improve the performance of local contractors in high rise building project namely establishing partnerships between local contractors and more experienced contractors, adopting innovative and efficient construction methods, providing technical training programs for local contractors ,improving the quality of materials supplied to local contractors and providing access to modern construction equipment for local contractors

The first ranked strategy to improve the local contractor's performance is establishing partnerships between local contractors and more experienced contractors (with RII of 0.885), if a good partnership is created between local contractor and more experienced contractors there will be a knowledge, experience, skill and knowledge transfer will be developed through time

The second ranked strategy to improve the local contractor's performance is adopting innovative and efficient construction methods (with RII of 0.876), and this will promote the performance of local contractors in terms of time, cost, safety and quality.

The third most equally ranked strategies to improve the local contractor's performance are providing technical training programs for local contractors and improving the quality of materials supplied to local contractors (with RII of 0.853),the quality of the construction material is critical in high rise building construction projects.

The third ranked strategy to improve the local contractor's performance is Providing technical training programs for local contractors (with RII of 0.853), giving a technical training for local contractors will enable them to develop a technical skill and to increase their efficiency.

Improving the quality of materials supplied to local contractors (with RII of 0.876), has been the fourth ranked strategy to improve local contractors' performance. Providing access to modern construction equipment (with RII of 0.85) can improve the performance of local contractors and promote their level of competition and enable them to increase their performance. The ranked strategies to improve the local contractor's performance in Table 4.8 below in tabulated form.

Table 4.8 :The ranked strategies to improve the local contractor's performance

No	Possible ways to improve the local contractor's performance	Clients, Consultants and Contractors' responses	
		RII	Rank
1	Providing technical training programs for local contractors	0.852	3
2	Providing incentives (such as bonuses or rewards) to local contractors	0.705	10
3	Clear communication and collaboration between project managers and local contractors	0.779	9
4	Improving the quality of materials supplied to local contractors	0.852	3
5	Increasing the level of supervision and monitoring of local contractors	0.808	7
6	Providing access to modern construction equipment	0.85	5
7	Adopting innovative and efficient construction methods	0.876	2
8	Increasing local contractors' involvement in the decision-making process	0.802	8
9	Providing financial support to local contractors	0.832	6
10	Establishing partnerships between local contractors and more experienced contractors	0.885	1

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the findings of this study, the following conclusions are drawn. The finding of the study revealed that the projects under study suffered an average delay of more than double the completion time; hence the high rise building project under the study had poor performance in terms of time.

As indicated in the analysis of this study, almost all of the projects under study were not completed with the agreed contract budget.This extra cost in a given project influences the client's budget. Therefore, it is fair to conclude that the high rise building projects studied had poor performance in terms of cost. The study revealed that half of the high rise building projects works was completed not meeting specification with defects ranging from minor to major defects, before and after defect liability period. Hence the high rise buildings had poor performance in terms of quality.

As the findings of the study shows, all of the high rise building projects studied lack written safety policy, safety and risk assessment plan, safety training's to the workers, safety representative, and periodic meetings on safety issues. In addition, it is evident in the findings that more than half of participants in the survey had occupational accidents to their workers on their construction projects. Hence the in high buildings projects had poor performance in terms of safety practices.

Non compliance to the approved schedule,inadequacy of finance of the contractor to run the project,inappropriate storage of materials, and lack of budget for safety was found to be the top most ranked adversely factors affecting time, cost, quality and safety performances of high rise building projects respectively.

5.2 Recommendations

The following recommendations are forwarded for stakeholders to help reduce the adverse effects of factors affecting the performance of local contractors as well as indicate ways of improvement.

5.2.1. Recommendations for Contractors

Based on the results of the study, the following recommendations are put forwarded to contractors to reduce the adverse effects on their performance:

1. Contractors should improve their financial problem due to improper utilization of their advance payments.
2. Contractors should provide reasonable cost estimation for bids in order to complete projects within the contract requirements and without compromising quality.
3. Contractors should have sufficient competent personnel with the required qualification and experience as well as should avail construction equipment with the required type, number and capacity in order to improve their performance.
4. The contractor should ensure efficient time utilization through proper resource planning, estimating activity duration, schedule development and control; to avoid delay and consequent cost overrun.
5. Contractors should improve their quality performance in different ways such as by purchasing quality construction materials and provide appropriate storage, preparing and implementing quality control plan and investing on quality training's. Contractors need to consider quality in the tendering process, contract review, project planning, financial control, sub-contractor and supplier selection, resource allocation and other management aspects.
6. Contractors should allocate budget for creating safe working environment. This can be achieved by employing safety officer who regularly monitors the level of safety, deliver training and create awareness, and provide protective equipment to the workers.

5.2.2. Recommendations for Government Agencies

Most of the high rise building projects in Addis Ababa are financed by the private companies. Hence, the the private companies are the key role players in performance of local contractors in high rise building projects. The following recommendations are forwarded to private companies

1. The private companies should avoid late interim payments so that contractors will not face cash shortage which affects their time performance.
2. The private companies should periodically inspect the contractors and assist in financing the project by setting rules and regulations to tackle the improper advance payment utilization.

3. A system should be developed for the private companies to check on the contractors capacity in terms of actual number and capacity of equipment owned, professional staffs that are actually hired by local contractors. This could be done during registering contractors, license renewal and/or periodic random supervision.

4. In order to develop safety practices, a section on safety requirements should be included in the body of the contract.

5.3 Areas for Further Research

The researcher has forwarded major recommendations for further studies that can improve the previous practices and performance of contractors. However, the issues covered by this research are so vast that it became difficult to present all relevant interventions in a comprehensive and exhaustive way. Hence, the following major points are recommended for further studies to improve the performance of local contractors in high rise building projects.

1. Further study is required to evaluate and develop the local contractors performance measurement framework and ranking mechanism in order to ensure all the relevant measures are included and point allocations are appropriate.
2. External factors associated with other stakeholders (apart from contractors) that are adversely affecting performance of contractors shall be studied in order to provide a comprehensive ways of improvement

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APPENDICES

Appendices 1

Questionnaire Designed for MSc Thesis Work

Dear respondent:

This *Questionnaire* is prepared to obtain necessary data for the partial fulfillment of the requirements for the Degree of Master of Science in Civil Engineering (Construction Engineeringand Management) at Adama Science and Technology University.

The information is required for the academic research entitled with **"Assessment of *performance of Local Contractors in high rise building project ,the case of Addis Ababa Building Projects"***. The main objective of this study is to assess the performance of local contractors in high rise buildings construction project in Addis Ababa

You are kindly requested to contribute to this research work by completing this questionnaire. Quality of your response towards the item of questions is highly valuable and contributory to the outcome of the research. The identity of the respondent and that of the company the respondent represent shall remain confidential and all data found from the investigation will only be utilized for the research under consideration. Therefore, please feel free to provide information and opinions.

Finally, I would like to extend my gratitude for taking your time to respond to this questionnaire. If you require further information about this research work, or this questionnaire survey, please contact through the following addresses.

Thanks for your cooperation!

Fitsum Hailu (Researcher) *Advisor: Meseret Getent (PhD)*

Questionnaire

SECTION I: General Information

This survey the basic information about the respondent

1. Grade of your Company?
   a) I b) II c)III d) IV e)V f)VI g) Other (Please specify) _____

2. Years of Your Company since establishment?
   a) <5 years
   b) 5-10 Years
   c) >10 years

3. Your level of education
   a) BSc
   b) MSc
   c) PhD
   d)Other (Please specify) _____

4. Your field of study?
   a) Civil Engineering
   b) Construction Technology and Management
   c) Architecture
   d) Other (Please specify) _____

5. Your position in your Company/Project?
   a) General Manager
   b) Deputy Manager
   c) Project Manager
   d) Project Engineer
   e) Construction Engineer
   f) Office Engineer
   g) Other (Please specify) _____

6. Your work experience in high rise Building and related construction projects?
   a) <5 years
   b) 5-10 Years
   c) >10 years

7. The highest type of high rise building project you constructed/are constructing
   _____

8. The sub-city where the high rise building project is
   located_____

SECTION II: Performance Related

This section surveys **Time, Cost, Quality and Safety performances** of local contractors and **Factors adversely affecting their performances** in high rise building construction projects.

1. Time Performance

A. Time Performance Assessment

1. How much was the project contract time? _____
2. Completion of your project in terms of the contract time?
   a) As per agreed contract time
   b) Completed with Contract time + Extension of time granted
   c) Delayed
   d) Terminated by fault of the contractor
   e) Terminated by fault of the client
   f) Terminated by mutual agreement
   g) Others, please specify, _____

3. If your project was delayed, how much was the delay? _____

B. Factors adversely affecting Time performance

Please mark on the appropriate column for factors adversely affecting time performance of your company.

No	Factors adversely affectingTime Performance	Occurrence /Frequency/				
		Always(5)	Usually (4)	Sometimes (3)	Rarely (2)	Never (1)
1	Untimeliness and poor qualityschedule submission					
2	Noncompliance to the approved schedule					
3	Late submittal of revised schedules, payment certificates,reports and claims					
4	Not purchasing and stock construction materials ahead ofschedule					
5	Not deploying machinerie's/Equipment's as per the contractand approved schedule					

No	Factors adversely affectingTime Performance	Occurrence /Frequency/				
		Always(5)	Usually (4)	Sometimes (3)	Rarely (2)	Never (1)
6	Not employing sufficient competent professionals with therequired experience					
7	Inadequacy of Contractors experience					
8	Poor coordination of work					
9	Inefficiency in planning,management skills and decision making					
10	Poor communication with otherconstruction parties					
11	Use of old equipment with lowlevel of utilization					
12	High competition of contractorsin Bids leading to insufficient cost submission					

2. Cost Performance

A. Cost Performance Assessment

1. How was the actual amount of work executed on completion of your project as compared to the original contract amount?
   a) Within ± 10%
   b) Above 10%
   c) Less than10%

B. Factors adversely affecting Cost performance

Please mark on the appropriate column for Factors adversely affecting Cost performance of your company.

No	Factors adversely affecting Cost Performance	Occurrence /Frequency/				
		Always(5)	Usually (4)	Sometimes (3)	Rarely (2)	Never (1)
1	Inadequacy of finance ofthe contractor to run the project					
2	Ineffectiveness infinancial planning and scheduling					
3	Poor management of manpower, material and equipment on site					
4	Low productivity of technical staff, skilled and unskilled labor					
5	Late submission of Payment certificates					
6	Low Creativity in controlling cost and achieving efficiencies					
7	Inability to foresee andbudget for potential inflation					
8	Offering low price to wina bid					

3. Quality Performance

A. Quality Performance Assessment

Please mark on the quality of work in your project with respect to the specification and plan?

Check List:	**Meet Specification**	**Do not meet Specification**				
		Minor defect during defect liability period	Major defect during defect liability period	Minor defect after project completion	Major defect after project completion	Remark
a)Excavation and Earth work						
b) Concrete work						
c) Masonry Work						
d) Block work						
e) Roofing						
f) Carpentry						
g) Joinery						
h) Metal Work						
i) Finishing Work						
j) Glazing						
k) Painting						
l) Electrical work						
m) Sanitary work						
n,Mechanical work						

B. Factors adversely affecting quality performance

For the following questions please mark on the appropriate column for factors affecting quality performance of your company.

No	**Factors adversely affecting Quality Performance**	**Occurrence /Frequency/**				
		Always(5)	Usually (4)	Sometimes (3)	Rarely (2)	Never (1)
1	Inadequacy of contractor‟squality control plan and lack of implementation					
2	Inadequacy of Quality Control testing mechanisms					
3	Not investing on Quality training's					
4	Not conducting Laboratoryand manual material tests as per the contract					

No	Factors adversely affecting Quality Performance	Occurrence /Frequency/				
		Always(5)	Usually (4)	Sometimes (3)	Rarely (2)	Never (1)
5	Poor analysis and record ofmaterial test results conducted in laboratory and on site					
6	Inappropriate storage of construction Materials					
7	Fail to identify and correctdefective works in a timely manner					
8	Use of old machinery's and equipment's					
9	Poor quality ofworkmanship (Experience, skills, ability andcompetences) of the project team					
10	Use of poor quality construction materials					
11	Lack of defect preventive measures					
12	Excessive errors or omission					

4. Safety Performance

A. Safety Performance Assessment

1.Did occupational accidents happen to any of the workers in your construction project?
   a) Yes
   b) No

2.If your answer for number 1 is yes, what was the degree of the injury?
   a) Small injury
   b) Partial disability
   c) Permanent disability
   d) Death

3.Did your company have written safety policy for the project under execution?
   a) Yes
   b) No
   c) I don't know

4.Did your company have safety and risk assessment plan during execution of the project?
   a)Yes
   b) No

5.Did the workers in your sites receive appropriate safety and health training's?
a)Yes
b) No
6. Was there a safety representative in your project?
a)Yes
b)No
7. Did your company have periodic meetings on safety and health issues?
a)Yes
b)No
8. Were the employees trained for first aid in the construction site?
a)Yes
b)No
9. Did your company have facilities in your site for treatment of injured employees?
a)Yes
b)No
10.Did your company include safety as part of the project performance review?
a)Yes
b)No
11.Did your company have correction of noted deficiencies on non Compliance with Safety Standards?
a)Yes
b)No

B. Factors adversely affecting Safety performance

Please rank the top 5 factors adversely affecting Safety performance in your construction site?

No.	**Factors adversely affecting Safety Performance**	**Impact on Safety performance**				
		Very High (5)	High (4)	Medium (3)	Low (2)	Very Low (1)
1	Lack of employing safety officer					
2	Lack of safety and health policy					
3	Lack of safety and health training					
4	Lack of safety and health motivation					
5	Lack of budget for safety and health					

III. Possible ways to improve the performance of high rise building project

Please rank the following list possible ways that are used to improve the performance of high rise building projects

No.	To what extent do you believe that the following list of Possible ways are used to improve the performance in high rise building projects	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	Providing technical training programs for local contractors can improve their performance					
2	Providing incentives (such as bonuses or rewards) to local contractors can boost their performance					
3	Clear communication and collaboration between project managers and local contractors can enhance their performance					
4	Improving the quality of materials supplied to local contractors can improve their performance					
5	Increasing the level of supervision and monitoring of local contractors can improve their performance					
6	Providing access to modern construction equipment can improve the performance of local contractors					
7	Adopting innovative and efficient construction methods can improve the performance of local contractors					
8	Increasing local contractors' involvement in the decision-making process can improve their performance					
9	Providing financial support to local contractors can improve their performance					
10	Establishing partnerships between local contractors and more experienced contractors can improve the performance of local contractors`					

Mention any other strategies that are used to improve the performance in high rise building projects

_____

_____

THANK YOU!!!

Appendices 2

Regulation No. 648 / 2021 Construction Certification and Registration (2)

2) ለልዩ ስራ ተቋራጮች የሚጠው ማስራታቻ ከስራ ባህሪያቸው ጋር የተገናዘበ እንዲሆን ሚኒስቴር መስሪያ ቤቱ የህግ አግባብ ባለው መልኩ ይወስናል፡ ፡

17. የአማክሪዎች ምድብ

1) በዚህ መመሪያ መሠረት የሚሰጣቸው አማክሪዎች እንደ የሥራ ምርጫቸው የሚከተሉት ምድቦች ይኖሯቸዋል፡ –

ሀ) የህንፃ አማክሪ

ለ) የአርክቴክቶች አማክሪ

ሐ) የመሀንዲሶች አማክሪ የሚሰሉት የስትራክቸራል፣ የሀይዌይ እና ድልድይ፣ የጂኦቴክኒካል ኢንጂንርንግ፣ የኤሌክትሪካልና ኤሌክትሮ መካኒካል እና የሳኒታሪ ምህንድስና አማክሪ ድርጅቶች ናቸው፡ ፡

መ) የኮንስትራክሽን ሜጅመንት አማክሪ

ሠ) የከተማ ፕላን ስራዎች አማክሪ

ረ) ልዩ አማክሪ የሚሰሉት የንብረት አቻ ግመታ፣ የህንጻ ወስጣዊ ከፍሎችን ሚነዋብ፣ የሜት አቀማመጥ ንድፍ አማክሪ፣ የኮንስትራክሽን አዲት የመሳሰሉት ናቸው፡ ፡

18. የኮንስትራክሽን ፕሮጀክቶች ምድብ

በዚህ መመሪያ መሠረት የሚሰጣቸው የኮንስትራክሽን ፕሮጀክቶች የሚከተሉት ምድብ ይኖራቸዋል፡ –

ሀ) የህንፃ ስራዎች የሚጠቃልሉት አነስተኛ፣ መካከለኛ፣ ከፍተኛ እና በጣም ከፍተኛ የህንጻ ስራዎች ናቸው፡ ፡

<u>አነስተኛ ህንጻ</u> ሚት ምንም ዓይነት አሳንሰር ወይም አሳንሰርን የሚጭካ ከምድር ወደ ፎቅ እንዲሠም ከፎቅ ወደ ምድር የሚመላለስ መሳሪያ የለለው ሆኖ ከምድር በላይ ከአምስት ያነሱ ፎቆች ያለው ነው፡ ፡

<u>መካከለኛ ህንጻ</u> ሚት ከምድር በላይ ቢያንስ አምስት ፎቆች ያለው ሆኖ ከአስራ አምስት ፎቆች በላይ የለለው ነው፡ ፡

<u>ከፍተኛ ህንጻ</u> ሚት ከምድር በላይ ቢያንስ አስራ አምስት ፎቆች ያለው ሆኖ ከአርባ አምስት ፎቆች በላይ የለለው ነው፡ ፡

<u>በጣም ከፍተኛ ህንጻ</u> ሚት ከምድር በላይ ቢያንስ አርባ አምስት እና ከዚያ በላይ ፎቆች ያለው።

of the certificate by the police and reports in the newspaper.

3) Replacement of a damaged certificate can only be made when the damaged certificate has been returned.

4) In lieu of the requests referred to in sub-articles 1, 2 and 3 of this Article, a fee must be charged for the certification or registration certificate.

13. About Representation

1) The service can be obtained through the owner or legal representative of the company for a new, renewal and growth certificate.

2) An application for a new professional qualification or registration certificate must be submitted by the professional himself; An application for renewal may be made through an agent.

3) Notwithstanding the provisions of sub-article 2, a professional renewal registration cannot be renewed by an agent for two consecutive terms.

14. About monitoring and control

1) The certification or registration certificate issued by the certification body in accordance with the regulation; The Ministry shall monitor the professional conduct of the professional or companies and the use of the license for the intended purpose.

2) According to this Regulation, the Ministry shall supervise and support the construction of a certified construction professional, professional, contractor and consulting firm.

ለ) የመንገድ ስራዎች የሚጠቃለሉት የግራቬል፣ የአስፋልት፣ የአስፋልት ኮንክሪት እና ሪጂድ መንገዶችና ድልድዮችን ነው፡፡

ሐ) ሌሎች የሚጠቃለሉት ከላይ በሀ እና በለ ያልተካተቱትን የኮንስትራክሽን ፕሮጀክቶች ነው፡፡

ክፍል አራት

የኮንስትራክሽን ባለሙያዎችና ሙያተኞች ብቃት ሚረጋገጫና ምዘገባ

19. የባለሙያ እና ሙያተኞች ብቃት ሚረጋገጫ ምዘገባ ለሚከናወን ስለሚቋርብ ማሟላቻ

ብቃት ሚረጋገጫ ወይም የምዘገባ ምስክር ወረቅት ለማግኘት የሚጠይቅ ማንኛውም ባለሙያ / ሙያተኛ በቅደማ ጥያቄውን ምስክር ወረቅት ሰጪው አካል ያዘጋጀዉን የማሟላቻ ቅፅ መሞላት የሚፆርበት ሲሆን፡ -

1) **ኢትዮጵያዊ ወይም ትውልደ ኢትዮጵያዊ ዜግነት ያላቸው አሟልካቾች**

ሀ) ካማከቱበት ዘርፍ ጋር ግንኙነት ባለው የትምህርት ማከ የተገኘ የትምህርት ሚረጃ ዋናውንና ፎቶ ኮፒ፤

ለ) የስራ ልምድ የምስክር ወረቀት ዋናውንና እና ፎቶ ኮፒ፤

ሐ) የታደሰ የቀበሌ መታውቂያ / መንጃ ፍቃድ / ፓስፖርት ዋናውንና እና ፎቶ ኮፒ፤

መ) ሀለት ጉርድ ፎቶ ግራፍ፤

ሠ) ለእደጎት/ ለእድገት ለሚዛቡ ባለሙያዎች የብቃት ሚረጋገጫ ወይም የምዘገባ ምስክር ወረቀት፤

ረ) በአነስተኛ እንዲሁም በማስተኛ ደረጃ ለሚዛቡ ሙያተኞች ከሚሞላከተው አካል የብቃት ምዘና ሚረጋገጫ ምስክር ወረቀት (COC)፤

ሰ) አሟልካቾች አግባብነት ባለዉ አካል የጸደቁ / የተረጋገጡ የፕሮጀክት ዲዘይኖች፤ ሪፖርቶችና ሌሎች በሙያቸው የሰሯቸውን ስራዎች አይነትና የፕሮጀክቶችን ወሰብስብነት / ጥልቀት የሚያስረዱ ማረጃዎች፤

2) **የዉጪ ሀገር ዜግነት ያላቸዉ አሟልካቾች**

የሚጠበት ማረጃዎች ህጋዊ እውቅና ባለው አካል አግባብነት ባለው ቋንቋ የተተረጎመ እንዲሁም

3) Supervise any contractor and consulting firm to ensure that it meets the requirements set by the qualified professionals and others.

4) If any construction professional or enterprise is found to be unqualified in the field of certification; The Ministry shall be instructed in writing to rectify the deficiencies within the time limit set by the Ministry.

5) The oversight under this Article may be conducted by the Ministry when it deems it convenient.

6) The enterprise or professional shall be obliged to provide and provide the appropriate information to the supervisors appointed by the Ministry in accordance with this Article.

7) Supervisors assigned by the Ministry shall show the identity card and the letter of the Ministry to the owner or legal representative of the company that controls it.

Part Three

Category Construction Professionals, Organizations and Projects

15. Category of professionals and Technicians

1) Professionals and professionals registered under this Regulation shall have the following categories according to their type of profession:

A) Technician
B) Associate Engineer
C) professional

በሚሟላከተው አካል የተረጋገጠ -

ሀ) የሥራ ፈቃድ ዋናወንና ፎቶ ኮፒ፤

ለ) የመኖሪያ ፈቃድ ዋናወንና ፎቶ ኮፒ፤

ሐ) በነበረበት ሃገር የተሰጠው የታደሰ የባለሙያ ምስክር ወረቀት ወይም ባለሙያ ስለመሆናቸው የሚልጽ ማስረጃ ዋናወንና ፎቶ ኮፒ፤

መ) ላቀረቡት የትምህርት ማስረጃ በሚሟላከተው አካል የተረጋገጠ የአቻ ግመታ ደብዳቤና በሚሟላከተው አካል ህጋዊነቱ የተረጋገጠ የስራ ልምድ፤

ሠ) ከመጀመሪያ ዲግሪ በኋላ የተገኘ አግባብነት ያለዉ እና በሚሟላከተው አካል የተረጋገጠ ከ4 ዓመት ያላነሰ የስራ ልምድ

ረ) የፕሮጀክቶቹን አይነትና ወስብስብነት የሚያስረዱ አግባብነት ባለው አካል የተረጋገጡ የፕሮጀክት ንድፍ፣ ሪፖርትና ሌሎች በሙው የተሰጡ አገልግሎት ማስረጃዎች ዋናወንና ፎቶ ኮፒ ማቅረብ ይኖርባቸዋል፡፡

20. ስለ ኮንስትራክሽን ባለሙያዎችና መዎተኞች ብቃት ሚጋገጫ ምዘገባ አሰጣጥ አፈጻጸም

ምዘገባውና ብቃት ሚጋገጫ አሰጣጡ የሚሟላከተው የአነስተኛ፣ መለስተኛ እና ከፍተኛ የኮንስትራክሽን መዎተኞችና ባለሙያዎችን ሲሆን፡ -

1) የአነስተኛ እና መለስተኛ መዎተኞች ብቃት ሚጋገጫ ወይም ምዘገባ የሚፈገው የብቃት ምዘና ምስክር ወረቀት ሲያቀርቡ ብቻ ሲሆን ለከፍተኛ ባለሙያዎች የብቃት ምዘና ምስክር ወረቀት መሰጠት ከተጀመረበት ቀን ጀምሮ የብቃት ምዘና ምስክር ወረቀት ማቅረብ አስገዳጅ ይሆናል፡፡

2) የባለሙያ ብቃት ሚጋገጫ ወይም ምዘገባ የሚፈገው የትምህርት ተቋሙ ወይም የብቃት ምዘና ሜክሉ በሰጠው ምስክር ወረቀት ላይ በተጻፈው የሙያ አይነት (Face value) መሥረት ይሆናል፡፡

3) ለብቃት ሚጋገጫ ወይም ምዘገባ የሚኮርብ የስራ ልምድ በኢንዱስትሪው ወስጥ ቀጥተኛ ተሳታፊነት የሚሳይና መዎተኛው / ባለሙያው የተመደበበትን የስራ መደብ፣ የስራው የቆይታ ጊዜ፣ የስራ ግብር እየተቆረጠ ለሚሟላከተው አካል ገቢ እየተደረገ መሆኑን ገልጾ የደቡዴቤ ቀን፣ ቁጥር፣ የኃላፊ ፊርማ እንዲሁም የድርጅቱን ማህተም አድራሻ የያዘ መሆን ይኖርበታል፡፡

2) Technicians and professionals assigned in accordance with sub-article (1) of this Article shall have the following levels

2.1. Technicians

A) Technician I

B) Technician II

2.2. Associate Engineering

C) Engineering Aid III

D) Engineering Aid IV

2.3. Professionals

A) Graduate Professional

B) Professional

C) Practicing professional

3) The degree below the previous curriculum and the credentials obtained from abroad will be determined by the authority responsible for the new curriculum.

4) Certificates of Small and Medium Professionals from Level 1 - 4 will only be issued to qualified professionals who have passed a qualification assessment.

5) A certificate of competency will be required to obtain a certificate from the date of commencement of certification.

16. Category of Contractors

1) Contractors registered under this Regulation shall have the following categories

A) General Contractor

B) Building Contractor;

C) Road Contractor;

4) በዚህ መመሪያ መሠረት የብቃት ሚረጋገጫ ወይም የምዘገባ ምክክር ወረቀት ለማኘት የሚከይቅ ከፍተኛ ባለሙያ የጥቅም ግጭት በሚፈጥር መልኩ በዲዛይን ወይም በኮንስትራክሽን ወይም በዲዛይን እና በኮንስትራክሽን ስራ ላይ ለሰሜራ ይችላል፡ ፡

5) ባለሙያዎች በራሳቸው የንግድ ፈቃድ የሚሰሩ ከሆነ የንግድ ዋና ምዘገባና የንግድ ስራ ፈቃድ፣ የብቃት ሚረጋገጫ የስራ ውለታ፣ የክፍያ ሰነድ እና መልካም የስራ አፈጻጸም ወይም ያደገ የግንባታ አፈፃፀም ሪፖርት ሲያቀርቡ እንደ ስራ ልምድ ሊያዝላቸው ይችላል፡ ፡

6) በአሁኑ ወቅት ከኮንስትራክሽን ስራዎች ጋር ተያያዥነት ባላቸው ሙያዎች በተለያየ ደረጃ ትምህርት እየተሰጠ ሲሆን ከተዘረዘሩት ሙያዎች ውጪ የሆኑ ሲያጋጥሙ መዘጋቢው አካል ደረጃና ለደረጃውም ረቂቅ መስፈርት በማዘጋጀት በሚመለከተው አካል እንዲጸድቅ ሚድረግ እንደተጠቀ ሆኖ በልዩ ሁኔታ በስራ ላይ የሚተናገዳበት ሁኔታ ይመቻቻል፡ ፡

21. ስለ አነስተኛ ሙያተኛ ብቃት ሚረጋገጫና ምዘገባ

ሀ) **ጀሚሪ ረዳት መህንዲስ ደረጃ I**

ከቴክኒክና ሙያ ወይም ከኮሌጅ ወይም ከተመሳሳይ የትምህርት ተቋም ተመርቆ በደረጃ አንድ (10 +1/2/3 12 + 1) የሙያ ብቃቱ በምዘና ለተረጋገጠ ወይም ተፈላጊ የትምህርት ዝግጅት ሳይኖረው በኮንስትራክሽን የሙያ መስኮች በደረጃ አንድ የሙያ ብቃቱ በምዘና ለተረጋገጠ እና ከዜሮ እስከ ሀለት ዓመት የስራ ልምድ ላለው ባለሙያ ይሰጣል፡ ፡

ለ) **ረዳት መህንዲስ ደረጃ II**

ከቴክኒክና ሙያ ወይም ከኮሌጅ ወይም ከተመሳሳይ የትምህርት ተቋም ተመርቆ በደረጃ አንድ (10+1/2/3/ 12 + 1) የሙያ ብቃቱ በምዘና ለተረጋገጠ ወይም ተፈላጊ የትምህርት ዝግጅት ሳይኖረው በኮንስትራክሽን የሙያ መስኮች በደረጃ አንድ የሙያ ብቃቱ በምዘና ለተረጋገጠ እና ከሁለት ዓመት በላይ የስራ ልምድ ላለው ባለሙያ ይሰጣል፡ ፡

D) Special Contractors are pre-tentioning, Post-tentioning, Landscaping, foundation work, construction completion, site maintenance, road safety signs, aluminum door and window assembly, painting and decoration work, wood and metal work, plumbing and sanitation work in the building ... they are.

2) The Ministry shall, in accordance with the law, determine that the incentives given to special contractors shall be commensurate with the nature of their work.

17. Category of Consultants

1) Counselors registered under this regulation shall have the following categories according to their employment preferences.

A) Building Consultant
B) Consultant Architects
C) Engineering consultants are structural, highway and bridge, geotechnical engineering, electrical and electromechanical and sanitary engineering consulting firms.
D) Construction Management Consultant
E) Urban Planning Works Consultant
F) Special consultants are Asset Valuation, Interior Design and Decoration, Landscaping, Construction Audit and the like.

22. ስለ ሚስተኛ ባለሙያ ብቃት ሚጋገጫና ምዘገባ

ሀ) ጀሚ ተባባሪ መህንዲስ ደረጃ III

ከቴክኒክና ሙያ ወይም ከኮሌጅ ወይም ከተመሳሳይ የትምህርት ተቋም ተመርቆ በደረጃ አራትና አምስት (10 + 4/5 ወይም 12 + 3) የሙያ ብቃቱ በምዘና ለተረጋገጠ እና ከዜሮ እስከ ሶስት ዓመት የስራ ልምድ ላለው ባለሙያ ይሰጣል፡፡

ለ) ተባባሪ መህንዲስ ደረጃ IV

ከቴክኒክና ሙያ ወይም ከኮሌጅ ወይም ከተመሳሳይ የትምህርት ተቋም ተመርቆ በደረጃ አራትና አምስት (10 + 4/5 ወይም 12 + 3) ከሶስት ዓመት በላይ የስራ ልምድ ላለው ባለሙያ ይሰጣል፡፡

23. ስለ ከፍተኛ ባለሙያ ብቃት ሚጋገጫና ምዘገባ

በኮንስትራክሽን ዘርፍ ተዛማጅነት ባላቸው የትምህርት መስኮች በመጀመሪያ ዲግሪና ከዛ በላይ ለተመረቁ ባለሙያዎች የሚሰጥ የሙያ ብቃት ፈቃድ ሲሆን ለከፍተኛ ባለሙያዎች የብቃት ምዘና ምስክር ወረቀት መሰጠት ከተጀመረበት ቀን ጀምሮ የብቃት ምዘና ምስክር ወረቀት ማቅረብ አስገዳጅ ይሆናል፡፡

1) ሞጁ ባለሙያ

1.1 ሞጁ የምህንድስና (ተዛማጅነት) ባለሙያ

የምህንድስና ወይም ከምህንድስና ጋር ተዛማጅነት ባላቸው የትምህርት መስክ ከታወቀ ዩኒቨርሲቲ ወይም ተመሳሳይ የትምህርት ተቋም በመጀመሪያ ዲግሪ የትምህርት ሚኒስቴር እና ከዜሮ እስከ ሶስት ዓመት የስራ ልምድ ላለው ባለሙያ ይሰጣል፡፡

ሞጁ የምህንድስና (ተያያዥ) ባለሙያ የሚካተትው በሲቪል፣ ኮንስትራክሽን ቴክኖሎጂ እና ሜጀርመንት፣ ኤሌክትሪካል፣ ሳኒታሪ፣ ኤለክትሮ መካኒካል ኢንጂነሪንግ ባለሙያዎችን እና ለሎች ወደፊት የሚጠሩ የኢንጂነሪንግ ባለሙያዎችን ነው፡፡

1.2 ሞጁ የአርክቴክቸር ወይም የከተማ ፕላን ባለሙያ

የአርክቴክቸር ወይም የከተማ ፕላን ባለሙያዎችን ወይም ተዛማጅነት ባላቸው የትምህርት መስክ ከታወቀ ዩኒቨርሲቲ ወይም ተመሳሳይ የትምህርት ተቋም የመጀመሪያ ዲግሪ የትምህርት ሚኒስቴር እና ከዜሮ እስከ ሶስት ዓመት የስራ ልምድ ላለው ባለሙያ ይሰጣል፡፡

2) ፕሮፌሽናል ባለሙያ

2.1 ፕሮፌሽናል የምህንድስና እና ተያያዥ ባለሙያ

18. Category of Construction Projects

Construction projects registered under this regulation will have the following categories.

A) Building works include small, medium 'high and very high construction works.

Small building has no elevator or elevator that can replace any elevator or elevator and has less than five floors above the ground.

Medium building is at least five storey above the ground and not more than fifteen stories high.

High-rise building has at least fifteen storey above the ground and no more than forty-five storey. The tallest building is at least forty-five or more floors above the ground.

B) Road works include gravel, asphalt, asphalt concrete and reed roads and bridges.

C) Others include construction projects that are not included in A and B above.

Part Four

Qualification and registration of construction professionals and professionals

19. Application for professional certification and registration of professionals

Any professional/professional requesting a certificate of qualification or registration certificate must first fill out the application form prepared by the certification body and