ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

FACTORS AFFECTING CONSTRUCTION PROJECT PERFORMANCE: THE CASE OF ETHIOPIAN INSTITUTE OF AGRICULTURAL RESEARCH

By: EYOB SISAY METAFERIA

ADVISOR: TEKLEGIORGIS ASSEFA (PH.D.)

JUNE 2022

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ADDIS ABABA, ETHIOPIA

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DECLARATION

I, the undersigned, hereby declare that this project work entitled **"Factors Affecting Construction Project Performance: The Case of Ethiopian Institute of Agricultural Research**" is my original work with the guidance of the research advisor and all sources of materials used for the project work have been acknowledged as complete reference. I further confirm that the study has not been submitted in full or partial fulfillment in any other recognized University/Institution for the purpose of earning any degree.

	Signature	**Date**
Eyob Sisay	_____	_____

STATEMENT OF CERTIFICATE

This is to certify that Eyob Sisay has completed her project work entitled "Factors **Affecting Construction Project Performance: The Case of Ethiopian Institute of Agricultural Research** ". In my opinion, her project is appropriate to be submitted as a partial fulfillment of the requirements for the award of Degree in Masters of Project Management.

Research Advisor	**Signature**	**Date**
Teklegiorgis Assefa (Ph.D.)	_____	_____

ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE
DEPARTEMENT OF PROJECT MANAGEMENT

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By: Eyob Sisay

APPROVED BY THE BOARD OF EXAMINERS

Teklegiorgis Assefa,Ph.D. Advisor	_____ Signature	_____ Date
Bahran Asrat, Ph.D Internal Examiner	_____ Signature	_____ Date
Mulatu Takele, Ph.D. External Examiner	_____ Signature	_____ Date

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Abstract

The construction industry is a significant contributor to economic growth and plays an indispensable role in the Ethiopian economy. However, despite its importance, the sector is beset by a multitude of factors. The same is true for the construction projects of the Ethiopian Agricultural Research Institute (EIAR). This study, therefore, aims at identifying factors affecting the performance of the construction project in the EIAR. To this end, a questionnaire survey was conducted involving 31 factors categorized into 7 themes. A total of 92 respondents, of which, 80 respondents (60 from the EIAR staff and 20 from contractors) returned complete questions. The data was analysed using the Relative Importance Index rank method (RII) to determine the perceptions of contractors and EIAR staff towards the pre-identified performance factors affecting construction projects. Besides descriptive analysis, correlation and regression models were used to identify relationships and the extent of these relationships on the performance of EIAR construction projects. The analysis revealed that material price escalation, the economic and political environment, shortage of materials, and inadequate site management and supervision were found to be the most important factors negatively impacting project performance. Hence, proactive abutment measures such as including clauses for potential revision of construction contract agreements would likely improve project performance. Furthermore, encouraging and supporting contractors to improve forecasting of economic trends, assessing the external environment, especially the political and business environment, in line with continuous site supervision, could improve the performance of construction projects

Key words: *Performance Analysis, Relative Importance index and regression*

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ACRONYMS

ADRRI	Africa Development And Resource Research Institute
AHP	Analytical Hierarchical Process
BPM	Building Project Management
CTP	Construction Time Performance
EARS	Ethiopian Agricultural Research System
ECI	Early Contractor Involvement
EIAR	Ethiopian Institute of Agricultural Research
ESI	Early Supplier Involvement
GDP	Growth Domestic Product
GNP	Growth National Product
IJRAE	International Journal of Innovative Research in Advanced Engineering
KPIs	Key Performance Indicators
NSTC	National Science and Technology Council
PM	Project Management
PMBOK	Project Management Body of Knowledge
PPE	Project Performance Evaluation
PPI	Project Performance Indicators
RII	Relative Importance index
SPI	Schedule Performance Index
SNNPR	South thern Nation, Natinalites, and Peoples Region
SPSS	Package or Social Science
UK	United Kingdom

Chapter One

Introduction

1.1 Background of the Research

Construction project management involves directing and organizing each part of the project life cycle, from conception to completion. It's a holistic practice with the goal of delivering projects on time and under budget. Construction project management is a complex discipline that requires addressing many important concerns, including cost control, scheduling, procurement, and risk assessment. Project managers interact with all team members involved in a construction project, from architects to owners to contractors.

The term "construction" refers to the entire economic activity of creating, modifying, repairing, or extending fixed assets, such as buildings, engineering-related land improvements, and other engineering-related structures .The progress of nations depends on the construction industry. It is one of the biggest industries and makes up roughly 10% of the GDP in industrialized nations, Navon (2005).

Construction is complex in its nature. As Carpenter (2014) described, dramatic changes have affected the construction industry over the past several decades. Every construction project is unique and has its own operating environment and set of technical requirements.As a result; the execution of construction projects is subjected to numerous constraints that limit the progression of field operations, which have a significant impact on project performance.

In Africa, construction project delivery is also a common reality. According to Omran, Abdulrahman, and Pakir (2012) in Sudan and Gaba (2013) in Ghana, research show that cost overruns, completion delays, and unsatisfactory and missed project objectives are on the rise in the majority of construction projects. According to Hiwot (2012), due to subpar contractor performance and limited stakeholder commitment, the majority of construction projects in Ethiopia are characterized by schedule delays, cost overruns, and subpar construction

The building sector has an important contribution to the Ethiopian economy. It involves substantial financial and human resources and plays a vital role in the national economy and has a wide range of applications to different major sectors, like health, education, and agriculture. Agriculture is the backbone of the Ethiopian economy. Since Ethiopia is endowed with abundant agricultural resources and has diverse ecological zones, agriculture plays a large role in the country's economy. The agricultural sector in Ethiopia contributed about 35%of GDP in 2017-18 (Government of Ethiopia 2019 b) and 65% of employment in 2019 (World Bank 2019a). Although agriculture is one of Ethiopia's most promising resources, overgrazing, deforestation, and high population density have led to massive soil degradation leading to low productivity. Therefore, to alleviate the mentioned difficulties, the Ethiopian agricultural research institute has made its vital contribution.

Construction projects' performance, how well, how quickly, and at what cost buildings and infrastructure can be constructed directly affects the cost of projects and contributes to the national output, and stimulates the growth of other sectors through a complex system of linkages. The same is true for the Ethiopian Agricultural Research Institute (EIAR). Currently, the EIAR is implementing different types of construction projects (laboratories, administrative offices, green hose, and so on) for the realization of its goals. Others are under construction to achieve its mission.

The governmental budget allocated during the study time for EIAR is more than 300 million Birr. In most programs, there are small to large construction projects undertaken as part of their plan. As per the engineering unit of the institute, the total annual budget of these constructions ranges between 130 and 150 million Birrs. This study focus on identifying the main construction performance factors for EIAR during this study period. However, most projects fail to be completed on time, causing cost overruns and, at times, complete abandonment. This can be seen in the same building projects which stand unfinished. Even more, there are projects that are finished at a date later than agreed in the project schedule. Therefore, assessing factors affecting the project performance of EIAR projects is a current issue and testing how they affect overall performance helps improve the performance of future construction projects.

1.2 Organizational over view of EIAR

The Ethiopian Agricultural Research Institute is a governmental research institute and a foundation for agricultural growth in Ethiopia. Ethiopian Agricultural Research (EIAR) is one of the largest agricultural research systems in Africa. It works with the ambition of conducting research that will provide market competitive agricultural technologies that will contribute to increased agricultural productivity and nutrition quality, sustainable food security, economic development, and conservation of the integrity of natural resources and the environment.

The Ethiopian Agricultural Research System (EARS) has evolved through several stages since its first initiation in the late 1940s. In 1993, a number of Institute of Agricultural Research centres were transferred to the regional governments and became independent research centres. During this time, the Ethiopian Agricultural Research Organization was established with a new set up in 1997 by Proclamation number 79/1997, and later it was renamed the Ethiopian Institute of Agricultural Research on 25th October 2005. The EIAR is now organized into a decentralized structure in which a head office is based in Addis Ababa and 22 main research centres and lots of sub-centres throughout the country. Fentahun . (2015)

1.3. Statement of the Problem

Successful projects play an important role in the country's development. For the past few years, construction projects have grown in size, complexity, and high demand by customers, causing construction projects to become more difficult to achieve the project objectives of time, cost, and quality to be achieved. In general, most construction projects experience time overruns and cost overruns during their execution phase. An examination of the records of more than four thousand construction projects by Morris et al. (1998) showed that projects were rarely finished on time or within the allocated budget.

The construction industry is a significant contributor to economic growth and plays an indespensible role in the Ethiopian economy. However, various challenges have been recognized as influcing the performance of construction projects. The same is true for the Ethiopian Agricultural Research Institute (EIAR) construction projects.

Assessing the factors of performance problems is vital. The study conducted by Memon. (2012) revealed that 92% of construction projects in Malaysia were facing time overruns and only 8% of the projects could achieve completion within the contract duration. 89% of respondents agreed that their projects were facing cost overruns, with an average overrun of 5-10% of the contract price. The same is true for Nigeria and Kenya. The research conducted by Auma (2014) is evidence that the performance of construction in Kenya is poor. The majority of the projects escalated by a magnitude of over 50% and over 50% of the projects are likely to escalate in cost by a magnitude of over 20%.

According to a report by the Federal Democratic Republic of Ethiopian, Ministry of Urban Development, Housing and Construction (2014), project performance status evaluation stated that among 14 public building projects under construction, 8 projects, i.e. 57%, have failed to meet the planned percentage (MOUDHD, 2014). Additionally, a few supportive studies were conducted in the Ethiopia context: Fetene, (2008), Tadesse, (2009), Abera and Fekadu (2018), Merid, (2016), Aschalew (2017), Behailu (2018), Shambel, (2018), Blen, (2019), Mesfin (2019) and none on specific projects implemented by agricultural research projects.

For several reasons, construction projects in the EIAR challenge their performance instead of achieving their planned goals. Most of these challenges are related to what we call project performance problems. This research focuses on identifying factors affecting the performance of construction projects in selected EIAR construction projects in order to assist the institute, consultants, and contractors to overcome performance problems, and improve the performance of future construction projects

1.4. Research Questions

- What are the significant factors affecting the performance of the EIAR construction projects?
- What extent do these factors affect the performance of the EIAR construction projects?
- What is the relationship between these factors and the performance of construction projects in EIAR?
- How these factors affect the performance of EIAR construction projects?

1.5. Objectives of the Study

1.5.1. General Objective

To determine the major factors that affects the performance of construction projects in the EIAR.

1.5.2. Specific Objectives

- To identify the significant factors affecting the performance of construction projects in the EIAR.
- To determine the extent of these performance affecting factors in the EIAR construction projects
- To identify the relationship between these factors in the performance of EIAR construction projects
- To identify how these factors affect the performance of EIAR construction projects.

1.6. Scope of the Study

The scope of this project is bounded by geographical boundaries and project years. Although there are different construction projects in EIAR, this study is limited to assessing EIAR construction project performance in Addis Ababa (head office), Amhara, Oromia, SNNPR, and Sidama regions.

The study focused on projects under-construction or completed between 2018 – 2021 GC (2010 and 2013 EC) for the sake of easily accessing the targeted respondents and getting relevant information.

1.7 Limitations of the Study

The study was limited to covering all construction projects' performance regarding project cost overrun, project schedule delays, and project quality by external project funds using inferential statistics.

1.8. Significance of the Study

This research is critical for identifying and analyzing the elements that influence construction project performance in the EIAR. In primary, it is very beneficial for several stakeholders, including EIAR, contractors, consultants, donors, and project managers, to know the causes and effects of performance problems in the EIAR construction projects.

Hence, it informs the management of EIAR on necessary alleviation strategies to handle their effects. It also informs the institute of future planning and strategy developments for existing and newly established agricultural research centers. Finally, the study would be important in the suggestion of areas requiring further research to build on the topic of factors affecting performance of projects.

1.9 Definition of Key Terms

Project: Construction projects under-construction or completed between 2018 – 2020 GC (2010& 2012 EC)

Construction: Construction of any buildings and infrastructure projects undertaken by the EIAR

Performance: The accomplishment of a given construction project against the contractual cost, time, and quality standards

Owner: Organization for whom the construction project is being undertaken. In the case of EIAR Research centres & sub-centers.

Contractor: A natural or juridical person under contract with an owner (EIAR) to construct the construction projects.

A key performance indicator (KPI): is a type of performance measurement which evaluates the success of an organization or of a particular activity in which it engages.

Time overruns: is defined as the extension of time beyond planned completion dates.

Cost overrun: is the difference between the original cost estimate of the project and the actual construction cost on completion of works.

1.10. Structure of Research

This research consists of five main chapters as follows:

- Chapter one: Introduction: this chapter shows the background of the study, statement of the problem, research questions, objectives of the research, scope, and limitations, significance, and Definition of Key Terms.
- Chapter two: Literature review: this chapter shows a detailed review of concepts and definitions to identify the main factors affecting the performance and key performance indicators in Building construction projects.

- Chapter three: Research methodology: this chapter shows the methodology used in this research in order to achieve the required objectives and to answer the research questions.
- Chapter Four: The collected data from the subject of the study are carefully analyzeed and interpreted.
- The fifth chapter presents summary, conclusions and recommendations on the findings of the study. Reference and appendix which include questionnaire are also part of this study paper.

CHAPTER TWO
LITERATURE REVIEW

2.1. Introduction

This chapter presents a literature review of the research work that was done by various scholars in the field of performance of construction projects. This includes Theoretical review, conceptual framework, empirical review, and critique of the existing literature relevant to the study, summary, and research gaps.

2.2 Theoretical review

Construction project management focuses on addressing the scope and characteristics of projects with the sole aim of ensuring that events conform to plans and standards. Yet the problem of the project could face several challenges confronting its performance in the areas of low productivity **ADRRI JOURNAL February, 2014.** Project management practices, in combination with numerous different elements, have an impact on project success and not all project management equipment and strategies are immediately related to project success. Although, even an intensive literature assessment couldn't discover any efficaciously completed project without having applied basic project management practices. As a consequence, (Carden & Egan, 2008) highlight that effectively carried out equipment and techniques may undoubtedly contribute to project success

2.2.1. Over view of Project

A project is a sequence of unique complex, and connected activities that have one goal or purpose and that must be completed by a specific time, within budget, and according to specification" Wysocki,(2014)

A project can be considered to be any series of activities and tasks that have a specific objective to be completed within certain specifications, defined start and end dates, funding limits, consume human and nonhuman resources and is multifunctional (i.e., cut across several functional lines) Kerzner, (2013). Merna and Al-Thani (2008) also defined a project as a unique investment of resources to achieve specific objectives, such as the production of goods or services, in order to make a profit or to provide a service.

A project is an irreversible change with a life cycle and defined start and completion dates. “A project is a temporary endeavor undertaken to create a unique product, service, or result” PMI, (2013).

Turner and Müller, (2003also states that project is an endeavor in which human, material and financial resources are organized in a novel way, to undertake a unique scope of work, of given specification, within constraints of cost and time, so as to achieve beneficial change defined by quantitative and qualitative objectives.

Construction project refers to a high-value, time - bound and special construction mission with predetermined performance objectives Chitkara, (1998). He further explains that the project mission is accomplished within complex project environments, by putting together human and nonhuman resources into a temporary organization. The major construction projects can be grouped into building construction, infrastructure construction, industrial construction and special-purpose projects.

2.2.2. Over view Performance

Performance has been described as the degree of execution of a certain task. It is related to the prescribed objectives which form the project considerations. Performance can be considered as an evaluation of how well individuals, groups of individuals, or organizations have done in pursuit of a specific objective.

Juran McCabe, (1998) defines performance as "the fitness of the project". This is broken down into four categories: quality of design, quality of conformance, availability and field service. The quality of design focuses on market research, the product concept and design specifications. Quality of conformance includes technology, manpower, and management. Availability focuses on reliability, main ability, and logistical support. Field service quality comprises promptness, competence, and integrity.

Various literatures have revealed that performance should not be considered only as the achievement of the project schedule, time and quality. It is a broader concept that can be assessed using different parameters relating to the objectives of different stakeholders for a particular project. Customer satisfaction, meeting specifications, health and safety, and environmental responsiveness are some of the concerns when evaluating successful achievement of project objectives.

From a project management perspective, it is all about meeting stakeholders' needs and expectations from a project. It invariably involves placing consideration on three major project elements, i.e. time, cost, and quality. PMI, (2004).In construction, because of the numerous participants who contribute towards the achievement of project objectives, performance has been defined in one sense as a participant's (client, consultant, or contractor) contribution to the execution of the task required to complete the project, Mullins, (1995).

2.2.3 Performance Measurement Theory

Performance measurement can be defined as a comparison between planned and actual performance. Furthermore, "you can't improve what you don't measure." Cain, (2004). When a deviation is detected, the construction management analyses the reasons for it. The reasons for deviation can be schematically divided into two groups: (a) unrealistic target setting (i.e., planning) or (b) causes originating from the actual construction process. In many cases, the causes of deviation originate from both sources. Navon (2005) stated that performance measurement is needed not only to control current projects but also to update the historic database. Such updates enable better planning of future projects in terms of costs, schedules, labor allocation, etc.

One of the methods used by industries to measure changes in performance is to compare actual with planned goals. Performance measurement is a systematic way of evaluating the inputs and outputs of manufacturing operations or construction activities and acts as a tool for continuous improvement (Sinclair and Zairi, 1995; Mbugua et al., (1999). Also, they have identified a distinction between performance indicators, performance measures and performance measurement.

According to Mbugua et al. (1999), Performance indicators specify the measurable evidence necessary to prove that a planned effort has achieved the desired result. In other words, when indicators can be measured with some degree of precision and without ambiguity, they are called measures. Performance measures are enablers of innovation and of corrective actions throughout a project's life cycle. They can help policy and decision-makers, and different concerned stakeholders, understand how processes or practices lead to success or failure, improvements in inefficiencies, and how to use that knowledge to improve methods, processes, and the outcomes of active projects.

In response to calls for continuous improvement in performance, many performance measurements have emerged in management literature. Some examples include financial measures. Kangari, (1992),client satisfaction measures. Walker, (1984), employee measures Abdel-Razek, (1997), project performance measures. Belassi et al., (1996) and industry measures Egan, (1998). Rene Cordero, (1990) classifies performance measurement based on the method of measurement and area of measurement.

The methods of measurement of performance can be in terms of technical performance, commercial performance, and overall performance. The areas of measurement are at the planning & design level, the marketing level, and the manufacturing level, etc., and the overall performance is at the level of a firm or strategic business unit. Project performance can be measured and evaluated using a large number of performance indicators that could be related to various dimensions (groups) such as time, cost, quality, client satisfaction, client changes, business performance, health and safety. Cheung et al. (2004). Saleh, (2009).

Performance measurement allows maximizing the results that are meaningful to organizations by adjusting products or services, using the capabilities and funding available. It enhances the development of a learning organization by capturing and analyzing what is happening in the firm or industry environment, especially through its customers, employees, suppliers, partners, and new technologies. Mbugua (1999).

Performance measurement has two main aims: to connect company goals and objectives to improvements and to set targets for improvement activity. Grunberg, 2004). Outputs are measured to determine whether they help to accomplish objectives (effectiveness) and resources are measured to determine whether a minimum amount of resources are used in the production of outputs (efficiency).

2.2.4 Project Success

Ideally, a project be considered totally successful if it is completed on time, within budget, and performs exactly to the designer‘s specifications. Harvey A. Lev, (2002). These three variables define the overall goals of a project. Any project that is on time, on budget, and of high quality is declared a success. The difficulty, however, exists in their relationship with one another. Achieving the proper balance of cost, schedule, and quality is beyond the control of the project manager alone.

All stakeholders, particularly those involved in project selection, influence the choices and trade-offs that make up the triple constraint. Erik Versuh, (2003). For a project to be successful, it is essential to understand the project requirements right from the start and project planning which provides the right direction to project managers and their teams and executes the project accordingly (Nader Sh. Kandelousi, Ooi. J., Abdollahi, 2011). A successful project is one that is delivered on time and managed within the budget

2.2.5. Construction

The construction industry is the sector involved in the erection, repair, and demolition of buildings and civil engineering structures in the economy. A definition typical of national income accounts in use in most advanced industrialized countries is as follows:

The assembly of building materials and/or components on-site; the materials and components are supplied by a variety of industries in the manufacturing sector; they are delivered to the site by the transportation and trade sectors; the assembly proceeds in accordance with plans, designs, and management procedures supplied mainly by the business services industry in the service sector; most of the funds required for construction are supplied by the financial services industry in the service sector, and a significant part of the output supplied by the construction sector delivered to the real estate industry in the service sector" Bon (1992)

The construction process consists of construction inputs, construction processing, and construction outputs. Construction inputs are defined as all resources and parties involved in the construction process. Abdel-Razeq, (2001). It is the execution process, which can be defined as activating construction inputs for executing construction activities. The construction output is the construction facility.Construction projects, have a predetermined duration with a beginning and an end. The life cycle of a typical construction project can be broadly divided into three phases: the formulation phase, mobilization phase, and the construction phase.

The formulation phase includes the conception of the project idea, feasibility studies, investment appraisal, and project definition. The mobilization phase covers the preparation of the project preliminary plan, designs and drawings, contracts, resource mobilization, and earmarking funds. The construction phase includes planning and controlling execution, inducting resources, construction and commissioning, and finally, handing over to the client. Chitkara, (1998).

Despite this complexity, the construction industry plays a major role in the development and achievement of goals in society. The pace of the economic growth of any nation can be measured by the development of physical infrastructure such as buildings, roads, and bridges. Takin and Akintoye, (2004).Construction contributes to the economic development of any country by satisfying some of the basic objectives of development, including output generation, employment creation, and income generation and redistribution. It also plays a major role in satisfying basic physical and social needs, including the production of shelter, infrastructure, and consumer goods. Moavenzdadeh F. (1976). The same is true for the least developed countries, like Ethiopia.

2.2.6 Performance Management in Construction

Developing a best performance system is the first step towards improving performance in the construction industry. A building construction project, like any other project, also faces different risks throughout the life of the project. According to Nafishah B., (2006), this is due to the uniqueness of every project, the uncertainties introduced by the project stakeholders, regulatory protocols, and other intrinsic and extrinsic constraints. He further discusses how risk can constrain the achievement of key project objectives, time, cost, and quality. Inability to achieve the project objectives has great consequences for all project stakeholders involved in the construction. For the client, it could mean extra cost and less return on investment. For the consultants, it could result in loss of confidence placed in them by the clients. For the contractor, it could mean loss of profit and a bad reputation etc.

Project success is almost the ultimate goal for every project. The success of construction projects depends mainly on the success of performance. Many previous researches have been studied on the performance of construction projects. Dissanayaka and Kumaraswamy (1999) remarked that one of the principal reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system. Thomas (2002) identified the main performance criteria of construction projects as financial stability, progress of work, standard of quality, health and safety, resources, relationships with clients, relationships with consultants, management capabilities, claim and contractual disputes, relationships with subcontractors, reputation and amount of subcontracting.

Construction performance affects the outcomes of national efforts to renew existing infrastructure systems; to build new infrastructure for power from renewable resources; and to remain competitive in the global market. Changes in building design, construction and renovation, building materials and materials recycling are essential to the success of national efforts. NSTC (2008).

2.3 Empirical Reviews

The success of construction projects depends mainly on the success of performance. Many previous research studies have studied the performance of construction projects. Dissanayaka and Kumaraswamy (1999) remarked that one of the principal reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system. Reichelt and Lyneis (1999) remarked three important structures underlying the dynamic of project performance, which are: the work accomplishment structure, feedback effects on productivity and work quality, and effects from upstream phases to downstream phases.

Cheung et al (2004) identified project performance categories such as people, cost, time, quality, safety and health, the environment, client satisfaction, and communication. It is found by Navon (2005) that a control system is an important element for identifying factors affecting construction project effort. For each of the project goals, one or more Project Performance Indicators (PPI) are needed. Cheung et al (2004) found that human factors played an important role in determining the performance of a project. Ugwu and Haupt (2007) remarked that both early contractor involvement (ECI) and early supplier involvement (ESI) would minimize constructability-related performance problems, including costs associated with delays, claims, wastages, and rework, etc.The most important practices relating to scope management are controlling the quality of the contract document, quality of response to perceived variations, and extent of changes to the contract**.**

2.3.1 Factors Affecting Performance of Construction Projects

Different studies have identified different factors that affect the performance of construction projects. The elements affecting the performance of the construction process are the components of both construction inputs and construction processing. Cost, time and quality are the three common parameters of project performance.

It has been stressed that in today's highly competitive and uncertain business environment, clients are demanding better value for their investment. They want their project to be completed on time, within the estimated cost, and with the right quality. Padang (2006).

Owusu Tawiah, (1999) identified two main factors affecting contractor performance. The two factors were the financial and managerial capacities of the firm. Under the financial factors, the contractors' financial stability in terms of access to credit was questionable and that has gone a long way to affecting their performance over the years. Managerial capacities, site management practices, lack of technical expertise, among others, as factors influencing contractor performance in Ghana.

Ankrah N.A. (2007) classifies the factors that influence project performance into uncontrollable and controllable. From a project perspective, uncontrollable factors include external constraints and industry factors. These are beyond the control of project participants and hence may be difficult, if not impossible, to influence at a project level in trying to improve performance, whereas the controllable factors include project and organization-related factors. The controllable factors include procurement route, contracts, variations, project complexity, project duration and cost, design time, plant and equipment, personnel, the interaction between project participants, some process-related issues, skills and capability, health and safety, quality, and specific company programmers.

The performance of the project team members can be assessed by their technical and managerial skills, working relationships and attitudes, and support from their parent companies. Chua. (1999) found that project performance is influenced by four main project aspects, namely, project characteristics, contractual arrangements, project participants, and interactive processes.

According to Enshassi et al. (2009) the most important factors agreed upon by the owners, consultants, and contractors were: average delay because of closure and materials shortages, availability of resources as planned throughout the project duration, leadership skills for the project manager, escalation of material prices, availability of personnel with high experience and qualifications, and the quality of equipment and raw materials.

Iyer and Jha (2005) did research on factors affecting cost performance evidence from Indian construction projects and found out that the project manager's competence and top management support are found to contribute significantly to enhancing the quality performance of a construction project. Nyangilo (2012) did an assessment of the organization structure and leadership effects on construction projects' performance in Kenya. He found out that lack of appropriate project organization structures, poor management systems and leadership are the major causes of poor project performance.

Mallawaarachchi & Senaratn (2015) identified factors that affect the quality of the housing projects, such as a lack of technical and professional expertise and resources to perform tasks, a lack of employee commitment and understanding, and a lack of education and training to drive the improvement process. According to Mane & Patil, (2015), other factors affecting the performance of construction projects include project managers' competence, poor monitoring and feedback, lack of an on-site project manager, inadequate project team capability, poor planning and control techniques, poor/insufficient information and communication channels, lack of early and continual client/consultant consultation by contractors, and insufficient project manager experience.

Teena (2014) identified the factors that affect the process quality of construction projects by collecting data from consultants and contractors through a questionnaire. According to the study, the most important factors that affect the quality of projects are financial problems, the quality of raw materials in the project, the availability of personnel with high qualifications, and conformance to codes and standards.

Adnan & Sherif (2009) identified the factors affecting the performance of local construction projects and their relative importance. The most important factors agreed by the owners, consultants, and contractors as the main factors affecting the performance of construction projects were: material prices, availability of resources as planned through project duration, average delay because of closures leading to materials shortages, availability of personnel with high experience and qualifications, quality of equipment and raw materials in projects, and leadership skills for project managers.

According to Ajayi (2010), the choice of the contractor (s) is a critical factor for the project manager and usually has a significant impact on the success or failure of a project. The performance of contractors definitely correlates with the performance of the contract. Several models and methods have been proposed by researchers for the evaluation of project performance. However, most of these procedures, according to Ajayi et al. (2010), limit their analysis to selected measures such as cost, schedule, or labour productivity. Construction performance embraces client satisfaction, time performance, cost performance, construction quality, and sustainable development.

Ayodeji (2017) examined various factors affecting the performance quality of construction projects by collecting data questionnaires from contractors, architects, engineers, quantity surveyors, and construction managers. The study identified that major factors affecting the performance quality of construction projects are related to the use of unskilled and incompetent contractors, poor on-site supervision and lack of commitment by the supervising team, poor planning and scheduling, and inadequate knowledge, training, and skills of construction workers. To minimize the impact of these factors and improve the performance quality of construction projects, the study recommends proper and modern construction equipment, techniques, and methods should be adopted by construction firms. There should be proper site management and supervision to ensure conformance with drawings and specifications, and adequate project duration should be allocated and stated in the contract documents.

Puspassari (2005) identified 46 possible factors responsible for the poor performance of construction contracts. He further categorized these factors into eight groups; factors caused by clients, factors caused by contractors, factors caused by consultants, factors related to subcontractors, factors related to materials and labour, contractual relationship factors, project procedures, and external environmental factors.

2.3.2 Factors affecting performance related to project procedures

The notion of procurement form and the method of tendering are both part of the project procedure. The selection of the most appropriate organization for the design and construction of the project demands early and careful consideration to assure success. Generally, the construction team is appointed under competition through a competitive tendering process. Sometimes, the head contractor may be appointed by negotiation on the basis of a fee.

When the design and construction are done as a complete package, both may be let by competition. The selection procedures applied to the members of the project team are therefore by no means always the same. It is noted from research that competitive tendering can adversely affect the outcome of major projects and the number of separate contracts is related to the chances of achievement. Different selection methods pose different levels of risk to the project team members.

A number of researchers identified the importance of procurement factors, such as procurement method (selection of the organization for the design and construction of the project), tendering method (procedures adopted for the selection of the project team and, in particular, the main contractor), contract formulation and contract administration, and project Aligned supply chain of goods/materials and services and contract close out.

Table 1 List of identified procurement related factors

	Procurement and contract related success factors	**Reference Literature**
1	Procurement and tendering methods	Osorio, et al. (2014), Muhammad, et al. (2008), Els, et al. (2012), Tsiga, et al. (2016), Chan, et al. (2004),
2	Contract formulation and contract administration	Hyvari (2006), BMG Research (2014), Ejaz, et al. (2013)
3	Contract close out	Gunduz M. (2015) and Silva Susi.(2015)

2.3.3. Factors affecting performance related to the Contractor/ Supplier

When the project enters the construction stage, the main contractor and subcontractors begin their primary responsibilities. Contractor experience, site management, subcontractor supervision and involvement, contractor cash flow, and the success of the cost control system are all factors to consider. Behailu 2018 identified four (4) contractor/supplier related factors from different works of literature.

Table 2 List of identified contractor/ supplier related factors

	Contractor/ supplier related success factors	**Reference Literature**
1	Contractor's/ supplier's competence and commitment	Belassi and Tukel (1996), Hwang,(2013), Ejaz, et al. (2013) and Gunduz M. (2015**)**
2	Contractor experience	
3	Contractor's effective site management, control and Coordination	
4	Contractor's/ supplier's cash flow/ financial capabilities	

Four (4) contractor/ supplier related factors

2.3.4 External and Work Environment Related Factors

The construction environment, according to R. Youker (1992), is the aggregate of surrounding things, conditions, or influences. He describes this environment as all external influence on the construction process. Thus, the environment includes virtually everything outside the project; its technology, the nature of its products, customers, and competitors, its geographical setting, and the economic, political, and even metrological climate in which it must operate. Bennett (1991), in a major review of project management theory, established that the environment interferes with the planned progress of construction projects. The less predictable the environment is and the greater its potential effects, the more it must be taken into account in managing the development of construction projects.

Ankrah N.A. (2007) classifies the factors that influence project performance into uncontrollable and controllable. From a project perspective, uncontrollable factors include external constraints and industry factors. These are beyond the control of project participants and hence may be difficult, if not impossible, to influence at a project level in trying to improve performance, whereas the controllable factors include project and organization-related factors.

Belassi and Tukel (1996) classify factors affecting the performance of construction projects as political environment, economic environment, social environment, technological environment, nature, client, competitors, and sub-contractors.

Akinsola (1997) described the "environment" as all external influences on the construction process, including social, political, and technical systems. The attributes used to measure this factor are the economic environment, social environment, political environment, physical environment, industrial relations environment, and the level of technology advanced.

Table 3 List of identified external and work environment related factors

Factors relating to the external environment	Reference Literature
Political environment, economic environment, social environment, technological environment, nature, client, competitors, sub-contractors.	Belassi and Tukel (1996)
Economic related factors (e.g. exchange rate, inflation, price escalation etc.).	Belassi and Tukel (1996),
Political related factors (e.g. political interference, political conflicts, vandalism etc.).	Muhammad, et al. (2008),
Socio-cultural related factors (e.g. customs, norms, values, languages, educational level, attitude towards social responsibility etc.)	Tsiga, et al. (2016),
Technical and technological environment	Chan, et al. (2004)
Physical environmental factors	Hyvari (2006)
Site related factors (access road, ground conditions	Fortune and White (2006),

Source: Behailu 2018

2.3.5 Performance indicators in construction projects.

A performance indicator is composed of a number and a unit of measure. The number gives us a magnitude (how much) and the unit gives the number a meaning (what). The purpose of the Key Performance Indicators (KPIs) is to enable measurement of project and organizational performance throughout the construction industry. UK working group, (2000).

The success of construction projects is determined by a number of distinct indicators that are available throughout the project's life cycle, from conception to operation and commissioning. Construction projects are typically judged successful if they are completed on schedule, on budget, according to technical requirements, and to the satisfaction of the client. Baker (1983). However, the criteria for success are in fact much wider, incorporating the performance of the stakeholders, evaluating their contributions and understanding their expectations. Atkinson (1997).

Salleh (2009) cited the work of Chan and Kumarswamy (1997) and presented the results of a survey undertaken to determine and evaluate the relative importance of the significant factors causing time and cost overruns in Hong Kong construction projects. The factors were grouped into eight major categories: project-related, client-related, design-related, contractor-related, materials, labour, equipment, and external factors.

Chan et al. (2004) reviewed seven international journals and summarized and grouped the factors into five categories: human-related, project-related, project procedures, project management actions, and external environment. Under each group, there are a number of identified factors listed that have a direct effect on the success of a project

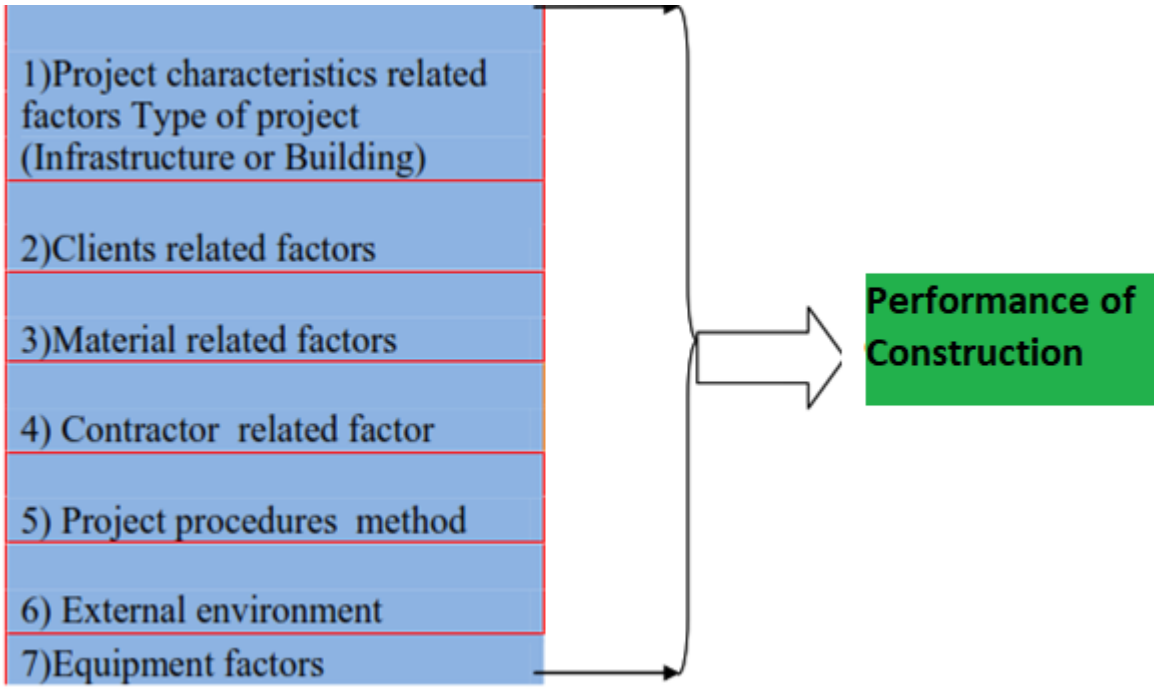
2.3.6 Conceptual Framework

A conceptual framework is a set of broad ideas and principles taken from relevant fields of analysis used to illustrate the fundamental relationships between dependent and independent variables.

The various variables affecting the performance of projects are identified from different works of literature. These factors can be grouped as project characteristics-related factors, material-related factors, contractors' related factors, project procedures, external environment, and equipment related factors. A variable in one group can influence a variable in the other and vice versa. It is graphically presented as shown below.

Conceptual Frame work

Independent Variables **Dependent Variable**



Own Survey

2.3.7 Research gaps

The reviewed literatures revealed various studies in different parts of the world that have largely touched on factors relating to determining project performance. These studies have been carried out and published. However, there is no literature available on the factors affecting the project performance of construction projects in agricultural research institutes like EIAR. This study, therefore, aimed to establish the actual influencing factors affecting construction projects performance in the EIAR.

2.4 Summary of the Chapter

Chapter two discusses the literatures relevant to the objectives of the study. Project characteristics related factors, Type of project (Infrastructure or Building), material related factors, Contractor related factor, Project procedures, External environment (Political environment, economic environment, social environment, and physical environment), and Equipment factors. These are discussed in detail and how they influence construction project performance which is the dependent variable.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Introduction

This chapter sets out the various stages and phases to complete the study. The methodology adopted in this research provides the procedures that are necessary for obtaining the information needed to structure the research questionnaire, collect data, analyse the collected data, and interpret and present the results. The methodologies followed in this survey are outlined in the following sections.

3.2. Research Approach

This study used quantitative research approaches. The three methods that are commonly implemented in research are quantitative, qualitative, and mixed, Creswell (2005). Quantitative research is a research strategy that focuses on quantifying the collection and analysis of data. Additionally, it is a type in which the researcher decides what to study, asks specific, narrow questions, collects numeric (numbered) data from participants, analyzes these numbers using statistics, and conducts the inquiry in an unbiased, objective manner. Therefore, in this research, a quantitative approach was used.

3.3. Research Design

This study was explananatory & descriptive in terms of research purpose. The major purpose of descriptive research is to explain and interpret the state of affairs as it exists at present. According to Cooper and Schindler (2003), a descriptive study is concerned with finding out the what, where, and how of a phenomenon. Thus, this study has tried to explain and describe the factors affecting the performance of construction projects in the case of the EIAR for the past three years

3.4. Research Methods

3.4.1 Target population

The study's target populations are the EIAR staff in the selected 20 research centres (with planning, construction management teams, related program managers, and procurement team members) and contractors involved in 46 construction projects over the study period.

3.4.2. Sampling method

A two-step process is used in which the population is partitioned into strata as owner (EIAR) and contractors. The strata are mutually exclusive and collectively exhaustive in that every population element should be assigned to only one stratum and no population elements should be omitted. A purposive sampling technique was used to select the staff among 20 research centres of the Ethiopian Institute of Agricultural Research. Based on this sampling technique, the researchers used proportional sampling from each of the research centres.

3.4.3 Sample size

A sample design is a definite plan for obtaining a sample from the sampling frame (Kothari, 2004). Different authors tend to give different guidelines concerning the number of cases required for multiple regressions. Tabachnick and Fidell (2001, p. 117) give a formula for calculating sample size requirements, taking into account the number of independent variables that you wish to use:

$N > 50 + 8m$ (where m = number of independent variables).

The target groups in this study are EIAR selected centres construction projects and their participants are owners (EIAR professional staff who know the concerned construction projects during the specified time.) and contractors.

The sample size is determined based on the following Slovin's sampling formula (Yemane, 1967).

$n = N / [1 + N*e^2]$ …….……. Equation 1

Where:

N = Total number of populations (85+23=108)

n = number of sample size =92

e = error margin / margin of error, a 95% confidence level is taken and e = 0.05

Therefore, 70 of the EIAR professional staff who know the concerned construction projects during the specified time, and 22 from contractor's organizations were selected.

3.4.4 Data Source and data collection

There are two types of research data collection: primary and secondary data collection. The researchers used primary sources of data. A questionnaire was designed from a literature review of various factors affecting the performance of construction projects and from secondary data sources to identify the most important factors that influence construction projects implemented by the EIAR.

3.5 Data Measurement

In order to be able to select the appropriate method of analysis, the level of measurement must be understood. In this research, ordinary was used. An ordinal scale is a ranking or rating data that normally uses integers in ascending or descending order. The numbers assigned to the agreement or degree of influence (1, 2, 3, 4, 5) do not indicate that the interval between scales is equal, nor do they indicate absolute quantities. Based on this scale, the researcher has the following table

Table 4 Rating scale for significance level of factors on project performance

Significance Level	Extremely Significant	Very Significant	Moderately Significant	Slightly Significant	Not Significant
Scale	5	4	3	2	1

3.6 Research Instruments

The questionnaire designed for this study utilizes the information sourced from the extensive literature review, the global nature of the construction industry, and relevance to the EIAR construction projects context. The questionnaires are divided into three sections: Part A, which seeks to establish general details of the respondent, Part B, which contains factors affecting the performance of construction projects grouped into seven, includes project characteristics related factors, material related factors, contractor related factors, project procedures, external environment, and equipment related factors. Part C contains the respondent's judgment on the overall performance of the executed construction projects on the above factors.

3.6.1 Reliability of Research Instruments

The statistical measure Cronbach's Coefficient Alpha reliability is used to make sure the questions are properly reliable in advance of data analysis

Table 5 Reliability Statistics of collected data

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.891	0.902	7

Alpha if item deleted**:** This represents the Cronbach's alpha reliability coefficient if the individual item is discarded from the scale. This value is then compared to the value of Cronbach's alpha present above to see if anyone wants to delete the item. A value of 0.7 reliability coefficient or higher is acceptable in the social sciences (Jugdev . 2007). The result of reliability measure was good α=902 in the study and it were concluded that all items in the survey were internally consistent and reliable

3.6.2 Validity of research instruments

Validity is the degree to which the sample of the test item represents the content that is designed to measure. Creswell (2003) notes that validity is considered if one can draw consequential and valuable inferences from scores on the instrument. The statistical requirements have to be achieved in the research study by determining the required sample size. Sutton and Staw (1995) concluded that, "a good construct must explain why particular sets of variables are interconnected and are strong predictors of the results". This study's questionnaire was designed based on a set of variables that were listed by a group of knowledgeable construction industry specialists, published books and different articles that support the study topic. Additionally, the research adopted content validity, which refers to the extent to which a measuring instrument provides adequate coverage of the topic under study. To ensure content validity, the instruments were reviewed to enable the content to address the purpose and avoid ambiguity. This ensured that all respondents understood the content of the questionnaire.

3.6.3. Ethical considerations

By adhering to the following ethical research guidelines, the researcher ensures that the research is conducted in an ethical manner. (Respondents' anonymity, confidentiality, and voluntary involvement). Prior to data collection, letters were sent from EIAR's concerned administrative agencies to a number of research centers and private companies where important information for the research may be obtained.

3.7 Method of Data Analysis

The data was analysed using the relative importance index rank method (RII) to identify the identified performance factors affecting the performance of construction projects.

The relative importance index is computed using the following formula; (Cheung et al, 2004; Iyer and Jha, 2005; Ugwu and Haupt, 2007):

$$RII = \frac{\sum (W)}{A \times N}$$

Where;

- W is the weight given to each factor by the respondents and ranges from 1 to 5
- A = the highest weight = 5
- N = the total number of respondents

The RII values have a range of 1 to 5. The higher the RII, the more important the factor for the performance of construction projects. The RIIs is ranked, and the results are shown by using tables. In addition to this RII, the analysis used both descriptive and inferential statistics (correlation and regression) to identify the relationship between these factors and to assess the extent of the performance of EIAR construction projects.

In addition to the RII, the factors were analysed using ordinal regression analysis. Ordinal regression is a member of the family of regression analyses. As a predictive analysis, ordinal regression describes data and explains the relationship between one dependent variable and two or more independent variables. In ordinal regression analysis, the dependent variable is ordinal (statistically it is polychromous ordinal) and the independent variables are ordinal or continuous-level.

CHAPTER 4
RESULTS AND DISCUSSION

Introduction

This chapter displays the discussion of the final results and the process through which the results were obtained. The data was collected through questionnaires from the contractors and staff of the EIAR who directly participated in the projects, and discussion about the results. The data was analyzed using both SPSS and Excel worksheets, after which meaningful results were derived from the percentages arrived at in this process. The purpose of the data analysis was to determine the factors that affect construction project performance in the EIAR.

4.1 Questionnaire Response Rate

The study targeted a sample size of 92 respondents and, accordingly, a total of 92 questionnaires were distributed, out of which 70 respondents were EIAR staff, and 22 contractors. On the other hand, out of 92 distributed questionnaires, a total of 80 questionnaires were collected, having been filled completely, resulting in a response rate of 85.37% as shown in table 8 below.

Table 6 Summary of the response rate of the study

Name of Respondents	**Questionnaire Distributed**	**Questionnaire Returned**	**Response Rate by %**
Contractor	22	20	90.9%
Owner	70	60	85.7%
Total	**92**	**80**	**86.96%**

Own Survey, SPSS output

The unsuccessful response rate (13.04%) consisted of those questionnaires that were not filled out. This response rate was excellent for the analysis.

4.2 Background Information of Respondents

4.2.1 Position in the Organization or Company

The questionnaires were distributed and responses were received from various professionals by virtue of their designation.

Table 8 Respondents Designation

Respondents Designation

	Frequency	Percent
Engineer/Designer	5	6.25%
Supervisor	13	16.25%
Project Manager	6	7.50%
Finance & Procurement	44	55.00%
Planning	2	2.50%
Program/Center Director	10	12.50%
Total	80	100.00%

Sources: Own Survey, SPSS output

It was evident that the majority of the respondents were Finance & Procurement staff (55%) followed by Supervisors (16.25%). This is because the EIAR merged its engineering & maintenance directorate into finance & recalled its procurement. While the rest are Program/Center Directors (12.5%), Project Manager (7.5), Engineer/Designers (6.25%) and Planning (2.5%) as shown in table 10. This shows that everybody in the construction firm had the opportunity to respond to the questionnaire.

4.2.2 Work Experience in Projects

The information about the respondents' years of work experience in a project was also asked and summarized on table 10.

Table 7 Experience of respondents

	Frequency	Percent
Less than 5 years	7	8.75%
Between 5 to 10 years	14	17.50%
Between 10-15years	39	48.75%
Between 15-20 years	13	16.25%
Above 20 years	7	8.75%
Total	**80**	**100.00%**

Sources: Own Survey, SPSS output

Accordingly, 39 (48.75%) indicated that they had been working between 10-15 years, followed by 14 (17.5%) who had been working between 5-10 years, 13 (16.25%) had been working between 15-20 years, and 7 (8.75%) had been working below 5 years and 7 (8.75%) had been working above 20 years. This shows that most of the respondents are capable of providing relevant data on factors affecting construction performance.

4.2.3 Educational Background

The study also sought to establish the respondents 'highest level of education and thus information relating to the level of education attained by the respondents was also analysed.

Table 8 Respondents' level of education

	Frequency	Percent
Diploma	3	3.75%
Bachelor's degree	52	65.00%
Masters	19	23.75%
PHD	6	7.50%
Total	80	100.00%

Sources: Own Survey, SPSS output

As indicated in the above table 11, the majority of the respondents' 52 (65.0%) had a bachelor's degree, 19 (23.75%) had a Masters, while 6 (7.0%) of the respondents had a PHD, and the rest 3 (3.75%) had a Diploma. This shows that the respondents are capable and reliable of exploring the fundamental issues related to the study.

Generally, the finding regarding the characteristics of respondents confirms that the respondents are qualified to understand the questions concerning factors affecting project performance at the EIAR. So, the researcher believes that the response obtained from them is reliable and trustworthy. That enables the researcher to move towards the intended research finding.

Table 9 Overall performance of cons. Cross tabulation

	Overall performance of construction projects					
	Not Significant	Slightly Significant	Moderately Significant	Very Significant	Extremely Significant	Total
EIAR	1	8	10	28	13	60
Contractor	1	2	12	3	2	20
	2.5%	12.5%	27.5%	38.8%	18.8%	100.0%

Sources: Own Survey, SPSS output

As indicated in the above table 12, from 60 EIAR respondents, 13, (21. %), from 20 contractors 2 (10%), from a total of 80 respondents, 15 (18.8%) of them believed project performance factors extremely affect the overall EIAR executed construction projects.

Additionally, 28 (46.67%) from EIAR and 3, (15. %) from contractors, a total of 31 (38.8%) of respondents believed project performance factors are very significant to the overall EIAR executed construction projects. From the total, 12.5% of respondents replied that project performance factors are slightly significant, while the remaining 2.5% of respondents responded that project performance factors are not significant to the overall EIAR executed construction.

4.3 Descriptive Analysis of Factors Affecting the Performance of Construction

The results of this part of the study show the rank of all factors affecting the performance of construction projects in the EIAR that have been investigated in this research from contractors and the EIAR staff viewpoints. A total of 31 factors which influence construction performance have been studied and discussed. The rank was based on the relative importance index of the factors ranking according to the type of target group.

Table 10 The relative importance index (RII) and rank of factors

Groups/Factors	**EIAR**		**Contractor**		From All Response		From Group
Project characteristics related factors	RII	Rank	RII	Rank	RII	Rank	Rank
Type of project (Building or infrastructure)	0.57	17	0.41	23	0.53	21	3
Nature of project	0.593	14	0.49	14	0.568	19	2
Size of project	0.507	28	0.37	28	0.473	29	5
Complexity of project	0.543	22	0.42	21	0.513	24	4
Shorter completion period given for the contract	0.567	19	0.73	7	0.608	12	1

Sources: Own Survey, SPSS output

Table 13 shows project characteristics related factors ranked by their combined value of relative importance index (RII). The rank of PCR factors agreed by all stakeholders is shorter completion period given for the contract, nature of project, type of project (building or infrastructure), complexity of project, and size of project with the value of RII of 0.608, 0.568, 0.53, 0.513, and 0.473 respectively. The shorter completion period given to the contractor is the most critical factor for parities of the project. Activity delays are a common issue in the EIAR construction projects and increase project schedules and costs.

Table 11 Clients related factors

Groups/Factors	EIAR		Contractor		From All Response		From Group
Clients related factors	RII	Rank	RII	Rank	RII	Rank	Rank
Delay of progress payment to contractors	0.527	26	0.39	26	0.493	27	2
Client's in ability to make project decisions	0.473	30	0.22	31	0.41	31	4
Client's emphasize on low construction cost	0.617	8	0.7	8	0.638	7	1
Client's interference during construction	0.443	31	0.38	27	0.428	30	3

Sources: SPSS Own Survey,

Table 14 shows clients' related factors ranked by their combined value of the relative importance index (RII). The first four most important CLR factors agreed by all stakeholders are delay in progress payment to contractors, client's ability to make project decisions, client's emphasis on low construction costs, and client's interference during construction, with the value of RII of 0.493, 0.41, 0.638 and 0.428 respectively. The client's emphasis on low construction costs is the most critical factor for both parties of the project.

Table 12 Material related factors

Groups/Factors	EIAR		Contractor		From All Response		From Group
Material related factors	RII	Rank	RII	Rank	RII	Rank	Rank
Shortage of material	0.7	4	0.75	5	0.713	5	2
Material change	0.597	12	0.66	10	0.708	6	3
Low quality material selection	0.577	16	0.53	12	0.625	9	5
Lack of project material management system	0.597	12	0.54	11	0.628	8	4
Escalation of material price	0.753	2	0.94	1	0.95	1	1

Sources: SPSS Own Survey,

Table 15 shows material related factors ranked by their combined value of the relative importance index (RII). The first five MAR factors agreed by all stakeholders are shortage of materials, material change, low quality material selection, lack of project material management system, and escalation of material price, with the value of RII of 0.713, 0.708, 0.625, 0.628, and 0.95 respectively. The shortage of materials is the most critical factor for both parties of the project. According to Public procurement agencies' manual article 4.2.5.12, escalation is not considered for projects whose project duration is less than 18 months.

Table 13 Contractor related factor

Groups/Factors	EIAR		Contractor		From All Response		From Group
Contractor related factor	**RII**	**Rank**	**RII**	**Rank**	**RII**	**Rank**	**Rank**
Contractor experience	0.543	22	0.48	18	0.62	10	2
Shortage of labour force	0.52	27	0.53	12	0.59	15	4
Site management & supervision	0.67	5	0.77	4	0.725	4	1
Competence and commitment	0.633	6	0.49	14	0.598	13	3
Contractor cash flow	0.617	8	0.49	14	0.585	16	5

Sources: SPSS Own Survey,

Table 16 shows contractor related factors ranked by their combined value of relative importance index (RII). The five COR factors RII agreed by all stakeholders are Contractor experience, Shortage of labour force, Site management & supervision, Competence and commitment, and Contractor cash flow, with the values of 0.62, 0.59, 0.725, 0.598, and 0.585respectively. Site management & supervision is the most critical factor for both parties of the project.

Table 14 Project procedure method

Groups/Factors	EIAR		Contractor		From All Response		From Group
Project procedure method	RII	Rank	RII	Rank	RII	Rank	Rank
Procurement method,	0.57	17	0.74	6	0.6125	11	1
Contract administration	0.583	15	0.37	28	0.5325	19	2
Contract close out	0.567	19	0.42	21	0.53	20	3

Sources: SPSS Own Survey,

Table 17 shows project procedure method related factors ranked by their combined value of relative importance index (RII). The three PPR factors RII agreed by all stakeholders are procurement method; contract administration and contract close out, with the value of RII of 0.6125, 0.5325 and 0.53 respectively. The procurement method is the most critical factor for both parties of the project.

Table 15 External environment of sites

Groups/Factors	EIAR		Contractor		From All Response		From Group
External environment of site	RII	Rank	RII	Rank	RII	Rank	Rank
Political environment	0.717	3	0.78	3	0.733	3	2
Economic environment	0.757	1	0.81	2	0.77	2	1
Social environment	0.533	24	0.41	23	0.503	25	4
Physical environment of sites	0.613	10	0.46	19	0.575	17	3

Sources: SPSS Own Survey,

Table 18. External environment related factors ranked by their combined value of relative importance index (RII). The four EER factors RII agreed by all stakeholders are the political environment, economic environment, social environment, and physical environment of sites, with a value of RII of 0.733, 0.77, 0.503, and 0.575 respectively. The economic and political environments are the most critical factors for both parties of the project with the highest RII.

Table 16 Equipment Related factor

Groups/Factors	EIAR		Contractor		From All Response	
Equipment factor	**RII**	**Rank**	**RII**	**Rank**	**RII**	**Rank**
Shortage	0.56	21	0.49	14	0.567	20
Efficiency	0.6	11	0.68	9	0.593	14
Break down	0.49	29	0.41	23	0.503	25
Poor planning	0.627	7	0.46	19	0.575	17
Wrong selection	0.53	25	0.35	30	0.485	28

Sources: SPSS Own Survey,

Equipment related factors are ranked by their combined value of the relative importance index (RII). Typically, construction equipment is used to perform essentially repetitive operations, and can be broadly classified according to two basic functions: first, operators, such as cranes, graders, etc.

In both cases, the cycle of a piece of equipment is a sequence of tasks which are repeated to produce a unit of output. For example, install a wall panel.

The five EQR factors RII agreed by all stakeholders are shortage, efficiency, break down, poor planning, and wrong selections, with a value of 0.567, 0.593, 0.503, 0.575, and 0.485respectively. Efficiency is the most critical factor for both parties of the project in the EQR factors.

The table below shows the top ten individual factors from all groups that affect the performance of construction projects in the EIAR

.

Table 17 The RII &Top five factors affecting the construction performance

Groups/Factors	EIAR		Contractor		All Response	
	RII	Rank	RII	Rank	RII	Rank
Escalation of material price	0.753	2	0.940	1	0.950	1
Economic environment	0.757	1	0.810	2	0.770	2
Political environment	0.717	3	0.780	3	0.733	3
Site management & supervision	0.670	5	0.770	4	0.725	4
Shortage of material	0.700	4	0.750	5	0.713	5

Sources: Own Survey,

Generally, results from the RII indicated that the factor Escalation of material price has been ranked in the first position by contractors & the EIAR staff with a mean score of 0.950. This result indicates the high importance of managing the escalation of material prices to complete the project planned. This agreement of opinions proves the importance of these factors in completing the project planned.

Table 18 : The relative importance index (RII) and rank of major groups

Factors	EIAR		Contractor		All Response	
	RII	Rank	RII	Rank	RII	Rank
Material related factors	0.645	2	0.684	1	0.725	1
External environment of sites	0.655	1	0.615	2	0.645	2
Contractor related factor	0.597	3	0.552	3	0.577	3
Equipment factor	0.561	5	0.478	6	0.544	4
Project procedure method	0.573	4	0.510	4	0.538	5
Project characteristics related factors	0.556	6	0.484	5	0.538	5
Clients related factors	0.515	7	0.423	7	0.492	7

Sources: SPSS Own Survey

As shown in the table, material-related factors, the external environment of sites, and contractor-related factors are the top three ranked factor groups that affect the performance of construction projects in the EIAR.

4.4 Statistical Assumption testing

A normality test was conducted in order to assure the appropriateness of the data. Normality tests are used to determine if a data set is well-modelled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. A normality test was conducted to determine whether sample data had been drawn from a normally distributed population (within some tolerance) before applying the regression analysis.

Table 19 . Kolmogorov-Smirnov& Shapiro-Wilk Tests of Normality

Tests **of** Normality

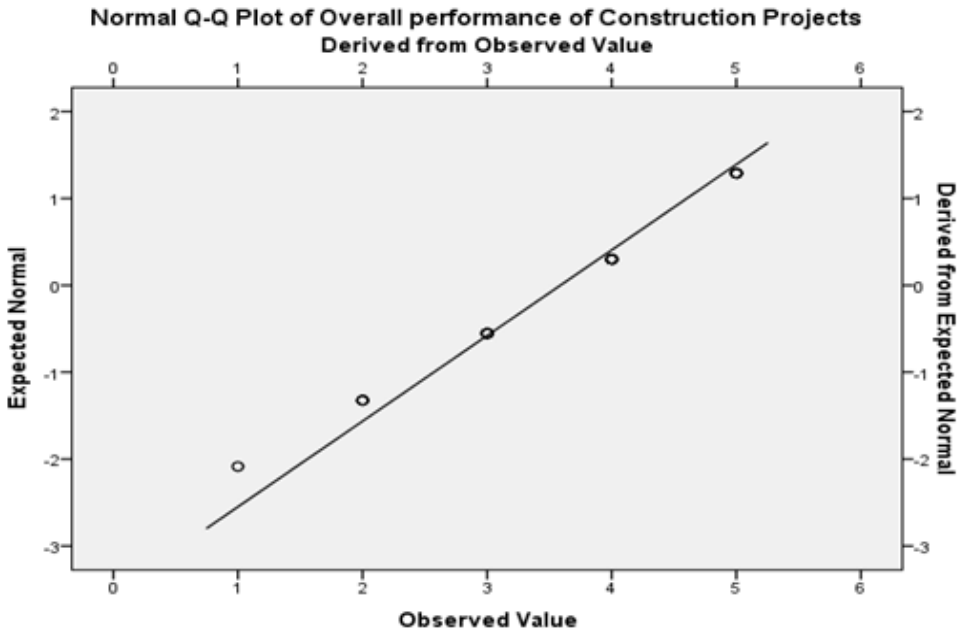
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Overall performance of Construction Projects	.233	80	.000	.893	80	.000

a. Lilliefors Significance Correction

Sources: SPSS Own Survey,

To determine the data distribution, the p-value at the significance level was checked. Usually, a significance alpha level (denoted as α or alpha) of 0.05 works well. A significance level of 0.05 indicates a 5% risk of concluding that the data does not follow a normal distribution when they actually do follow a normal distribution. From the above, SPSS Tests of normality output interns of Shapiro-Wilk test probabilities are less than 0.05 (the typical level), so these data are significantly different from normal.

Figure 1Normal Q_Q plot



Sources: SPSS Own Survey,

Above (fig2) shows that dots are not despersed along with the line. This indicates that the data is not normally distributed. Having checked the remaining skewness and by Kolmogorov-Smirnov & Shapiro-Wilk Tests, Visual Kurtosis inspection of their histogram, normal Q-Q plots and box plots showed that their factor scores were not normally distributed.

4.5.Correlations

To examine the presence of a relationship among the factors, correlation analysis was done. Correlation Analysis is used to measure the association or relationship between two or more variables (Marczyk, Dematteo & Festinger, 2005). The result of the correlation measures the strength and direction of the relationship. Spearman's correlation method was preferred for this study.

Spearman's correlation is a nonparametric variation of Pearson's product-moment correlation, used most commonly for measurements that do not follow a normal distribution pattern. The correlation coefficient varies between +1 and -1, where +1 implies a perfect positive relationship (agreement). While-1 results from a perfect

negative relationship (disagreement). As the relationship gets weaker, the correlation gets closer to zero.

To examine the presence of a relationship and the level of correlation between the dependent variable (overall performance of construction projects) and independent variables (Project characteristics related factors, Clint related factors, material related factors, and contractor related factors, Project procedures, external environment, and equipment factors), Spearman correlation was done.

Among the seven factors, the correlation of EER factors to the overall performance of construction projects is shown below.

Table 23 Correlation EER factors

Correlations

			EER1 Political environment	EER2 Economic environment	EER3 Social environment	EER4 Physical environment of sites	Overall performance of Construction Projects
Spearman's rho	EER1 Political environment	Correlation Coefficient	1.000	0.184	0.051	0.210	.259*
		Sig. (2-tailed)		0.103	0.654	0.062	0.020
		N	80	80	80	80	80
	EER2 Economic environment	Correlation Coefficient	0.184	1.000	.409**	0.048	-.621**
		Sig. (2-tailed)	0.103		0.000	0.674	0.000
		N	80	80	80	80	80
	EER3 Social environment	Correlation Coefficient	0.051	.409**	1.000	.356**	-.323**
		Sig. (2-tailed)	0.654	0.000		0.001	0.004
		N	80	80	80	80	80
	EER4 Physical environment of sites	Correlation Coefficient	0.210	0.048	.356**	1.000	0.215
		Sig. (2-tailed)	0.062	0.674	0.001		0.055
		N	80	80	80	80	80
	Overall performance of Construction Projects	Correlation Coefficient	.259*	-.621**	-.323**	0.215	1.000
		Sig. (2-tailed)	0.020	0.000	0.004	0.055	
		N	80	80	80	80	80

Sources: SPSS Own Survey,

As shown in the table above, it is found that, there is very strong significant correlation between test samples of EER_1 (Economic environment) with (p= 0.000 and r=--0.621.So, there is a moderate negative relationship between independent variables. Among the seven factors, MAR to the overall performance of construction projects is shown below.

As exhibited in the table above, there is a moderate negative correlation between test samples of MAR1 (Shortage of material) and MAR5 (Escalation of material price) with (p=0.000 and r=-0.474**) and (p= 0.000 and r=-0.402**). So, there is a moderate negative relationship between independent variables.

Table 20 Case Processing Summary

		N	Marginal Percentage
Overall performance of Construction Projects	Not Significant	2	2.5%
	Slightly Significant	10	12.5%
	Moderately Significant	22	27.5%
	Very Significant	31	38.8%
	Extremely Significant	15	18.8%
Valid		80	100.0%
Missing		0	
Total		80	

Sources: SPSS Own Survey,

Table 24 represents the summary of the overall performance of construction projects. The result from this table shows that among the respondents, only 2.5% of them said that construction projects were not affected. However, 97.5% believed that construction performance is affected negatively by the study factors considered in this study.

Table25 Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	220.759			
Final	0.000	220.759	14	0.000

Sources: SPSS Own Survey,

Table 25 shows the model fitting information, i.e., it contains the result of the comparison between the intercept only model (base model) and the final model which contains all explanatory variables. The significance of the difference between the "-2 Log Likelihood" between the final and intercept only models is tested using a chi-square test.

The smallest sig. value indicates that the final model gives a better improvement than the intercept only model. The p-value of less than 0.001 shows that the model is a very good finding on how well the model fits the data.

The next table in the output is the Goodness-of-Fit. This table contains Pearson's chi-square statistic for the model (as well as another chi-square statistic based on the deviance).These statistics are intended to test whether the observed data is consistent with the fitted model. If we do not reject this hypothesis (i.e. if the p value is large), then we conclude that the data and the model predictions are similar and that we have a good model.

Table26 Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	215.072	298	1
Deviance	129.263	298	1

Sources: SPSS Own Survey,

The above Table 26 indicates the Pearson chi-square and deviance. It helps to test the hypothesis H0: the fit is good vs H1: the fit is not good. The large sig. value (P=1) implies we do not reject H0, which implies that our model fit is good.

In linear regression, R 2 (the coefficient of determination) summarizes the proportion of variance in the outcome that can be accounted for by the explanatory variables, with larger R 2 values indicating that more of the variation in the outcome can be explained up to a maximum of 1. For logistic and ordinal regression models, it is not possible to compute the same R2 statistic as in linear regression, so three approximations are computed instead.

Table 21 Pseudo R-Square

Pseudo R-Square	
Cox and Snell	0.937
Nagelkerke	0.999
McFadden	0.994

Sources: SPSS Own Survey,

The table above contains the values of three pseudo R-square values. High values of R^2 indicate that the model well explains the data. All the pseudo R-square values considered in this study (Cox and Snell, Nagelkerke, and McFadden) have R^2 values greater than 0.9. This indicates that the explanatory variables considered in this study explain most of the variations, or, in other words, the explanatory variables in this study are a good predictor of the outcome variable.

Table 28 Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[OVAP = 1]	-61.128	95.847	0.407	1	0.524	-248.985	126.729
	[OVAP = 2]	-38.459	59.452	0.418	1	0.518	-154.984	78.065
	[OVAP = 3]	-19.447	31.323	0.385	1	0.535	-80.838	41.945
	[OVAP = 4]	13.869	25.785	0.289	1	0.591	-36.670	64.408
Location	PCR	-10.363	15.803	0.430	1	0.512	-41.335	20.610
	CLR	6.162	9.733	0.401	1	0.527	-12.915	25.239
	PPR	-4.043	6.486	0.388	1	0.533	-16.755	8.670
	EQR	12.221	18.718	0.426	1	0.514	-24.466	48.907
	MAR	6.718	11.012	0.372	1	0.542	-14.865	28.302
	EER	-3.951	6.505	0.369	1	0.544	-16.701	8.799
	COR	-12.796	19.997	0.409	1	0.522	-51.989	26.396
Scale	PCR	1.195	0.483	6.108	1	0.013	0.247	2.142
	CLR	-0.845	0.420	4.047	1	0.044	-1.668	-0.022
	PPR	-1.102	0.271	16.589	1	0.000	-1.632	-0.572
	EQR	0.051	0.432	0.014	1	0.905	-0.796	0.899
	MAR	1.254	0.635	3.899	1	0.048	0.009	2.499
	EER	0.905	0.354	6.533	1	0.011	0.211	1.599
	COR	-1.156	0.430	7.226	1	0.007	-1.999	-0.313

Sources: SPSS Own Survey,

From the above table, a statistically significant result for MAR score (p-value = 0.048). We also have a statistically significant result for variable "EER" (p-value = 0.011).Additionally, we also have a statistically significant result for "PCR (p-value =

0.013). On the other hand, the result of analysis indicated that CLR scores (p-value = 0.044). PPR scores (p-value = 0.000) and COR scores (p-value = 0.007)

The negative parameter estimates imply that as sores increase on an independent variable, there is decreased probability of falling at a higher level of dependent variable. This is true for CLR, PPR and COR due to their negative parameters. The Material Related factor is ranked as the most significant independent variable with an estimated result of 1.254. Which means a 1unit increase in MRF result affects project performance by 125%. The same is true for EER, EQR, and PCR respectively due to their positive variable estimates. The ordered analysis result indicates that MAR, PCR, COR, PPR, EER, and CLR respectively.

In another way, instead of interpreting the odds of being in the j^{th} category or less, we can interpret the odds of being greater than the j^{th} category by exponentiating itself. By this method, the results in Table 20 indicate that the parameter estimated values and the relationships between the explanatory variable and the outcome variable (performance of construction projects). The odds of the overall performance of construction projects being affected increased by a factor of 3.54 and 3.30 for MAR and PCR, respectively. For CLR, PPR and COR, the odds decreased by a factor of 0.43, 0.33 and 0.32, respectively.

4.6 Research discussion and Findings

The perceptions of the respondents about factors affecting construction project performance in the EIAR were analysed using the relative importance index method. Based on the overall rankings of groups' material related factors, these factors are ranked as the main factors that affect project performance of the EIAR. The external environment of sites, contractor related factors, equipment factors, and project procedure methods, project characteristics related factors, and client related factors are other listed factors that affect project performance in the EIAR following the major factors.

In addition to the group rank, the major variables within the group were also analysed. According to the RII analysis, the most important top two external environment related factors were the economic environment, with RII equals 0.770, and the political environment, with RII equals 0.730. This agreement is traced to the difficult political situation from which the EIAR research centres suffered.

The most important top two contractor related factors were site management & supervision with RII equals 0.725 and contractor experience, competence, and commitment of contactors with RII equal to 0.620 and 0.598 respectively.

Appropriate site management & supervision are perceived to have a significant influence on construction project performance.. This finding supports the generally accepted view that poor management control significantly impacts the contractor's ability to overcome unforeseeable challenges in site-related construction activities and results in additional costs to the project budget (Akintoye 2000). Through proactive planning and good development of management competencies, the contractor is generally the appropriate party to provide effective site management practices on-site. However, given that proactive decision approval by the clients significantly empowers the contractor's management ability, the overall site is well managed with a shared responsibility between both parties.

Project procedure related factors are also among the factors that affect the project performance of the EIAR construction projects with the RII equals 0.613 and 0.533 are procurement method and contract administration respectively. The most important top two project characteristics related factors that affected project performance of the EIAR were the shorter completion period given for the contract with RII equals to 0.608 and the nature of the project with RII equals to 0.568.

Equipment factors also affect the performance of the EIAR construction projects. Their top two influential factors were efficiency (RII equals 0.593) and poor planning for equipment (RII equals 0.575 respectively. Finally, the clients' related factors that affected the project performance of the EIAR construction projects were the client's emphasis on low construction costs and the delay in progress payment to contractors with RII equals 0.638 and 0.493 respectively.

The main factors from all listed variables were analysed. Based on this, the top ten most significant factors affecting construction project performance in the EIAR were discussed in detail below.

The escalation of material prices has been ranked in the first position by contractors & the EIAR staff with a mean score of 0.950. The result is in line with Enshassi et al (2009), Wiguna and Scoot (2005). The escalation of material prices was one factor that contributed and had a significant impact on construction performance. All construction bids in the EIAR are based on a fixed price. These prices are determined by material prices which are estimated prior to the beginning of the project. It is not uncommon for material prices to fluctuate dramatically from the time of bid to the time of completion. Over the past year, the volatility of construction materials prices has wreaked havoc on construction budgets and caused many disputes between contractors and the EIAR.

In addition to this, the shortage of materials and material changes, which ranked (5th) and 6th, led to difficulty anticipating and managing the cost of materials for the project and made group material related issues rank as the 1st major factor affecting project performance of the EIAR? This rank was supported by the ordinal regression results.

The economic environment has been ranked in the 2nd position by contractors and the EIAR staff with a mean score of 0.770. Construction is naturally volatile and it is highly responsive to the fluctuation in both customer and business confidence. Sustained low economic growth typically leads to a construction recession and high economic growth leads to a rapid acceleration of construction activity. The result is in line with (odeh and Battaaineh). A challenging task for any project manager is to ensure that a project is financially viable in a fluctuating economic environment. Since the periodic economic cycle significantly affects the performance of construction, accurate forecasting of economic trends, both local and global, is important. In an economic downturn, fewer construction jobs mean less business for suppliers, which could drive prices higher or force suppliers out of business. When suppliers are out of business, construction companies may be forced to pay more for suppliers, making it more difficult for them to stay afloat.

The political environment has been ranked 3ed.with a mean score of.733. The political environment is concerned with government policy and the effect of political decisions on construction projects.

The significant roles played by the government in the construction industry are regulators of the national economy, and regulators of the construction environment and construction practices, among many others. In its capacity as regulators of the construction environment, governments influence the development and building approval processes and enforce compliance with Acts and Regulations. As observed by Mansfield (1994), governments may also invoke their powers to initiate or stop projects on political, social, and environmental grounds. Political stability, national unity and good political leadership are thus crucial to national development. Uncertain environment, such as unstable government, unpredictable shifts in the economy, and unexpected changes in consumer demand.

The main reason associated with this is that in the last two to three years, the country's unstable political environment has affected the free flow of people and materials as needed. This result agrees with Saleh Samir Abu Shaban (2008) as this factor affects the schedule & cost performance of projects. A review of the results of hundreds of World Bank projects by Youker (1992) indicated that success or failure often depends on factors in the general environment outside the control of the project manager.

Site management & supervision has been ranked 4th with a mean score of 0.713. This agrees with Akawak Endale, (2020). Sambasivan and Soon, (2007) identified that site management and supervision are highly contribute to construction project performance. Site management & supervision is a key to ensuring project performance successfully. When there is good supervision, projects are done to the design specifications and, therefore, work is not repeated due to incorrect installations which have to be re-done. The gap in managing the project activities is reflected in either poor quality of work, or unnecessary additional costs to the project. This result is in agreement with Adnan Enshassi, (2010) that it affects strongly the project performance.

The client’s emphasis on low construction costs is ranked 6th and the procurement method is ranked 7th with a mean score of 0.6375 and 0.6125 respectively. Even though the variables are groped in different groups, they are highly related.

Mostly, the preferred biding option of EIAR is the ‘traditional working process', which always involves the lowest price. This procurement process has been working for many years, so everyone knows how it works because it has been tried and tested. However, this method forces contractors to price work at unrealistically low levels. As it is impossible to maintain standards and make profits, the quality of work falls and contractors become more eager to engage in legal battles to recover their ‘losses’. Additionally, it does not deliver cost savings, but in fact, is more likely to result in cost and time overruns, leading ultimately to poor value for money and greater whole-life costs in the maintenance and operation of assets.

The shortest completion period given for the contract has been ranked 8th with a mean score of 0.6025. This is in line with the study by Long (2004). He identified that inaccurate time estimating contributes to the causes of delays in construction projects. Time estimates are important as inputs into other techniques used to manage and structure all projects. An inaccurate time estimation technique may cause a project delay. For instance, in some delayed projects, the contractor does not allow time for some common problems that always happen during the construction stage, such as breakdown of equipment, missing deliveries of supplies, accidents and emergencies, and so on. Because of this problem, the actual time run out from the estimated. So, the whole project performance is affected.

Competence and commitment of the contractor has a mean score of 0.5975. The presence of competent and experienced project managers ensures the leading of a process of construction project implementation. This also guarantees a proper program of work which should be followed by the commitment of contractors. Due to their close involvement with site activities, supervisors’ management efforts impact directly on the productivity and final quality of the work they are responsible for. Their performance is thus of particular importance for achieving a project’s objectives.

Poor planning for acquiring and using project machinery and equipment has a mean score of 0.595. The term planning is being used in many ways and different contexts, but here it is explained as planning for acquiring and using project machinery and equipment. This is in line with the study of Ogunlana (1998), who mentioned that frequent breakdowns and poor planning are the most significant factors that contribute

to the performance of construction. Once machinery breaks down, the work stops immediately and cause some work delays. Finally, the whole project performance is affected.

From the result of ordinary regression case processing summary, the selected factors are extremely significant for EIAR construction projects (12.5%). A total of 97.5% of respondents believed that the construction performance of EIAR was affected negatively by the selected factors.

Additionally, the model fitting information showed a p-value of less than 0.001. This demonstrated that the model was a very good finding in how well it fits the data factors considered in this study.

The output is the Goodness-of-Fit These statistics are intended to test whether the observed data is consistent with the fitted model. Pearson's chi-square statistic for the model from the result showed that the data and the model predictions were similar and that we have a good model. The three pseudo high values of R2 indicate that the model well explained the data. All the pseudo R-square values considered in this study (Cox and Snell, Nagelkerke, and McFadden) have R2 values greater than 0.9. This indicates that the explanatory variables considered in this study explain most of the variations, or, in other words, the explanatory variables in this study were a good predictor of the outcome variable.

From the Parameter Estimates of the Ordinal Regression Analysis, statistically significant results for MAR score (p-value =-0.048), "EER" (p-value = 0.011). Additionally, we also have a statistically significant result for "PCR (p-value = 0.013). On the other hand, the result of analysis indicated that CLR scores (p-value = 0.044). PPR scores (p-value = 0.000) and COR scores (p-value = 0.007)

The odds of the overall performance of construction projects being affected increased by a factor of 3.54, 3.30, 2.47, and 1.05 for MAR, PCR, EER, and EQR, respectively. For CLR, PPR and COR, the odds decreased by a factor of 0.43, 0.33 and 0.32, respectively.

The negative parameter estimates imply that as sores increase on an independent variable, there is a decreased probability of falling at a higher level of dependent variable. This is true for CLR, PPR and COR due to their negative parameters.

The Material Related factor is ranked as the most significant independent variable with an estimated result of 3.54.. Which means

1 unit of increase in material related factors affects project performance by 3.54 The same is true for EER and PCR, respectively, due to their positive variable estimates.

1 unit of increase in external environmental related factors affects project performance by 2.47

1unit of increase in project characteristics related factors affects project performance by 3.35

1unit of increase in contractors' related factors. There is a prediction of a decrease of 0.32 percent in project performance.

1unit of increase in project procurement related factors. There is a prediction of a decrease of 0.33 in project performance results. Their values indicate the order of their odd value despite the singe.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter explained the discussion of key findings, conclusion drawn from the findings and recommendation made regarding the study. The conclusions and recommendations drawn were focused on addressing the objective of the study.

5.2 Summery of finding

This research was conducted on EIAR construction projects that have been undertaken for since 2018 with the prime intent of identifying factors affecting the performance of construction projects, ranking these factors and seeing their relationship with the performance of construction projects. Based on the objectives and findings of the study, the following conclusions are drawn.

From a literature review under seven independent variables, 31 factors were selected and distributed to respondents. Based on the perceptions of the respondents, factors were analysed and ranked using the relative importance index (RII) method to identify the most influential factors that affect the performance of construction projects. Based on the overall RII rankings, material related issues are the key factors that affect the project performance of the EIAR. The external environment of sites and contractor related factors are other major factors that affect project performance in the EIAR. These RII ranks were supported by the ordinal regression results.

To examine the presence of a relationship between the factors, correlation analysis was done. It was found that there is a very strong significant correlation between test samples of EER1 (Economic environment) and ($p=0.000$ and $r=-0.621^{**}$). Additionally, it was found the correlation between test samples of MAR1 (Shortage of material) and MAR5 (Escalation of material price) with ($p= 0.000$ and $r=-0.474^{**}$) and ($p= 0.000$ and $r=-0.402^{**}$). So, there is a moderate negative relationship with independent variables.

5.3. Conclusion

Conclusion of the study can be made based on the results found, their interpretation and discussion of the questionnaire and statistical analysis in accordance of the research question.

In relation to the objective of this research, it was shown that the factor escalation of material price has been ranked in the first position by contractors and the EIAR staff with a mean score of 0.950. This result indicates the high importance of managing the escalation of material prices to complete the project as planned. This agreement of opinions proves the importance of these factors in completing the project as planned.

In relation to the problem stated in the research, the results showed that the top five crucial factors influencing the success of the EIAR construction projects are the following: increasing material prices, the political and economic climate, a shortage of materials, site management, and supervision. As a result, the escalation in material prices, which has a RII of 0.95, stands out as one of the material-related factors that had the greatest impact on the EIAR projects' performance to complete projects on time and on budget.

5.4. Recommendation

Based on the conclusions reached, the following recommendations are provided to improve the performance of construction projects in the EIAR. Changes in material prices pose a significant risk to the parties involved in any construction project. In any event, the better practice is to specifically address price escalations going forward to mitigate these risks.

Proactively including cost adjustment for an escalation clause in the EIAR construction contract agreements is vital. Mitigating the effects of price escalations should start in the bidding process. During the bidding phase of a project, identifying materials most susceptible to price volatility and considering possible changes will set aside contractors from the small risk of escalated material prices. Therefore, it is better to address price escalations during the bidding process and include for price escalation adjustments clauses in the construction contracts going forward to mitigate these risks. Following price adjustment clauses, an adequate contingency allowance`

has to be allocated on the EIAR side in order to cover escalation for certain specified material costs.

A good understanding of the different features and factors within the environment that can have an effect on the project is essential. Therefore, contractors should need the most accurate forecasting of economic trends both locally and globally. This is important in their cost estimation in order to overcome gaps caused by materials shortages. Due to intertwined security problems that require being resolved, political decisions and considerations of the ongoing external environment, especially the political and business environment, are important to improve the performance of the construction projects.

The successful delivery of projects is hinged on proper supervision of work.. Therefore, encouraging and supporting contractors to improve forecasting of economic trends, assess the external environment, especially the political and business environment.

Further study should be conducted into the factors affecting project performance in the EIAR construction projects regarding project cost overrun, project schedule delays, and project quality by the capital & external project funds using inferential statistics in order to enhance generalizability of factors affecting projects across the sector. The built environment, in line with continuous site supervision, could improve the performance of construction projects.

5.5 Suggestion for Future Research

Further study should be conducted into the factors affecting project performance in the EIAR construction projects regarding project cost overrun, project schedule delays, and project quality by the external project funds using inferential statistics.

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Questionnaires

Dear Respondents,

This questionnaire is of Master of Business Administration in Construction Management of Addis Ababa Science and Technology University.

To successfully undertake this research, it is mandatory to look into the issues from different perspectives by involving professionals who have involvement in the construction projects. In this respect, **you are the one who can give the correct and necessary information**. Hence, I kindly request you to take time and give your honest answers to the questions listed below.

I would like to confirm you that your response designed to gather information on the research title "Factors Affecting project performance in the case of Ethiopian Agricultural Research Institute. The study is being carried out for a research project in partial fulfilment of the requirements for the award of degree will be kept strictly confidential. The result shall be used for academic purposes and the final recommendation and finding shall be forwarded to the respective office of EIAR for their preventive measure and actions. Besides, your quick response is vitally important in order to complete the research timely and I would appreciate if you return the completed questionnaire within a week of your receipt of the same.

Thank you very much for your time and cooperation and looking forward to receiving your response.

Yours Sincerely,

Eyob Sisay

Mobile No -0913141485 **Email Address** - eyobshe @gmail.com

Post Graduate Candidate, Master of Business Administration in Construction Management

Addis Ababa Science and Technology University

Addis Ababa

Part One: General Information **of the Respondent Please tick (√) the appropriate box to indicate your answer.**

1. Kindly indicate your gender? Male [ ] Female [ ]

Male [ ] Female [ ]

2. State the type of your organization or company.

Engineer/ designer [ ] Supervisor [ ]

Project manager [ ] Program/center Director [ ]

Finance &Procurement team [ ] Planning [ ]

Others [ ]

4. How many years of experience do you have in EIAR

Less than 5 years [ ] between 5 to 10 years [ ] between 10-15years [ ]

Between 15-20 years [ ] above 20 years [ ]

5. Kindly indicate the level of your education?

Less than diploma [ ] Diploma [ ] Bachelor's degree [ ]
Masters [ ] PHD

Part Two: Factors Affecting the Performance of Construction Projects

1. There are a number of factors affecting the performance of construction projects. From your experience, please express your opinion on the importance of the following factors. To what extent do they affect the performance of construction projects in the EIAR?

Groups/Factors	**Please tick (√) the appropriate answers to indicate your reactions to the following Groups/Factors**				
	Extremely Significant (5)	**Very Significant (4)**	**Moderately Significant (3)**	**Slightly Significant (2)**	**Not Significant (1)**
1.Project characteristics related factors					
Lists of Factors	Extremely Significant (5)	Very Significant (4)	Moderately Significant (3)	Slightly Significant (2)	Not Significant (1)
Type of project (Building or infrastructure)					
Nature of project					
Size of project					
Complexity of project					
Shorter completion period given for the contract					
2.Clients related factors					
Lists of Factors	Extremely Significant (5)	Very Significant (4)	Moderately Significant (3)	Slightly Significant (2)	Not Significant (1)
Delay of progress payment to contractors					
Client's ability to make project decisions					
Client's emphasize on low construction cost					
Client's interference during construction					

3.Material related factors					
Lists of Factors	Extremely Significant (5)	Very Significant (4)	Moderately Significant (3)	Slightly Significant (2)	Not Significant (1)
Shortage of material					
Material change					
Low quality material selection					
Lack of project material management system					
Escalation of material price					

4. Contractor related factor

Lists of Factors	Extremely Significant (5)	Very Significant (4)	Moderately Significant (3)	Slightly Significant (2)	Not Significant (1)
Contractor experience					
Shortage of labor force					
Site management & supervision					
Competence and commitment					
Contractor cash flow					

5.Project procedure method

Lists of Factors	Extremely Significant (5)	Very Significant (4)	Moderately Significant (3)	Slightly Significant (2)	Not Significant (1)
Procurement method,					
Contract administration					
Contract close out					

6.External environment of sites

Lists of Factors	Extremely Significant (5)	Very Significant (4)	Moderately Significant (3)	Slightly Significant (2)	Not Significant (1)
Political environment (political interference, political conflicts &instabilities, vandalism etc.					

Economic environment exchange rate, inflation, price escalation etc.					
Social environment Diversity with employees, customs, norms, values, educational level, attitude towards social responsibility etc. of the society within which the projects undertake					
Physical environment of sites access roads, ground conditions, right off way, challenging terrains, other unforeseen conditions etc.					

7.Equipment factor

Lists of Factors	Extremely Significant (5)	Very Significant (4)	Moderately Significant (3)	Slightly Significant (2)	Not Significant (1)
Shortage					
Efficiency					
Break down					
Poor planning for acquiring & using of project equipment					
Wrong selection					

Part Three: Overall performance of Construction Projects Executed in the EIAR

Description	**Very Good Performance (5)**	**Good Performance (4)**	**Moderately Performance (3)**	**Low Performance (2)**	**Poor Performance (1)**
Perceived Overall executed construction project performance considering the above factors					

Appendix

Table 22 The relative importance index (RII) and rank of factors

Groups/Factors	EIAR		Contractor		From All Response		From Group
For Project characteristics related factors	RII	Rank	RII	Rank	RII	Rank	Rank
Type of project (Building or infrastructure)	0.57	17	0.41	23	0.53	21	3
Nature of project	0.593	14	0.49	14	0.568	19	2
Size of project	0.507	28	0.37	28	0.473	29	5
Complexity of project	0.543	22	0.42	21	0.513	24	4
Shorter completion period given for the contract	0.567	19	0.73	7	0.608	12	1

MAR Correlations with OVP

			MAR1 Shortage of material	MAR2 Material change	MAR3 Low quality material selection	MAR4 Lack of project material management system	MAR5 Escalation of material price	Overall performance of Construction Projects
Spearman's rho	MAR1 Shortage of material	Correlation Coefficient	1.000	0.176	0.020	.252*	.220*	-.474**
		Sig. (2-tailed)		0.118	0.860	0.024	0.050	0.000
		N	80	80	80	80	80	80

MAR2 Material change	Correlation Coefficient	0.176	1.000	0.063	0.048	-0.008	-0.174
	Sig. (2-tailed)	0.118		0.578	0.669	0.942	0.124
	N	80	80	80	80	80	80
MAR3 Low quality material selection	Correlation Coefficient	0.020	0.063	1.000	.604**	0.123	-0.015
	Sig. (2-tailed)	0.860	0.578		0.000	0.275	0.898
	N	80	80	80	80	80	80
MAR4 Lack of project material management system	Correlation Coefficient	.252*	0.048	.604**	1.000	0.056	-0.182
	Sig. (2-tailed)	0.024	0.669	0.000		0.619	0.106
	N	80	80	80	80	80	80
MAR5 Escalation of material price	Correlation Coefficient	.220*	-0.008	0.123	0.056	1.000	-.402**
	Sig. (2-tailed)	0.050	0.942	0.275	0.619		0.000
	N	80	80	80	80	80	80
Overall performance of Construction Projects	Correlation Coefficient	-.474**	-0.174	-0.015	-0.182	-.402**	1.000
	Sig. (2-tailed)	0.000	0.124	0.898	0.106	0.000	
	N	80	80	80	80	80	80

*. Correlation is significant at the 0.05 level (2-tailed).