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Factors Influencing the Construction Project Performance in Ethiopian Electric Power Project: In Case of Asela II Wind Power Project

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DECLARATION

This is to declare that the thesis entitled "Factors influencing construction project performance in Ethiopian Electric Power: The case of Asela II wind power project", submitted in partial fulfillment of the requirements for the Degree of Masters of art in project management of the Postgraduate Studies, Addis Ababa university school of commerce, is a record of original work carried out by me and has never been submitted to any other institution to get any other degree or certificates. The assistance and help I entered during the course of these examinations have been properly conceded.

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LIST OF ABBREVIATION AND ACRONYMS

CFSs……Critical Success Factors

EEP……. Ethiopian Electric Power

GTP…….....Growth and Transformation Plan

AWPP……... Asela Wind Power Project

SPSS……. Statistical Package for the Social Sciences

RII……Relative Importance Index

GERD……. …Grand Ethiopian Renaissance Dam

PMBOK…….....Project Management Body of Knowledge

VIF ……. Variance Inflation Factor

ABSTRACT

Construction sector plays key role in national development as one of the principal drivers of economic growth. The sector involves multiple stakeholders such as clients, contractors, consultants and others which complicate its performance. It encounters numerous problems and difficulties related to cost, time, scope and quality. This paper aims at identifying and examining the key factors that influence the construction projects performance within the study area. The study employed stratified sampling technique, categorizing participants into three key stakeholder groups: clients, contractors, and consultants. Primary data was collected from the three stakeholders (owner, contractors and consultant). Questionnaire survey was administered using 24 factors identified from previous literatures and grouped into 5 groups. A total of 153 questionnaires were distributed, with 129 collected and returned: 18 (100%) from owners, 101 (82.8%) from contractors and 10 (77%) from consultants. A quantitative research approach was employed in order to investigate the key factors influencing project outcomes. The study employed a mixed-methods design, combining descriptive and explanatory research designs. The data received were analyzed using SPSS version20 and Microsoft excel, and its outputs were ranked using relative importance index (RII) to determine owners, contractors' and consultant perceptions of the factors influencing performance in construction projects. The most important factors of RII that were agreed upon by all project parties were that poor project team leadership, unclear and inadequate details in drawing designs, poor planning in acquiring and using project equipment, lack of consultant monitoring during execution phase, unclear project scope definition etc. The study also employed correlation analysis to examine the associations between independent and dependent variables, and it is found statistically significant and acceptable correlations. Multiple linear regression analysis was also conducted and it is found that all the results of the regression analysis of all factors influence the construction performance positively. In the study, the model explains 80.8% of the construction project performance based on the studied variables, leaving 19.2% influenced by unexplored factors. So, the researcher recommend that future research should identify these missing variables to better control performance determinants and further examine their positive impacts on construction project projects. This will enhance predictive accuracy and project outcomes.

Key words: Project performance, Relative Index Importance (RII), Asela II WPP

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CHAPTER ONE
INTRODUCTION

1.1. Background of the Study

The emphasis on project performance involves various stakeholders, including beneficiaries, sponsors, and government entities, all of whom play crucial roles. Project performance encompasses multiple facets, and achieving timely task completion and meeting goals is essential, particularly when resource limits are a concern (Rahman, 2018; Bjorvatn & Wald, 2018).

"Although project managers can impact important internal factors, external influences also play a crucial role in determining project results. (Dragnić, 2014). From the external elements include factors such as social, economic, natural, political, and technological changes are the major factors. "Today's projects are increasingly complex due to various reasons, such as large investments, diverse areas of activity, broad geographical distribution, tight schedules, strict quality standards, rising costs, environmental shocks, heightened stakeholder power, and advancements in ICT" (Adeyemi, 2013). "Project managers must navigate challenges arising from insufficient resources and make critical decisions regarding team composition to ensure that tasks are performed according to project requirements." Thompson et al. (2017),

The construction industry of Ethiopia, is the largest recipient of government funding for development programs, with public construction projects consuming nearly 60% of the capital budget. This highlights the importance of ensuring project success in this sector. The construction industry is dynamic, affected by uncertainties in technology, budgets, and development processes (Albert P.C. Chan, 2004). Its complexity arises from the involvement of various parties, including clients, contractors, consultants, stakeholders, and regulators. Many projects suffer from poor performance due to issues like material shortages, frequent design changes, inadequate coordination, ineffective monitoring, and lack of leadership (UNRWA, 2006). Broader political and economic factors can also negatively influence project outcomes (UNRWA, 2006 & 2007).

In order to assess the performance of construction projects, many studies were focused on measuring the performance indicators as cost, time, and quality. However, major of these studies have yielded unsatisfactory results. Many construction sectors projects experience cost overruns, time delays, and issues with quality, highlighting significant challenges in the industry. Defining project success is essential, as it can vary among stakeholders. "Key performance indicators often include cost, time, and quality, which are commonly referred to as the iron triangle" (Ashley et al.,

1987; Liu and Walker, 1998; Wuellner, 1990). Ashley et al. (1987) identified that there were five criteria for project success: exceeding expectations in “cost, schedule, quality, safety, and participant satisfaction”. In spite of cost, time, and quality being referred to as the "iron triangle," many researchers were considering adding other factors such as environmental sustainability and market conditions.

Most of the construction renewable energy generating projects in Ethiopia is generally considered to be “successful when it is completed on time, within set budget, and with specified quality, safety, based on with the goals and satisfying stakeholder expectation (Tsegay & Luo, 2017, Worku & Jha, 2016). In reality, however, most projects have one or more factors for success going not as planned. For instance, the Gibe III hydroelectricity power project was initiated in December 2007 and it was expected to be completed by 2011, but it was completed five years later, i.e., August 2016. Likewise, the Tekeze hydropower project was initiated in June 2002 and opened for use in November 2009, one and a half years late. The Ashegoda wind energy project was expected to be completed within three years but was completed one year late. Additionally, the Aysha wind power plant that was started before 9 years was still it’s on progress which is expected to be completed within only two years. but still ongoing. This suggests that many construction projects struggle to meet their planned timelines, which is a key indicator of project performance. This delay is a significant issue affecting most construction projects.

Despite considerable research, many construction projects still face significant cost overruns, delays, and quality issues. While the basic performance indicators of “time, cost, and quality are viewed as critical, others argue that project success is a more complex concept” (Chan et al., 2004). “Understanding the factors influencing project success is vital for improving project delivery effectiveness and involves continuous progress measurement, plan evaluation, and corrective actions by project managers” (Kerzner, 2003).

In previous study research has explored CSFs in construction. According to (Takim et al., 2004) “the major challenge and critical problems in managing construction projects, particularly in the public sector, is the failure to identify Critical Success Factors (CSFs) throughout various project phases”. But consensus on these factors remains elusive. Belassi and Tukel (1996) categorized CSFs into four groups: “project-related, project management, human-related, and external factors”, with interrelated variables within each category.

This study was focused on factors related to cost, time, and quality, includes timely delivery, cost

efficiency, construction quality, and sustainable development. This focus is particularly pertinent to the Asela II Wind Power Project in Ethiopia, where identifying factors affecting construction performance is essential for aligning industry goals with project objectives.

Ethiopia has a lot of energy sources like water and wind power. The Asela II Wind Power Project started being built in the 2010s. This project uses the wind in that area to make energy. It was developed by Ethiopian Electric Power. The Asela II Wind Power Project is part of the government's plan to help the country grow and get better. This plan is called the Growth and Transformation Plan. The main goal of this plan is to make sure everyone has energy and to help people. The Asela II Wind Power Project is very important, for Ethiopia's energy. Many things can affect this project, like things, new technology and social and economic things. The Asela II Wind Power Project is a part of Ethiopia's renewable energy. The Asela II Wind Power Plant construction is a significant facility operated by EEP, Given the project's complexity and the involvement of multiple stakeholders, this study was aimed to identify and analyze the major factors that influence the performance of the plant construction projects, and then providing recommendations for EEP's project parties.

Given the critical nature of the issues, the researcher must study the factors affecting construction project performance to identify the specific elements impacting the Asela Wind Power Project (WPP). This investigation will focus on understanding the challenges within the study area and how they influence project outcomes. The findings have valuable for all stakeholders. By understanding the factors that affect project performance, stakeholders can address root causes and mitigate negative effects, thereby minimizing additional costs that might exceed the project's original budget.

1.2. Statement of the problem

"The construction sector in Ethiopia fails to meet both national and international quality standards, as well as the performance expectations" (MoWUD, 2006). Projects often struggle with inadequate construction techniques and management, as well as limited funding and time. Key challenges include lack of completing projects on schedule, poor-quality work, and budget overruns. Most construction projects experience time delay and budget overruns during the project execution phase. Morris et al. (1998) found that 'over 4,000 projects rarely finished on time or within budget'. Project delay is one of the indicators of poor project performance prevalent at every stage of construction projects in Ethiopia, creating widespread challenges. Research indicates that only

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"8.25% of projects are completed on time, with the remaining 91.75% experiencing delays averaging 352% beyond their planned schedules" (Werku Koshe, 2016). Energy-related construction projects are part of the broader construction industry and are affected by the same factors influencing overall construction performance. So, like many infrastructure projects in Ethiopia, energy-related developments often struggle to achieve their targets in terms of timeline, quality, and budget. Almost all energy initiatives managed by Ethiopian Electric Power have faced major delays and budget overruns. Similarly, at Asela II Wind Power Project has encountered significant time overruns, along with issues related to cost and quality (SCI Construction Tracker Reports, 2017 & 2018), leading to construction activities being viewed as highly risky during program development.

The Asela II Wind Power Project was launched in the first quarter of 2021 planned to be accomplished within two years. But it remained unfinished, marking a three-year delay Recognizing success factors before project implementation is essential, as these factors can evolve over time in dynamic project environments. Continuous monitoring is necessary, and project managers should adjust factors as needed to improve the chances of meeting success criteria (Ioana Beleiu & Emil Crisan & Razvan Nistor, 2015). The researcher is inspired by the complex and dynamic relation the diverse factors have on project performance so as to examine the factors influencing the project construction performance at Asela II Wind Power Project. This is an urgent and serious issue as it continues to affect project outcomes and the overall effectiveness of the construction industry in the country. Thus, this research aims to identify and explore the factors influencing construction project performance, particularly at the Asela II Wind Power Project, with the objective of improving success rates in future projects, thereby reducing failures and time delays. The study focused on identifying the factors contributing to these time delays and other performance issues that hinder project performance. It also intends to identify the top-ranked factors that influence the construction project performance in Asela II wind power project.

1.3. Research question

The research questions intended to be addressed by this thesis are: -

1. What are the effects of project development-related factors (project design, project scope, project duration) on construction projects performance?
2. What is the effect of project resource-related factors on construction projects performance?
3. What is the effect of project contractor related-factors on construction on projects performance?
4. What is the effect of project consultant-related factors on construction projects performance?
5. What is the effect of project client (owner) related-factors on construction projects performance?

1.4. Research objectives

General Objective

The major objective of this research is to examine and analyze the factors that influence the performance of construction projects.

Specific Objectives

The specific objectives intended to be achieved by this research are to: -

1. To examine the influence of project development-related factors (project design, project scope, project duration) on the performance of construction projects.
2. To examine the influence of project resources-related factors on the performance of construction projects.
3. To examine the influence of contractors-related factors on the performance of construction projects.
4. To examine the influence of consultant-related factors on the performance of construction projects.
5. To examine the influence of clients-related factors on the performance of construction projects.

1.5. Significance of the study

The study can contribute to effective project management practice by showing how and the degree to which the various factors influence the construction of performance projects. Effective performance of these projects is crucial and very important for the overall national economic and social growth and development. Given resource constraints such as limited human and financial resources, proper understanding about the degree to which the different factors influence project

performance contributes to effective and economic utilization of resources. For instance, better understanding about how and to what extent factors related to competence of contractor influences performance of project informs wise selection of contractor by the project owners. This research helps allocate limited resources more effectively, ensuring that training and support are directed where they're needed most. Ultimately, the study aims to improve the effectiveness of energy-related construction projects, contributing to national growth and better living standards for communities.

The worth of this study also lies in its potential to benefit different stakeholders participated in different construction projects, especially in energy generating areas of construction related to quality and quality management systems. It aids in assessing the factors that influence project performance, ensuring usefulness, and implementing remedial measures to prevent issues. Additionally, it serves as a reference for future research especially in power plant project that will be constructed.

In many construction projects, at least one success factor or indicators such as time, cost and quality often fails or does not meet. This issue is particularly practiced in developing countries like Ethiopia, especially in the energy sector, which is critical for sustaining fast and equitable socio-economic development and improving the livelihoods of millions. Therefore, focusing this study on the energy-related construction industry is both significant and timely.

The findings will contribute to addressing the factors that hinder the helpfulness of energy-generating construction projects. It helps to identify the key performance factors that project teams must focus on to ensure projects are completed on within allocated budget, within planned schedule, and to the required quality standards, satisfying end users.

The findings and recommendations of the study will also provide for scientific and reliable information to government and other project stakeholders for formulating and implementing policies aimed at enhancing construction project performance. Effective policy making depends on reliable and cogent scientific findings. The findings of this study on construction projects in the energy sector are crucial for shaping policies, enhancing project management, and guiding resource allocation. By identifying key performance factors that affect success such as time, cost, and quality policymakers can create targeted regulations and project managers can focus their efforts on what matters most.

1.6. Scope of the research

The scope of the research includes all the owners, contractors, subcontractors and consultants that will participate construction projects in Ethiopia electric power. The geographic scope is limited to the Asela Wind Energy Generation Construction Project. where data will be collected directly from the project site and office. The subject scope focuses specifically on the excluding other construction areas like roads or bridges, wind energy construction sector, the study covers a five-month, aligning with active project phases to ensure relevant data collection. Methodologically, a mixed design combining descriptive and explanatory research designs will be employed, using questionnaires, document reviews, and linear regression analysis to examine and interpret the findings.

1.7. Organization of the study

The paper is organizing and categorize into five chapters. The first chapter addresses the introduction, including background of the study, statement of the problem, research questions, and objectives of the study, scope of the study and the significance of the research. The second chapter deals with the review of related literature, such as the theoretical review, the empirical review, and the conceptual framework. Chapter three focused on the research methodology which encompasses research approach, research design, population, sample and sampling techniques, source of data, data collection, and procedures, Data analysis method and validity and reliability of data whereas the fourth chapter is time schedule and budget/cost needed for the proposal to be conducted. The fourth chapter deals with result and discussion of the study such as correlation, multiple linear regression, RII. Finally, the fifth chapter deals that finding, conclusion and recommendation of the study.

1.8. Definition of terms

Project performance (Y): How well the construction phases of the Asela II Wind Power Project are meeting its Key Performance Indicators (KPIs). In this study, it is operationally defined and measured based on four critical criteria: the project is delivered on schedule, the project is delivered within the allocated budget, the project meets rigorous technical quality standards (such as turbine safety standards), and the project attains overall stakeholder satisfaction.

Project Development factor (X1): The basic characteristics, complexities and initial planning constraints that the project received prior to active execution. This includes clarity of the initial

project scope definition, site topography challenges specific to the Asela wind site, and accuracy of early feasibility studies and engineering designs.

Project contractor factor (X2): The administrative, technical and operational capacity of the lead construction firm responsible for physical implementation. This relates to the contractor's management on site, technical knowledge of the installation of wind energy infrastructure and ability to supervise and control sub-contractors on site.

Project consultant factor (X3): The quality of performance, accuracy and supervision provided by the supervising engineering firm responsible for quality control. This involves their meticulous review of designs and documents, their rigor in supervising the construction on a daily basis, and the rapidity with which they inspect and approve works upon completion on the site.

Project resource factor (X4): The management, availability, and mobilization of physical, human, and financial inputs required for execution. In a wind energy context, this specifically relates to the uninterrupted supply of heavy materials and imported specialized machinery (like wind turbines, blades, and heavy-lift cranes), continuous financial cash flow, and the deployment of a technically skilled workforce

Project client factor (X5): The administrative behaviors, decisions and financial inputs directly from the project owner- Ethiopian Electric Power (EPP). This operationally measures the speed of the client in making critical decisions, timeliness of parsing payment disbursements and avoidance of excessive or bureaucratic owner interference.

1.9. Limitation of the study

The study relied on self-reported data from Likert scale questionnaires, which may introduce bias. Additionally, the quantitative approach could limit insights into qualitative aspects of project performance. Furthermore, the focus on only five performance variables (project development, resources, contractors, consultants, and clients) may overlook other relevant factors for wind power projects. Future research should aim to explore additional influences on project performance that were not included in this study. the findings are specific to the Asela II WPP project and may not be applicable to other wind power projects. Comparative studies across different regions or types of construction projects would enhance the assessment of the findings' generalizability.

CHAPTER TWO

RELATED REVIEW OF LITERATURE

This chapter presents a related literature review of the studies work that was done by various literatures in the field of performance of construction project. This encompasses a theoretical review, a conceptual framework, and an empirical literature review relevant to the study, along with a summary. This review aims to identify relevant theories, empirical studies, and conceptual frameworks that provide insights into project performance in the construction project sector.

2.1 Theoretical review of literature

2.1.1 Project Concept

It has long been difficult to define what a project is, which has led to continuous discussions among design operations specialists. According to Ireland (2002) and Crawford (2007), the word "project" is intrinsically transdisciplinary and can mean many things depending on personal viewpoints and experiences. This idea has been thoroughly examined by several writers.
A project refers to a temporary and organized activity designed to achieve a specific objective within defined constraints such as time, cost, and quality. Projects possess unique characteristics and necessitate the collaboration of human, financial, and technical resources (PMI, 2013). In a similar fashion, Turner and Muller (2003) describe a project as "a systematic arrangement of human, material, and financial resources, organized innovatively to execute a specific scope of work, all while complying with particular cost constraints." The complexity of projects highlights the diverse array of interpretations that continue to develop within the discipline.

2.1.2 Construction Concept

According to Chitkara (2005), Construction projects involve complex activities that require substantial investment, careful coordination, and adherence to schedules, budgets, and technical requirements. The quality of managerial, economic, technological, and company capacities has a major impact on the various players and processes involved in development. According to Takim & Akintoye (2002), Cheung et al. (2004), and Shahrzad & Hamidreza (2011), ten benchmarking metrics for project performance have been identified, including "cost, time, predictability, defects, client satisfaction, and company performance indicators like safety, profitability, and productivity." According to Radosavljevic and Bennett (2012), it includes a number of activities intended to establish new structures or alter ones that already exist. In this sense, a "project" is a particular section of construction work that has been approved or is presently undergoing testing.

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To achieve specific objectives, construction design entails a complex array of interconnected processes and tasks, all of which require financial investment. Successful completion hinges on adhering to timelines, staying within budget, and meeting established requirements (Assaf and Al Hejji, 2006).

2.1.3 The Theory of Performance

In order to explain and improve performance, the theory of performance presents a framework that incorporates six fundamental elements. The needs found during the analysis stage have a big impact on the entire development process in the building industry. Important choices regarding the project's goals and execution strategy are made at this phase, which is known as the beginning phase. "The outcomes of these initial activities determine the nature and success of subsequent tasks," according to Ogunlana and Shamas (2009). Setting clear, fair, and specific goals for each project participant is essential because it helps everyone in the group realise where they are now and how far they are from reaching those objectives. According to this concept, a performer's efficiency is indicated by each level of the trip that is performance. on the state of performance at the moment. The six components context, knowledge, skills, identity, personal factors, and fixed factors together have a comprehensive impact on current performance levels.

Furthermore, the theory proposes three maxims for effective performance improvement: cultivating a performer’s attitude, immersing in elevating environments, and engaging in insightful practices. Higher performance levels yield significant results, including enhanced quality, capability, capacity, knowledge, skills, and identity.

2.1.4 Construction Projects and Performance

Research indicates that the choice of procurement systems significantly impacts project performance, with inappropriate systems often leading to poor outcomes (Ibrahim et al., 2024). Key performance indicators (KPIs) identified include financial stability, work progress, quality standards, health and safety, and stakeholder relationships (Galjanić et al., 2023) (Pandey & Singh, 2023). Additionally, time management is increasingly recognized as a critical factor for assessing project efficiency (Albtoush et al., 2022).

Numerous research papers have been done to assess and enhance performance in the construction sector. Classically, the sector measures the performance using three basic indicators of time, cost, and quality. However, (Cheung S O, Suen H C and Cheung K K 2004) argues that these traditional metrics are no longer effective in determining project achievement. In practice, many additional

factors influence construction performance, both directly and indirectly. (Hare B, Cameron I and Roy Duff A 2006) suggests “incorporating safety and health considerations for improved performance”, while (Da Costa J M 2012) highlights “the significance of financial factors for a construction company's profitability and sustainability”. Similarly, (Westerberg M 2011) addresses “the role of environmental factors in enhancing performance”, and (Rahmat I 2010) emphasizes “the importance of client/customer satisfaction”. Additionally, (Jha K N 2011) asserts that “stakeholder management is vital for improving company performance”.

Key Performance Indicators

Financial Stability: Essential for ensuring project viability and sustainability.

Quality Standards: Directly linked to client satisfaction and project reputation.

Health and Safety: Critical for minimizing risks and ensuring worker welfare.

Stakeholder Relationships: Strong relationships with clients and subcontractors enhance collaboration and project success.

2.1.5 Construction project performance measurement models

The Integrated success Index (Pillai, 2002) and Key Performance Indicators (Construction Industry Task Force, 1998) are two models created to evaluate the success of construction projects. Based on actual experiences overseeing India's integrated guided missile development program, the Integrated Performance Index was first developed for assessing R&D projects. Stakeholders involved, performance measures, and performance indicators associated with each phase are all included in this model, which delineates three project phases. Project selection, project execution, and implementation are the steps that have been recognized. Its benefit is that it can be applied at any stage of the project lifecycle, making it easier to rate projects for selection, compare performance as they are being carried out, and offer insights for future project management. Nevertheless, a significant disadvantage is the unclear use of mathematical formulas to combine the recognized crucial elements into an extensive

In contrast, “the Key Performance Indicators (KPIs) were developed by the UK construction industry in response to Egan’s report to evaluate project performance based on ten specified parameters” (Construction Industry Task Force, 1998). These include “seven performance indicators construction cost, construction time, cost predictability (both design and construction), time predictability (both design and construction), defects, client satisfaction with the product, and client satisfaction with the product, and client satisfaction with the service as well as three company

performance indicators: safety, profitability, and productivity". This model's strength lies in its straightforward concepts that can be simply understood and practiced by clients, designers, consultants, contractors, subcontractors, and suppliers. However, a limitation is that the KPIs are not categorized by project stages.

2.1.6 Performance Measurement Theory

(Mbugua, 1999) Differentiate between performance indicators, performance measures, and performance measurement. They explain that performance indicators provide measurable evidence needed to demonstrate that a planned effort has achieved its intended results. When indicators can be quantified accurately without ambiguity, they are referred to as measures. Conversely, when precise measurement is not feasible, the term "performance indicators" is typically used. Performance measures are defined as the numerical or quantitative metrics (Sinclair D., 1995). Performance measurement, on the other hand, is a systematic approach to evaluating the inputs and outputs in manufacturing operations or construction activities, serving as a tool for continuous improvement (Sinclair D., 1995).

In response to the demand for ongoing performance improvement, colorful performance measures have been proved in operation literature. Exemplifications include "fiscal measures" (Kangari et al., 1992), "customer satisfaction measures" (Walker, 1984), "hand measures" (Abdel- Razek, 1997)," design performance measures" (Belassi et al., 1996), and "assiduity measures" (Egan, 1998). Rene Cordero (1990) categorizes performance dimension grounded on the styles and areas of dimension. Dimension ways can concentrate on specialized performance, marketable performance, and overall performance. The areas of dimension include planning and design, marketing, and manufacturing, while overall performance can be assessed at the position of an association.

2.1.7 Measurement of Project Performance

The aim of performance measurement is to assist organizations in understanding how their decision-making processes and practices have contributed to past successes or failures, and how this insight can inform future improvements. (Tangen Stefan, 2004) Noted that performance measurement is a multifaceted topic that typically involves at least three disciplines: economics, management, and accounting. Recently, there has been considerable interest in performance measurement among both scholars and practitioners. (Lehtonen Tutu Wegelius, 2001) Emphasized the growing importance of performance measurement systems within construction firms. Karim

and Marosszeky (1999) state that "these systems are crucial in the manufacturing industry for business process re-engineering, enabling the tracking of results and the effectiveness of implementations".

Navon (2005) describes performance measurement as "the assessment of the difference between desired and actual performance levels". He highlighted that measurement performance is crucial not only for managing ongoing projects but also for updating historical data, which facilitates better planning for future projects concerning budget, schedules, and labor allocation. Karim and Marosszeky (1999) noted that "key performance indicators (KPIs) are designed to facilitate comparisons among various projects and organizations, helping to identify specific trends".

They examined budget and schedule performance through various metrics, including procurement systems, project characteristics, project team effectiveness, and client and contractor attributes.

Samson and Lema (2002) pointed out that "the characteristics of emerging performance measurement indicators require an analysis of both the organization and its environment, considering factors such as the nature of work, global competition, quality awards, organizational roles, external demands, and the influence of information technology". These indicators should effectively discover causes of problems, suggest all possible performance drivers, and highlight potential improvement opportunities. On the other hand, Cheung et al. (2004) identified seven key performance indicators such as "time, cost, quality, client satisfaction, client changes, business performance, and safety and health".

2.1.8 Problem of Performance in Construction Industry

The failure of construction projects is primarily linked to issues related to performance. Numerous reasons and factors contribute to these problems. (Long Nguyen Duy, 2004) Categorized the performance issues in the construction industry of developing economies into three levels: inadequacies in industry infrastructure (particularly resource supply), challenges posed by clients and consultants, and shortcomings due to contractor incompetence. (Okuwoga Adeyinka A., 1998) Pointed out that performance issues often stem from ineffective budget and time management. (Long Nguyen Duy, 2004) Noted that various factors contribute to performance problems in large construction projects, including incompetent designers and contractors, poor estimation and change management, social and technological challenges, site-specific issues, and the use of improper techniques and tools. (Ronie, 2005) Classified the primary performance problems into two categories: (a) unrealistic target setting (i.e., planning) and (b) issues arising from the actual

construction process, with many deviations originating from these sources.

2.1.9 Factors affecting construction project performance indicators

"Successful construction projects are defined as those completed on time, within budget, according to specifications, and meeting stakeholder satisfaction" (Chua et al., 1999; Puspassari, 2005; Ogunsemi, 2006; Yaman, 2007). Research has shown that factors such as "skill shortages, poor supervision, inadequate site management, unsuitable leadership, and equipment issues lead to delays in the UAE" (Faridi and El-Sayegh, 2006). Ajayi et al. (2010) highlighted that "the importance of contractor selection for project managers, noting that contractor performance directly affects project outcomes". They also pointed out that evaluating performance remains a challenge, with many models focusing solely on specific metrics like cost and schedule.

Enshassi et al. in his 2009 thesis examined the factors influencing construction project performance in the Gaza Strip. They identified key issues agreed upon by the project parties of owners, consultants, and contractors, including delays due to closures and material shortages, resource accessibility throughout the project, the leadership capabilities of project managers, rising material costs, the presence of highly well qualified workforce, and the quality of equipment and raw materials. Similarly, Bui et al. (2010) investigated construction project outcomes in Vietnam and found that successful projects were significantly influenced by the involvement of foreign experts, government oversight, and close supervision when implementing new construction methods.

Amusan and Adebile (2011) analyzed factors affecting cost performance at Nigerian construction sites and found that issues such as "contractor inexperience, poor planning, inflation, frequent design changes, and project complexity were major contributors to cost overruns". Additionally, Iyagba, Odusami, and Omirin (2003) examined "the association among project leadership, team composition, and performance in Nigeria". They concluded that "a leadership style and the qualifications of the project leader can significantly impact the overall project success, though their profession showed no significant correlation".

Iyer and Jha (2005) identified that "the competence of project managers and the support of top management as critical to enhancing project quality in Indian construction". Nyangilo (2012) assessed organizational structure and leadership effects on project performance in Kenya, finding that "an inadequate management systems and leadership were significant contributors to poor outcomes".

Chan and Kumaraswamy (2002) noted that "the project performance measurement encompasses time, budget, safety, quality, and client satisfaction". Kuprenas (2003) emphasized that "effective performance measurement enhances cost, schedule, and quality during both design and construction". The construction sector's performance is influenced by national economies, and despite its complexities, it is vital for societal development, as indicated by Takin and Akintoye (2004), who linked infrastructure development to economic growth.

Mbachu and Nkando (2007) found that "the quality of service and mindset that significantly holdback the successful project delivery in South Africa". Ling et al. (2007) noted that "the architectural, engineering, and construction firms in China face challenges in managing project performance due to unfamiliar operating conditions". Kim et al. (2008) noted that "the international projects encounter more complex risks compared to domestic ones, including political and economic uncertainties". Puspassari (2005) identified "46 factors leading to poor construction performance, categorizing them into eight groups related to clients, contractors, consultants, subcontractors, materials and labor, contractual relationships, project procedures, and external factors".

Fetene (2008) investigated cost overruns in Ethiopian public building projects, discovering that 67 out of 70 projects exceeded their budgets, with overruns varying from 0% to 126%. Tekalign (2014) emphasized the need for future research on how construction managers' skills impact project performance and to differentiate performance levels between public and private projects.

Generally, studies indicate that performance measurement involves various factors, including the key performance indicators (KPIs) like cost, time, quality, client satisfaction, leadership style, and safety. These indicators are crucial for assessing current project performance and guiding future improvements, while also relating to broader topics such as construction management, information technology, and benchmarking practices.

2.1.10 Factors Affecting Cost and Time Performance

(Pheng Low Sui and Chuan Quek Tai, 2006) Noted that numerous studies have been conducted on project performance concerning cost and time factors. (Chan Daniel w. m. and Kumaraswamy MohanM, 2002)Observed that research from various countries has significantly enriched the understanding of time performance in construction projects over the past thirty years, while (Iyer K.C. and Jha K.N., 2005) highlighted that cost-related project performance has been studied since the 1960s. According to (Chan Daniel w. m. and Kumaraswamy MohanM, 2002), unexpected

issues and changes from the original design that arise during construction can lead to cost and time performance problems. They identified poor site management, unforeseen ground conditions, and slow decision-making among project teams as the three key factors contributing to delays in local building projects. (Okuwoga Adeyinka A., 1998) Pointed out that cost and time performance issues are widespread challenges in the global construction industry.

Dissanayaka and Kumaraswamy (1999) suggested that “factors like project complexity, client type, team experience, and communication are closely related to time performance, while project complexity, client characteristics, and contractor also play significant roles and attributes are closely related to cost performance”. Iyer and Jha (2005) identified several factors that impact cost performance, including that “the project manager's competence, top management support, the project manager's coordination and leadership skills, monitoring and feedback from participants, decision-making quality, and coordination among project members, with coordination being the most influential factor on cost performance”.

Chan and Kumaraswamy (2002) proposed specific technological and managerial strategies to enhance construction speed and improve time performance. They emphasized that “an effective communication, rapid information exchange among project participants, better manager selection and training, and full construction time using superior software can significantly increase project performance”.

2.1.11 Factors Affecting Quality Performance

Arditi and Gunaydin (1998) identified several key factors that influence quality processes, including management's commitment to continuous quality improvement, leadership in fostering high process quality, quality training for all personnel, effective teamwork to address quality issues at the corporate level, and strong cooperation among all parties involved in a project. (Pheng Low Sui and Chuan Quek Tai, 2006) Demonstrated through case studies that total quality management, a successful approach in manufacturing and service industries, can be effectively adapted to the construction industry, yielding similar advantages such as reduced quality costs and improved employee job satisfaction. (Iyer K.C. and Jha K.N., 2005) Noted that a contractor's quality assurance system, which ensures consistent quality, is crucial for preventing issues and avoiding their recurrence. Their survey also highlighted a significant lack of documentation of quality systems among most contractors.

2.1.12 Project development related factors

Attention must be directed towards project developments when analyzing project performance (Ling, 2004), "as factors such as complexity, size, and construction type significantly influence outcomes". Bennett (1991) also emphasizes the economic context as a crucial characteristic that should not be overlooked. Additionally, "environmental factors such as political conditions, local market dynamics, and legislation play important roles on have influence on project performance". (Tukel & Rom, 1998).

2.1.13 Client related factors

Research shows that "there is a lack of focus on client performance in the construction industry, with limited studies exploring the crucial roles of clients" (Alinaitwe, 2008). On the other hand Low and Chuan (2006) suggest that "inadequate project performance might not stem from others' incompetence, but rather from the client's behavior before, during, and after the project". As (Hemanta, Sawhney & Iyer, 2012) stated in their study "the client's influence is a significant factor contributing to a lack of commitment and inefficiency among contractors".

In a previous study (Alinaitwe et al., 2007), several client-influenced factors were identified that can impact work progress. These include design changes or slightly modification, work failure due to disputes between contractors and owners, halts caused by bankruptcy, non-compliance with regulatory requirements, and delays in inspections.

2.1.14 Consultant related factors

"The tasks assigned to consultants by clients can vary (, but typically include: conducting project feasibility studies, coordinating designs and drawings, estimating and planning budgets, prequalifying construction firms, and awarding contracts to successful bidders" (Chitkara, 2005 & Anderson, 2009). Additionally, they design project organizations for execution, develop regular operating procedures and systems, create full construction plans, and supervise project activities. This involves managing contracts and monitoring the project's schedule, quality, budget, and scope. These activities are essential for guiding future actions and ensuring the success of the project.

2.2. Empirical Review of literature

2.2.1 Factors affecting cost performance

In India the scholars of Iyer and Jha (2005) performed a survey-based study to make out the critical success factors affecting the project cost performance in the construction projects. Their research

involved 112 participants and evaluated 55 variables, ultimately highlighting "the project manager's capacity, the manager's coordination, guidance from the top management, and leadership skills" as the three most impactful factors. Differently, Elinwa and Buba (1993) focused on the "failure factors in Nigeria's construction sector" through a survey of 109 respondents and 31 variables. Their findings emphasized material costs, price volatility, and financial management challenges, such as delayed payments, as the primary contributors to cost overruns.

2.2.2 Factors affecting project time performance

Jha and Iyer (2006) investigated the success factors influencing time performance in construction using survey-based research. Their research identified the project manager's expertise, collaboration with supportive owners and senior leadership, and effective monitoring and controlling, feedback, and coordination systems as the three most critical drivers of timely project delivery. In contrast, Chan and Kumaraswamy (1997) investigated "causes of delays in Hong Kong's construction sector" using a questionnaire survey with 148 participants and 83 factors grouped into eight categories. Their study highlighted "contractor-related issues, design team inefficiencies, and labor challenges as the most significant overarching categories". Specific factors impacting timelines included inadequate site management, unexpected ground conditions, and delays in decision-making processes.

2.2.3 Factors affecting the project quality performance

Hoonakker et al. (2010) conducted a mixed-methods study to investigate success factors in quality performance, combining qualitative interviews with nine contractors and a subsequent quantitative survey of 148 contractors. Their research distinguished between indicators (measurable outcomes) and influencers (drivers) of quality. The most significant indicators were reported as "client satisfaction levels, organizational dedication to quality standards, and client retention rates". Meanwhile, the key influencers included collaborative employee practices, leadership prioritization of quality, and access to a trained workforce. In a separate study, Jha and Iyer (2006) analyzed the factors that contribute to quality failures in construction projects. Through their survey research, they identified that "interpersonal conflicts among stakeholders, adverse socio-economic conditions, and extreme weather challenges as the top three barriers to achieving quality outcomes".

2.2.4 Factors influencing project performance

A. Contractor-related factors

Contractors identify several key factors contributing to project delays. Assaf and Al-Hejji (2006) highlight four main causes: insufficient payments from owners, issues with subcontractors, challenges in obtaining work permits, and equipment failures. Al-Najjir (2008, cited by Al- Najjir, 2009) emphasizes additional factors in the Gaza Strip, such as material shortages, cash flow issues, poor site management, and delays in owner payments.

Overall, the choice of the lowest-bidding contractor is frequently recognized as a significant cause of delays by owners and consultants (Sadi Assaf and Sadiq Hajji, 2005).

B. Consultant Related Factors

According to the adviser, the main reasons for project delays are primarily related to material import issues, which are considered the most critical factor. Inadequate project planning and timing, closely associated with the contractor's responsibilities, also contribute significantly (Teka Alemayo, 2020). Additional factors include inaccurate site investigation reports, design errors, complexities, and delays in the issuance of working drawings and designs (Abduezak et al., 2019). Based on survey feedback, the top four causes of delay identified are insufficient data collection prior to design, delays in approving major scope changes, delays in producing design documents, and poor communication (Abdilkerim et al., 2023).

C. Client Related Factors

In the construction industry, a contractor's performance is vital for the overall success of a project. Selecting a capable contractor is essential for the successful completion of building projects. Studies indicate that project owners must make contractor selections that support optimal performance. In Malaysia, issues such as poor site performance can lead to defects, disputes, cost overruns, and delays (Sambasivan and Soon, 2007). Similarly, in both Ethiopia and Malaysia, inadequate performance monitoring and reporting significantly contribute to design cost overruns (Al-Emad, 2017; Belachew et al., 2017). Moreover, human behavior often leads to planning errors, with Yenetlem (2020) identifying the overconfidence bias of project owners as the second most common cause of project delays.

D. Resource related factors

The strength and quality of any building project depend on various factors, with material management being crucial (Wambui et al., 2015). When essential equipment, supplies, or building

materials are unavailable at the right time or place, project efficiency can suffer. Zarihun (2017) discusses several material-related challenges, including material scarcity, delays in manufacturing, and issues with material acquisition, such as damage and delivery delays. In Afghanistan, contributing factors to project delays include a lack of building materials on the market, changes in material types and specifications during construction, and various market fluctuations affecting material availability (Gidado and Niazai, 2012).

Additionally, the use of major equipment tends to be infrequent, as contractors often hire equipment as needed. Equipment breakdowns can significantly delay projects, especially if they stem from age or poor maintenance (Fugar and Adwoa, 2010). Shortages of required equipment and equipment failures are key factors causing delays in construction (Eshetie Tesfaye, 2020). Using incorrect or faulty equipment can further extend project timelines due to repair needs.

E. Project development related factors

Research highlights several project-related factors contributing to performance issues. Niazai and Gidado (2012) identified factors affecting performance in Afghanistan, such as unrealistic initial timelines, legal disputes among stakeholders, vague definitions of project completion, insufficient penalties for delays, and contract type. Similarly, Babalola and Ojo (2016) emphasized how project complexity, scope, duration, and construction type influence outcomes, a perspective echoed by Albert et al. (2002). Kawira (2015), as noted that “poorly defined goals and objectives further exacerbate project failures”. Effective time management, which involves monitoring how team members allocate hours to tasks, is also critical to addressing these challenges.

2.3. Conceptual framework

In citation of previous studies, little attention is being paid to construction performance in Ethiopia and generally on non-governmental organization implemented projects. Based on a literature review of the existing factors affecting performance of construction projects, they can be grouped as project characteristics related factors, labor and material related factors, project procurement related factor, external environment. These categories form the basis by which research model developed to measure their effect on construction performance of this study. (Argaw Tadi, 2025)

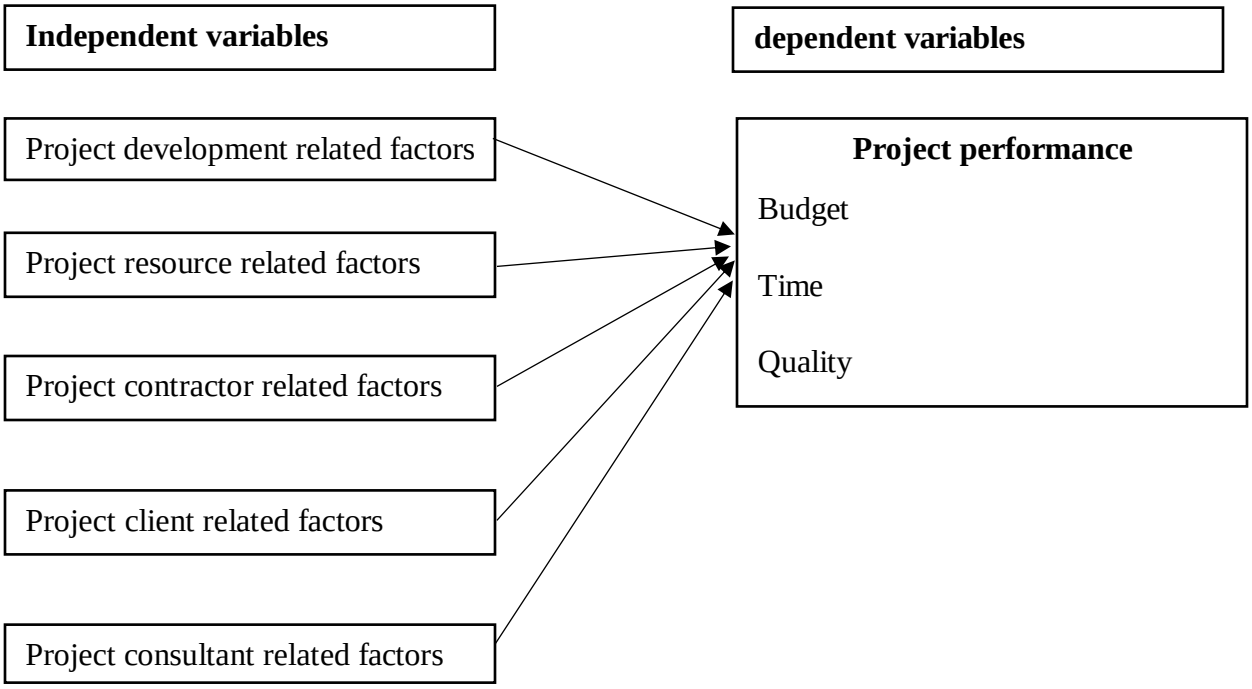


Figure 2.1 Conceptual framework

2.2.1 Research gap

Table 2.1 Summary of gap

Gap Identification Summary			
Author Name	Title of the research	(Independent Variable) pp	Findings
Awss Hatim Mahmoud	Factors influencing outcome in Iraqi construction projects: The case study of the ministry of construction, housing, and municipalities and public works in Iraq.	project performance factors related to project party's consultant, owner, contractor, budget, schedule, quality, resources, internal and external	Lack of enough experience, inadequate design requirements and drawings, scarce terms, and limited availability of skilled labor, materials, and appropriate equipment.
Oluwatuyi Opeyemi Emmanuel, Babalola Ifedolapo, Helen Akinloye Lawal, and Aiyewalehinmi Elkanah	Factors affecting construction projects performance in Akure, Nigeria	Project characteristics, labor and material, contractual, procedures, EEF,consultant, contractors related factors	Increasing material costs, inadequate material supply, the motivational ability of the project team leader, quality control of equipment, consultant dedication to specifications, delays in progress payments, the experience of the project team leader, their technical skills, general management strategies, and the economic environment.
Zarqa University	Factors affecting projects construction performance in unstable political and economic situations	schedule related factors, budget related factors, productivity factors, quality related factors, client satisfaction factors, community related factors,	Costs associated with security, time-related security measures, expenses due to corruption, unofficial holidays impacting time and costs, security measures affecting productivity, bureaucratic delays within client departments, resource

		health, safety and environment factors	availability as planned throughout the project duration, average delays in payments from the owner to the contractor, and costs from variation orders.
Dr. Ezekiel Chinyio, Eng. Faisal Alqahtani, Dr. David Oloke, Prof. Sabah Mushatat,	Factors Effecting Projects Performance: A Conceptual Framework	Project Manager Project Management Culture, Organizational Culture	Competencies and skill capabilities, self-efficacy, leadership style, strategic focus, support from top management, project management methodology, commitment and involvement of different stakeholders, communication systems, project review and learning processes, and organizational values, norms, and artifacts in leadership.
Sarah Atieno OguyaDr. Willy Muturi	factors affecting project performance of road construction in arid and semi-arid areas in kenya	Contractor's skills, construction groups financial management, timely availability of construction resources, conflict	the contractor's management skills and contractor's experience, Inflation in material prices, delay in progress payment by client and financial difficulties, Insufficient supply of labor, unavailability of better-quality material, insecurity due to terrorism
T Chinda, E Soewin,	Factors affecting construction performance: exploratory factor analysis	Budget, time, quality, safety and healthy, client satisfaction, environment, financial performance, people, information technology innovation	The study's empirical findings and analyses indicate that the performance of construction companies is not solely reliant on the traditional iron triangle of time, cost, and quality. It is also

			influenced by various other factors, including safety and health, environmental considerations, client satisfaction, financial performance, internal and external stakeholders, as well as information, technology, and innovation.

Source, own survey and from literature, 2026

Many scholars have identified factors influencing project performance in their respective study areas using various techniques. However, despite extensive research and discussions, the issues related to performance in construction projects persist. The researcher discovered several articles addressing factors affecting construction projects in Ethiopia but found no specific studies focused on the Asela II WPP project.

Another gap identified by the researcher is that many scholars tend to rely on a singular research design, a descriptive or explanatory design or limited sample sizes, which can introduce bias. To address this gap, the researcher employed using both descriptive and explanatory research designs, along with a stratified sampling method to eliminate potential biases associated with smaller samples. By using both methodologies, the study aims to fill the gap.

Another gap the researcher identified in previous studies is the lack of in-depth empirical research, with a strong reliance on theoretical frameworks. To address this, this study features a comprehensive quantitative analysis that is uniquely empirical and thoroughly conducted, effectively bridging the gap left by previous research.

2.4 Research Hypothesis

According the examined literature and in accordance with the study's goals, the following research hypotheses are proposed to empirically investigate the connection between project development related factors, project resource related factors, contractor's related factors, clients related factors, and consultants related factors and project performance. So, the following hypotheses are developed and have been tested using Analysis of Variance Statistical tool or SPSS.

Ha1: Project development related-factors significantly affect construction projects Performance at Asela II WPP.

As research shows that several project-related factors significantly influence performance,

including unrealistic timelines, legal disputes, vague definitions of project completion, insufficient penalties for delays, and contract types. Project complexity, scope, duration, and construction type also affect outcomes. Furthermore, poorly defined goals and objectives can exacerbate project failures.

Ha2: Project resources related-factors significantly affect construction projects performance at Asela II WPP.

Resource-related factors significantly affect project performance. When essential equipment, supplies, or building materials are unavailable at the right time or place, project efficiency can decline. It's highlighted that several challenges, including material scarcity, manufacturing delays, and issues with material acquisition, such as damage and delivery delays.

Ha3: Project contractors related-factors are significantly affecting construction project performance at Asela II WPP.

Contractor-related factors can positively affect project performance. Studies highlight issues such as insufficient project funding, construction errors requiring rework, inadequate supervision, and poor communication among stakeholders as major contributors to delays. Additionally, delays often arise from late material deliveries, labor mobilization issues, strikes, and insufficient contractor experience. Addressing these challenges can lead to improved project outcomes.

Ha4: Project consultant related-factors are significantly affecting construction project performance at Asela II WPP.

Consultant-related factors can positively impact project performance. According to survey feedback, the top four factors affecting performance include insufficient data collection before design, delays in approving major scope changes, delays in producing design documents, and poor communication. Additional challenges include inaccurate site investigation reports, design errors, and delays in issuing working drawings and designs.

Ha5: Project client's related-factors significantly affect construction projects performance at Asela II WPP.

Client-related factors can positively influence project performance. This due to that previous study identified several client-influenced factors that impact work progress, including design changes or minor modifications, disputes between contractors and owners, project halts due to bankruptcy, non-compliance with regulatory requirements, and delays in inspections. Effectively managing these factors can enhance overall project outcomes.

CHAPTER THREE
RESEARCHES METHODOLOGY

Research methodology refers to the systematic process used to derive results and explanations for a specific problem. The methodology outlined in this paper details the necessary steps for gathering the information needed to develop the research questionnaire, collect pertinent data, analyze that data, and present the findings. This chapter addresses various aspects, including the research approach, design, sampling strategy, data sources, instruments and procedures for data collection, analysis, as well as the validity and reliability of the data, and ethical considerations.

3.1 Description of Study Area

The Assela Wind Farm Project, carried out by Siemens Gamesa (a joint venture between Spain and Denmark) and consultant DAR (UAE), in partnership with the EEP engineering sector, involves the construction and installation of twenty-nine (29) G132 3.465 CII type wind turbine generators (WTGs). Each turbine has a capacity of 3.465 MW, resulting in a total installed capacity of 100 MW (slightly adjusted from 100.485 MW for consistency with the stated generating capacity). Each turbine stands 84 meters tall and has blades that are 66 meters long, optimized for maximum energy capture. Once fully operational, the project is expected to generate around 361.1 GWh of electricity annually, making it Ethiopia's largest wind farm in terms of energy output. The project is funded by or supported by a €145 million investment from the Danish government, includes significant infrastructure developments such as a 1 km access road from the national Adama-Assela Road, 16.6 km of internal roads connecting the turbines, 29 crane pads, and foundations for the wind turbine generators (WTGs). The electrical works involve cable trenches, 33 kV overhead lines, curbing and communication networks, as well as a 33/230 kV substation connected to the national grid through a 230 kV double circuit overhead line linked to the existing Koka-Melka Wakena transmission network.

Beyond its technical aspects, the Assela Wind Farm Project offers significant socioeconomic and environmental benefits. As part of Ethiopia's renewable energy strategy, it promotes diversification of the energy mix and enhances environmental sustainability by reducing reliance on fossil fuels. The project creates employment opportunities for local communities and strengthens energy security by meeting the growing electricity demand. Additionally, over 794 landowners have been compensated for land acquired for the project, demonstrating efforts to integrate development with local communities (Assela Wind Farm Google Search, n.d.).

However, the project has encountered multiple challenges that have resulted in delays. Construction began in December 2021, with an initial completion target of March 2023. Progress has been hindered by disruptions related to COVID-19, a state of emergency in northern Ethiopia, tax compliance issues affecting the contractor, and logistical difficulties due to deteriorating roads in Djibouti. Currently, over 80% of the project is complete, with 23 of the 29 turbines installed. Full completion is now anticipated in 2026 (Telegram: Contact @EEPCommunication, n.d.).

These geographic, technical, and socioeconomic factors make the Assela Wind Farm Project a crucial case study for understanding the opportunities and challenges of large-scale wind power development. The region's moderate climate and strategic location further enhance the feasibility of large-scale renewable energy projects.



Figure 2.1 Asela II Wind power project station

3.2 Research Paradigm, Design and Approach

3.2.1 Research Paradigm

The main goal of this research paper was to identify the factors affecting construction project performance at Asela II WPP. Since the study focused on practical outcomes, suggesting that the value of ideas is best measured by how well they work in real situations. By addressing real

problems instead of abstract theories, this research emphasizes practical solutions and results. Therefore, a pragmatic research approach is most fitting because this paradigm focuses on practical solutions and outcomes.

3.2.2 Research Design

(F.N., 1986) Defines research design as the framework and structure of an investigation aimed at answering research questions or testing hypotheses. This framework outlines the overall strategy for data collection and analysis necessary to evaluate the research hypothesis. In this study, both descriptive and explanatory research designs will be employed. The primary goal of descriptive research is to depict current conditions or description of the state of affairs as it exists at present. Therefore, these study aims to describe and critically evaluate the factors influencing the performance of construction projects at Asela wind power plant. A quantitative, organizational-based cross-sectional study will be conducted.

3.2.3 Research Approach

There are two basic approaches to research: quantitative and qualitative (Leedy and Ormrod, 2005). The former involves the generation of data in quantitative form which could be subjected to accurate quantitative analysis in a proper and rigorous manner and in the form of a data base from which to realize characteristics or relationships. In quantitative research, samples of a population are studied (observed or questioned) to establish its characteristics, in short, a quantitative approach attempts to produce “real answers” from “hard data”, where as a qualitative approach is concerned with subjective evaluation of opinions, behavior and attitudes. Qualitative methods are not good at giving direct answers, but are good at developing more questions, because of consistent use of “soft data” (Higgins, 2009). In this research, a quantitative approach will be employed to gain a comprehensive and detailed understanding of the study.

3.2.4 Types of data

A closed-ended or structured survey was employed to gather quantitative data through questionnaires. The items in the questionnaire were primarily developed in alignment with the study's objectives and research questions. The questionnaire was distributed to clients, consultants, and contractors involved in various construction projects. Participants included project managers, site supervisors, site engineers, and civil engineers, each contributing from different capacities related to the construction projects.

This type of data collection allows for the gathering of large volumes of information that can be

statistically analyzed. It ensures consistency in the questions, facilitating comparison and analysis. Additionally, it can quickly reach a wide audience, particularly when conducted online.

3.2.5 Source of data

In this paper, the primary data source was gathered through a questionnaire survey technique. The questionnaire was developed based on a previous literature review of various factors that affect the performance of construction projects and related area.

Secondary data was gathered from a range of published and unpublished sources pertinent to the research topic. This included project progress reports, performance audits, and organizational records from EEP of Asela II WPP project office, scholarly articles, books, and previous research studies. Such secondary data offers essential background information and context, enriching the interpretation of primary data. It acts as a crucial resource, providing a comprehensive view of the project's historical context, leadership skills, and factors affecting project success. Additionally, it facilitated comparisons between the primary data findings and existing knowledge in the field.

3.3 Sampling design

The study employed a sample survey method, focusing on a subset of the entire population involved in construction projects. This included owners, engineers from EEP construction management offices, program managers, and contractors who participated during the study period. First, the target population was stratified into stratum/groups based on their characteristics such as client, contractor, and consultant. Then, a stratified random sampling technique was employed, there is a chance that one larger group will disproportionately dominate the sample if a basic random technique is used, which would introduce selection bias and drown out the opinions of the smaller groups. I ensured that every stakeholder category was fairly and proportionately represented by first stratifying the population. This was crucial to my study's methodology since my regression model explicitly examines and contrasts the various effects of client, contractor, and consultant-related variables on the Asela II Wind Power Project's overall performance. where respondents were randomly selected from each stratum to ensure representativeness. The questionnaires were then distributed to the selected participants within each group or stratum.

3.3.1 Population and sampling frame

The research population of the study consists of different parties and stakeholders involved in construction projects; as owners (EEP in Asela II WPP of selected project), consultants and contractors who were involved in construction projects during study period were carefully

considered. As (Cooper and Schindler, 2003) noted "Study population is the entire group of things about that the researcher wants to draw conclusion". There was a total of 250 work force of the project as shown in table below. From this workforce those administering construction projects on the owner side (EEP project office) 30 from the contractor side 200 and from consultant side 20. "A sampling frame is defined as an exhaustive list of all units from which a sample can be selected" (O. Mugenda, 2003). In this study, the list of respondent names for each sampling unit was obtained from the EEP's Asela II WPP project office and served as the sampling framework for the research.

Table 3.1 work force of the plant

Position Level	Contractor	EEP (Client)	Consultant	Total
Executive Level	~15	~5	~3	~23
Middle Management	~35	~10	~7	~52
Non-Executive (Site Staff, Inspectors, Subcontractors, Back-Office, etc.)	~150	~15	~10	~175
Total Estimated Workforce	**~200**	**~30**	**~20**	**~250**

Source, from firm, 2026

3.3.2 Sampling unit

Sampling units refer to the elements or subgroups within a population from which data is gathered during the sampling process (Kothari, 2004). In this research, the sampling units consisted of individuals directly involved in the Asela II WPP initiative. Initially, 153 respondents were identified as potential sampling units; however, ultimately, 129 respondents actively participated and were considered the final sampling units in this context.

3.3.3 Sample size determination

When conducting research, it does not mean that all the members of stakeholders are possible respondents for the questionnaire unless the respondents of the population were less. Instead, the questionnaire was randomly distributed to limited members of the construction projects during the particular and specified period. The formula for determining sample size is based on the following Slovin's sampling formula (Yemane, 1967).

$$n = N / [1+N*e2]$$

Where:

• N = the whole/total number of populations (200+30+20=250)

• n = number of sample size

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

Therefore, the sample size becomes = 250/ (1+250*0.052) = 153

So, the sample size for this study, conducted at the Asela II WPP, is 153. This number was calculated using the above formula that allows for generalization to the broader population of the Asela II WPP project.

3.3.4 Sampling techniques and sampling procedure

The stratified sampling technique was employed to categorize the population into distinct groups: consultants, contractors, and owners. These groups are mutually exclusive and collectively exhaustive, ensuring that each member of the population is assigned to only one group and that no members are omitted. Subsequently, a stratified random sampling method was utilized to select respondents from each category. This approach facilitates the gathering of more precise, competency-focused, and high-quality data.

3.4 Data Collection Instruments

The data collection method utilized a closed-ended questionnaire derived from relevant literature. This questionnaire was specifically designed for this research, incorporating insights from prior studies, the global nature of the construction industry, and the context of the Asela II WPP project. An ordinal scale was implemented, allowing for the ranking or rating of responses, typically represented by integers in ascending or descending order. The response levels were assigned values: strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). It is important to note that these numerical values do not indicate equal intervals or represent absolute quantities. The questionnaire was divided into three sections: Part 1 focused on the general characteristics of the respondents, Part 2 assessed indicators and their significance to project performance factors, and Part 3 addressed factors influencing the performance of construction projects, categorized into five groups.

A questionnaire was developed to gather insights and perspectives from experienced respondents regarding construction performance issues in the Asela II WPP. The survey was categorized into two main sections. The first parts focused on the participants' and their companies' backgrounds, including questions about: Organization type, typical projects undertaken by the organization,

company size (based on employee count), respondents' job titles and their educational status, years of professional experience, number of projects completed in the last five years, respondents' position in the firm.

The second section examined factors influencing construction performance, covering a total of 24 factors categorized into five groups: project developments-related factors (5 factors/items), project resource-related factors (5 factors/items), project contractor-related factors (5 factors), project consultant-related factors (4 factors), and project client-related factors (5 factors).To ensure the effectiveness of the research instrument, a pre-testing phase was conducted for the self-administered questionnaire before distribution. Recognizing the need to identify potential weaknesses, the questionnaire was reviewed and tested on a pilot sample comprising 5 individuals from the owner side and 7 from the contractor side and 4 from consultant side. All randomly chosen and excluded from the final sample. Following Mugenda and Mugenda's (2003) guideline that the pilot sample should represent about 10% of the total study size, feedback from these participants was gathered to refine the questionnaire. This process revealed vague questions, allowing for necessary adjustments to enhance clarity and communication. Ultimately, piloting strengthened the instrument, ensuring it effectively conveyed its intent to all respondents and contributed to more reliable findings.

Table 2.2 variable operationalization

Variable	Type	Definition
Project performance (Y)	Dependent variable	The final success of construction project
Project Development factor (X1)	Independent variable	Factor related to initial planning and scope definition
Project contractor factor (X2)	Independent variable	Technical and management of main Contractor
Project consultant factor (X3)	Independent variable	The performance of supervisors
Project resource factor (X4)	Independent variable	The availability of critical project input
Project client factor (X5)	Independent variable	The Influence of EEP As the Client

3.5 Data Validity and Reliability

3.5.1 Validity

Zikmund, (2003) noted that "validity refers to the extent to which the research instrument measures what it is intended to measure". To ensure the validity of the content, the questionnaire was developed following an extensive literature review and examination of tools used in similar project performance studies. Content validity is a key aspect of validity, ensures that a measuring instrument adequately covers the topic being studied, as noted by Kothari (2004). He emphasized that "good content validity occurs when the instruments include a representative sample of the universe". In this context, the content validity of the research instruments was carefully reviewed by the advisor and his feedback was utilized to, ensuring that clarify ambiguous points, ensure conceptual alignment, and confirm that each item accurately represented the variable. So, the respondents understood the questionnaire content. The constructs for all independent and dependent variable factors were defined using established theoretical frameworks and empirical evidence from prior research.

Additionally, face validity was assessed through a pre-test/pilot study. A pilot study was conducted with a small sample of 15 respondents from various project departments. This pre-test allowed for the evaluation of the questionnaire's structure, clarity, and language.

Another technique was the construct validity of the variables was assessed using Pearson's principal component factor analysis during data analysis. This statistical technique helped verify that the details grouped under each factor of independent and dependent variables were appropriate. According to Hair et al. (2010), "a factor loading of ±0.30 is considered minimally acceptable, ±0.40 is deemed more significant, and ±0.50 or higher is regarded as virtually significant". The results from the Pearson factor analysis indicated that the loadings for items within their respective factors were greater than 0.70. "High factor loadings (typically 0.70 or above) indicate that the factor is well represented by the items" (Tabachnick & Fidell). This suggests that the questionnaire effectively measures multiple concepts, demonstrating good construct validity.

Table 3.3 construct validity result

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.749
Bartlett's Test of Sphericity	Approx. Chi-Square	587.990
	Df	15
	Sig.	.000

Component Correlation Matrix

Component	1	2
1	1.000	.394
2	.394	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Source from own survey, 2026

Construct validity was supported by PCA with Oblimin rotation, yielding two moderately correlated components ($r = 0.39$). The KMO measure (0.75) and Bartlett's test ($p < .001$) confirmed the suitability of the data for factor analysis, indicating that the scale measures distinct but related constructs.

3.5.2 Reliability

As an internal validity was ensured through the correct application of research instruments to accurately measure the variables during data collection, data consistency was assessed using the reliability test, specifically the Cronbach's Alpha method.

According to Sekaran (2010), "a reliability scores below 0.6 is considered poor, 0.7 is acceptable, and above 0.8 is good, with a score closer to 1.0 indicating better reliability". The Cronbach's Alpha test revealed a value of 0.83 for the variables, which exceeds the acceptable threshold of 0.7, indicating that the scale is reliable for further analysis. Furthermore, Cronbach's alpha statistical instrument was used to ensure the inner consistency of a questionnaire. As (Gliem, 2003) noted "the closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale where alpha value is ">0.9, Excellent, >0.8 Good, >0.7, Acceptable, > 0.6 Questionable, > 0.5 Poor, and < 0.5 Unacceptable". Therefore, with the aid of SPSS version 20, a

Cronbach Alpha test was conducted for degree of significance in order to assure its reliability and consistency. The following outcomes were attained.

Table 3.4 Reliability analysis result

Categorical Factor	Number of items	Cronbach's Alpha	Condition
Project clients related factors	5	0.745	Acceptable
Project resources/PM related factors	5	0.701	Acceptable
Project contractors related factors	5	0.716	Acceptable
Project consultant related factors	4	0.762	Acceptable
Project characteristics related factors	5	0.732	Acceptable
Factors affecting Project performance	3	0.758	Acceptable
Overall	27	0.856	Good

Source: primary data/Own survey, 2026

The Cronbach's alpha value in the above Table 3.3 is 0.856 for the overall items, indicating that it's a good reliability in terms of internal consistency for the data set from this study. The independent variable factors had values greater than 0.7, good reliability which is considered acceptable as recommended by Kline (2013) a Cronbach's alpha analysis performed was, applying a threshold of 0.7 and above is acceptable. This Cronbach's Alpha analysis confirms that the instruments and data are consistent and reliable for further research.

3.6 Method of Data Analysis

The research problem statement, research questions and objectives served as the foundation for the study analysis. Quantitative data were gathered, coded, analyzed, interpreted, and presented. Coded data from closed-ended questions entered into SPSS version 20 and Microsoft Excel to summarize responses for analysis. Tables, percentages, and frequencies provided a descriptive summary, complementing quantitative information.

3.6.1 Method of quantitative data analysis

In this study the quantitative data analysis engaged mixed-method research which inferential statists and descriptive statistics. Descriptive statistics is research design such as means and standard deviations, to summarize performance metrics. Whereas an inferential statistic is a design

that included both correlation and multiple linear regression that explore the relationships between variables and assess their combined effects on outcomes of the project performance.

In descriptive statics the relative importance index (RII) for each factor was determined using frequency data, as illustrated by the formula from El-Razek et al. (2008) cited by Aziz et al. (2016). Factors affecting construction projects were ranked based on RII. The Relative Importance Index (RII) method was employed to rank the perceptions of owners, consultant and contractors regarding the performance indicators in Asela II WPP construction projects. This method helped and contributed that it identifies and rank the most significant factors from the variables that affect project performance.

To determine the perceptions of owners, consultant and contractors concerning at Asela IIWPP, the RII was calculated using the following formula, as cited in Saleh Samir Abu Shaban's thesis (2008) and referenced in studies by Cheung et al. (2004), Iyer and Jha (2005), and Ugwu and Haupt (2007): "RII=∑ (W*f)/ (A*N)".

$$RII = \frac{\sum w}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N}$$

This formula facilitates a systematic ranking of the factors based on their perceived importance.

In this study, W represents the loading assigned to each factor by respondents on a scale of 1 to 5, where: n1 = number of respondents who strongly disagree, n2 = number of respondents who disagree, n3 = number of neutral respondents, n4 = number of respondents who agree, n5 = number of respondents who strongly agree and A denotes the maximum load (5 in this case), and N represents the total number of samples. The Relative Importance Index (RII) value ranges from 0 to 1. The analyzed data was ultimately presented using descriptive methods for easier interpretation and comparison.

Were,

RII = Relative important index

W = Weight given to each factor by respondents ranging from 1 to 5

f = frequency of each weight

A = highest weight i.e. 5

N = total number of responses

In the inferential statistics, both multiple linear regression and correlation analysis were applied. Multiple linear regression is a statistical model that forecasts a dependent variable using two or

more independent variables. This model helps to understand the relationship between the dependent variable and multiple predictors, allowing for more comprehensive analysis and forecasting in Asela II WPP construction projects. These techniques explore the association between a dependent variable denoted by Y and one or more independent variable denoted by X. In case there is a single independent variable, it is called simple linear regression which is stated in equation 1 below; in case of several independent variables, then it is called multiple linear regressions as stated in equation 2 below, which was used in this research. This helps identify which independent variables are related to the dependent variable and examines the nature of these relationships.

Before conducting correlation and regression analyses, the necessary assumptions were checked to determine if the model could be applied. If these assumptions were not met, alternative techniques would be considered. The assumptions included normality, linearity, heteroscedasticity, autocorrelation, and multicollinearity. It is essential for these assumptions to be validated for the analyses to proceed. So, in this study, all assumptions were found to be valid and significant, allowing for the application of both analyses.

The model is defined as:

$Y=\beta X+\epsilon$……. Equation 1

Were,

Y = dependent variable (performance of construction projects)

β = the coefficients of the independent variables also called regression coefficients.

X = independent variables/explanatory variables

ϵ =epsilon/error term

This equation forms the basis for assessing the factors that impact performance metrics to determine whether the independent variables affect the dependent variable. A multiple linear regression analysis was performed, and all coefficients derived from the model were interpreted using the following formula (Dunteman & Ho, 2006):

The Spearman's rank correlation coefficient (ρ) was used to show the degree of agreement between the rankings of any two parties. The Spearman's rank correlation is a nonparametric test. Non-parametric tests are also referred to as distribution-free tests. These tests do not require the assumption of normality or the assumption of homogeneity of variance. They compare medians rather than means and, as a result, if the data include one or two outliers, their influence is excluded

(Fugar and Adwoa, 2010) The Spearman's rank correlation coefficient (ρ) was calculated as follows:

$\rho=1-6\Sigma d2 / n (n2 -1)$ Where:

d = the difference between the ranks given by any two respondents for an individual cause.

n = the number of causes or groups, which in this case was 23 factors or 5 groups.

To see the independent variables, whether they were affecting the dependent variable, multiple linear regression analysis was carried out. In addition, variables were regressed using a model and all coefficients interpreted. Linear regression equation was used to find out what relationship use for this research if any, exists between the independent variables and the dependent variable.

The model took this formula (Dunteman & Ho, 2006)

$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \ldots + \beta_n x_n + e$ … (Equation 2)

Where: ϵ = error term

Y = Dependent Variable

X1-n= Independent variable (explanatory variables which measured as Likert scale)

β_0 = the constant

B_1 to β_n is the regression coefficients, indicating that the increase or change in Y when the independent variable (χ) changed too.

3.7 Ethical Consideration

The study has been conducted after getting Ethical clearance from the company EEP and Official letter of cooperation also obtain from the project construction office Participants in the study were involved on a voluntary basis. Written informed consent was obtained from each participant before the interview to confirm their willingness, following an explanation of the study's objectives.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter focused on the analysis, presentation, and interpretation of data collected through questionnaires was incorporated. The results were presented by using table, graph and major finding were presented via percentages, mean and Relative Importance Index (RII). The collected data were processed using Microsoft Office Excel 2016 and SPSS version 20. The analyses conducted included descriptive statistics, correlation analysis, multiple linear regression analysis, and the relative importance index.

4.1 Demographic Characteristics and Response Rate of Respondents

4.1.1 Response rate

Out of 153 distributed questionnaires to key stakeholder's clients, contractors, and consultants 129(84.4%) were returned but, 24(15.6%)2 respondents from consultants and 22 respondents from contractors, did not reply in time due to scheduling conflicts and their heavy daily workloads and the project execution timeframe, a few chosen site engineers and field supervisors were unable to return the questionnaires because the Asela II Wind Power Project is an active, fast-paced construction site. According to wambi, Ombui, and kagiri (2015) "an observed response rate of 50% is adequate, 60% is good and above 70% rated very well". Hence, the observed data in this study is sufficient for the analysis and reporting.

4.1.2 Demographic information's of respondents

Table 4.1 Demographic information of respondents

Gender of the respondents			
	Frequency	Valid Percent	Cumulative Percent
Male	113	87.6	87.6
Female	16	12.4	100.0
Total	129	100.0	
Age of the respondents			
	Frequency	Valid Percent	Cumulative Percent

26-30	15	11.6	11.6
31-35	70	54.3	65.9
>36	44	34.1	100.0
Total	129	100.0	
Educational status of the respondents			
	Frequency	Valid Percent	Cumulative Percent
diploma	3	2.3	2.3
degree	94	72.9	75.2
masters and above	32	24.8	100.0
Total	129	100.0	
Responsibilities of the respondents			
	Frequency	Valid Percent	Cumulative Percent
Executive level	10	7.8	7.8
middle management	26	20.2	27.9
non-executive level	93	72.1	100.0
Total	129	100.0	
Respondents experience in organization			
	Frequency	Valid Percent	Cumulative Percent
less than 5 years	23	17.8	17.8
5-10 years	47	36.4	54.3
11-15 years	51	39.5	93.8

Above 15 years	8	6.2	100.0
Total	129	100.0	
Respondents position in the Firm			
	Frequency	Valid Percent	Cumulative Percent
contractor	101	78.3	78.3
client	18	14.0	92.2
consultant	10	7.8	100.0
Total	129	100.0	

Source: Own survey data, 2026

The above table reveals a significant gender disparity among respondents, with males constituting 87.6% and females only 12.4%. Despite the fact that women make up more than half of the population, there is very little female involvement in the construction industry in the studied area. The study emphasizes the necessity of actively encouraging female participation in project activities by developing their skills and capacities in order to remedy this imbalance. These initiatives would enable women to achieve fair participation in local and national contexts, secure livelihoods, and contribute to national development.

The bulk of respondents were between the ages of 31 and 35, followed by those over 36, who accounted for 34.1% of all respondents, according to the statistics in the table. This suggests that the majority of project participants are either young or older, and that younger people are more likely than older people to embrace new technology and travel. These age groups typically have higher levels of creativity and productivity, which improves overall performance. The project's active age group emphasizes how crucial energy is to managing initiatives in the research area.

In project management, possessing relevant theoretical and practical skills is a key determinant of project performance. Consequently, the level of education is a critical demographic factor that enhances project outcomes in the construction sector. From the data presented in Table 4.1, it can be inferred that the majority of respondents hold at least a bachelor's degree, accounting for approximately 72.9%, followed by master's degree holders at 24.8%. This indicates that the

respondents possess significant knowledge and are capable of effectively fulfilling their responsibilities in project management.

Another crucial characteristic to consider is the experience of the respondents, as it significantly impacts project outcomes. The majority, 39.5%, indicated they have worked in the organization for 11-15 years. Approximately 36.4% have been with the company for 5-10 years. About 17.8% reported having less than 5 years of experience, while only 2.3% have worked there for more than 15 years. This distribution highlights the varying levels of experience among the respondents, which can influence project performance. Based on this characteristic, the majority of respondents are experienced professionals who have worked in the organization long enough to acquire relevant expertise for related projects. This suggests that executing projects to enhance the performance of plant construction requires significant project management expertise.

During the research, it was important to take into account the positions of the respondents to ensure the reliability of the data collected. According to Table 4.1, contractors represented the highest percentage at 78.3%, followed by clients at 14% and consultants at 7.8%. The respondents' positions are crucial, as they directly influence the quality of information provided for analysis and reporting in the study.

Grasping these demographics is essential for effective stakeholder engagement and can greatly impact project performance and results. By weaving these insights into project planning and execution, the research can amplify its effectiveness, paving the way for more successful and sustainable outcomes in achieving construction performance goals.

4.2 Descriptive Statistics

4.2.1 Relative Importance Index (RII) results

The results of this part of the study indicate the Relative Importance Index (RII) and the ranking of factors affecting the performance of construction projects at Asela II WPP. The table below summarizes the ranking of factors based on each target group.

The aim of this analysis was to identify, categorize and rank the performance factors identified in the literature review based on their impact. These factors were categorized into five major categories: project development-related factors, project resources-related, client-related, contractor-related, and consultant-related.

Factors Influencing the Construction Project Performance in EEP Project

The study gathered data from experienced professionals involved in the relevant projects. To assess the significance of various project performance construction projects, the researchers employed the Relative Importance Index (RII). Data was gathered and collected using Likert-scale closed-ended questionnaires and analyzed through SPSS and Microsoft Excel.

Using the Relative Importance Index, the study ranked the leading affecting project performance to determine the most significant influential factors within each category and overall. Respondents including clients, consultants, and contractors prioritized the factors affecting based on their perceived importance. RII (or weighted average of ratings) based on a 5-point Likert scale: -

0= (or very low RII value close to 0), 1=not important" or "very low importance/effect, 2=low importance/effect, 3= moderate importance/effect,4= high importance/effect and 5= extremely important," "very high importance," or having the highest impact

Table 4.2 Top ten factors of project parties' perception

	Top 10 Contractors perception					
No	**Independent variables category**	**Factors**	**RII**	**mean**	**SD**	**rank**
1	Project consultant related factor	Unclear and inadequate details in drawings Design	0.756	3.80	1.041	1
2	Project resource related factor	Poor planning for acquiring and using of project equipment	0.754	3.76	0.925	2
3	Project contractor related factor	Project team leaders working with each other's	0.754	3.81	0.990	2
4	Project development related factor	Project activities duration poorly estimated	0.737	3.42	0.757	3
5	Project consultant related factor	Lack of consultant monitoring during execution phase	0.737	3.72	1.008	3

6	Project contractor related factor	Large number of subcontractors	0.727	3.63	1.125	4
7	Project contractor related factor	Project team leaders experience is low	0.717	3.57	0.864	5
8	Project contractor related factor	Lack of monitoring and follow up	0.703	3.58	0.998	6
9	Project development related factor	Lack of user involvement in defining project scope, tasks, and requirements.	0.693	3.63	0.953	7
10	Project development related factor	Project activities duration poorly estimated	0.691	3.42	0.757	8
`Top ten Clients perception						
No	**Independent variables category**	**Factors**	**RII**	**mean**	**SD**	**rank**
1	Project contractor related factor	Large number of subcontractors	0.744	3.63	1.125	1
2	Project contractor related factor	Lack of monitoring and follow up	0.711	3.58	0.998	2
3	Project contractor related factor	Project team leaders working relationship with others	0.700	3.81	0.990	3
4	Project contractor related factor	Project team leaders experience is low	0.700	3.57	0.864	3
5	Project development related factor	Project design changes	0.689	3.54	0.866	4

6	Project contractor related factor	Delay in approving payments of completed works	0.689	3.48	1.061	4
7	Project consultant related factor	Poor response to changes and modifications	0.689	3.55	1.068	4
8	Project resource related factor	Poor mechanism uses of material in project	0.678	3.43	1.029	5
9	Project resource related factor	Poor planning for acquiring and using of project equipment	0.678	3.76	0.925	5
10	Project client related factor	Excessive owner interferences	0.678	3.43	1.014	5
Top ten Consultants perception						
No	**Independent variables category**	**Factors**	**RII**	**mean**	**SD**	**rank**
1	Project contractor related factor	Project team leaders working relationship with others	0.960	3.81	0.990	1
2	Project consultant related factor	Poor response to changes and modifications	0.960	3.55	1.068	1
3	Project consultant related factor	Unclear and inadequate details in drawings Design	0.960	3.80	1.041	1
4	Project consultant related factor	Lack of consultant monitoring during execution phase	0.920	3.72	1.008	2
5	Project development related factor	Unclear project scope definition	0.900	3.74	0.923	3
6	Project development related factor	Shorter completion period given for the contract	0.880	3.40	0.931	4

7	Project development related factor	Lack of user involvement in defining project scope, tasks, and requirements.	0.860	3.63	0.953	5
8	Project resource related factor	Poor planning for acquiring and using of project equipment	0.860	3.76	0.925	5
9	Project contractor related factor	Lack of monitoring and follow up	0.860	3.58	0.998	5
10	Project client related factor	Excessive owner interferences	0.840	3.43	1.014	6

Source: Own survey data, 2026

Table 4.3 Overall/combined group factors perception

No	**Independent variables category**	**Factors**	**RII**	**mean**	**SD**	**Rank**
1	Project contractor related factor	Project team leaders working relationship with others	0.763	3.81	0.990	1
2	Project consultant related factor	Unclear and inadequate details in drawings Design	0.760	3.80	1.041	2
3	Project resource related factor	Poor planning for acquiring and using of project equipment	0.752	3.76	0.925	3
4	Project consultant related factor	Lack of consultant monitoring during execution phase	0.744	3.72	1.008	4
5	Project development related factor	Unclear project scope definition	0.735	3.74	0.923	5
6	Project contractor related factor	Large number of subcontractors	0.726	3.63	1.125	6

7	Project development related factor	Lack of user involvement in defining project scope, tasks, and requirements.	0.716	3.63	0.953	7
8	Project resource related factor	Insufficient supply of materials	0.716	3.23	1.057	7
9	Project contractor related factor	Project team leaders experience is low	0.715	3.57	0.864	8
10	Project resource related factor	Poor response to changes and modifications	0.710	3.55	1.068	9

Source: Own survey data, 2026

Generally, based on the combined finding of relative importance index (RII) scores generally, the study identifies key factors impacting construction project performance in Asela II wind power plants, ranked by stakeholders using the Relative Importance Index (RII). Contractors emphasized unclear/inadequate design details, poor resource planning, and equipment mismanagement as primary issues. Clients highlighted excessive subcontracting, insufficient monitoring, design changes, and project leaders' inexperience and poor collaboration. Consultants prioritized team communication, adaptability to changes, design clarity, execution-phase oversight, and vague project scope.

Table 4.4 The top most significant variables of RII

No	**Independent variables**	**Most Significant (RII)**	**Rank**
1	Project contractor related factor	0.763	1
2	Project consultant related factor	0.760	2
3	Project resource related factor	0.752	3
4	Project development related factor	0.735	4
5	Project client related factor	0.687	5

Source: Own survey data, 2026

The above table 4.4 shows the insight of clients, contractors and consultants towards the category of the factor affecting the project performance. Based to the overall perception of all responding parties, it is perceived that contractor related (RII 0.763), consultant related have (RII 0.760), resource related (RII 0.752), project characteristics (RII 0.735), client related (RII 0.687).

Table 4.5 RII of project performance indicators

No	dependent variables indicators	RII	Mean	SD	Rank
1	The project you are engaged in will be completed according the allocated budget	0.665	3.33	1.076	2
2	The project you are engaged in will be completed within planned schedule	0.659	3.29	1.056	3
3	The project you are engaged in will be completed according to the specified quality standard	0.699	3.50	1.146	1

The above table 4.5 displays the analysis results and rankings based on the Relative Importance Index (RII) for crucial project performance indicators: budget, schedule, and quality. The RII findings indicate that these indicators correlate with extended timelines, cost overruns, and overall project quality. Notably, project quality received the highest ranking with an RII of 0.699, having met the necessary criteria and requirements. In comparison, the budget and schedule ranked second and third, with RII values of 0.665 and 0.659, respectively. This is further corroborated and supported by data from the EEP project documentation for the Asela II Wind Power Project (WPP), which shows that while the project met quality standards, it exceeded both budget and schedule goals, leading to significant challenges. The Asela II WPP began in April 2021, with a planned completion within two years and a budget of €146 million. Although the project is still in progress, it is currently advancing well. (Assela Wind Farm Google Search (Wikipedia, n.d)

4.2.2 Finding of project development related factors

Among the three project parties, the results indicate that the most significant factors identified by consultants include unclear project scope definition (RII 0.900), shorter completion periods for contracts (RII 0.880), and lack of user involvement in defining project scope, tasks, and requirements (RII 0.860).This is primarily because many construction projects under humanitarian

programs have tight deadlines to meet donor expectations, often overlooking the amount of work and local conditions. This highlights the essential importance of accurately estimating project duration. An essential responsibility of the owner is to set the project duration based on the volume of activities and local circumstances. This finding aligns with Odeh and Battaineh (1999), highlighting the significant impact of this factor on project scheduling performance. Additionally, contractors ranked poorly estimated project activity durations as the fourth most significant factor (RII 0.737), while clients perceived project design changes as the fifth most significant factor (RII 0.689).

overall results of project development-related factors have the fourth effect on construction project performance, with a Relative Importance Index (RII) of 0.735.

4.2.3 Project resource related factors

Resource-related factors result significantly impacting project performance include poor planning for acquiring and using project equipment, which was the top perceived factor by both consultants (RII 0.880) and contractors (RII 0.754). Clients also noted that poor processes for using materials in the project were another significant factor, with an RII of 0.678. The main issue is the lack of skilled technical personnel, both in administrative and on-site roles. This shortage makes effective planning difficult and delays decision-making by owners or managers when it comes to contractor-related problems. This connects with Arditi's (1985) point that staffing deficiencies can seriously harm project results and may cause total project failure. Similarly, Chan A. and Chan D. (2004) highlighted the need for careful construction planning to make sure projects stay on schedule and within budget. Despite this, technical skills among project staff are only ranked ninth in priority, mainly because of problems in coordinating project tasks. These gaps often lead to poor work, longer timelines, or unnecessary cost overruns. Generally, from the overall results indicated above that project resource-related factors have the third most significant impact on construction project performance, with a Relative Importance Index (RII) of 0.752. Hence, as from the result the project construction performance were highly affected by project development related factors.

4.2.4 Finding of project contractor related factors

Based on the results, contractor-related factors significantly impacting the performance of the Asela II WPP include the project team leaders' working relationships, which ranked highest with an RII of 0.960, and a lack of monitoring and follow-up (RII 0.860). Contractors also noted a large number of subcontractors (RII 0.744) and low project team leader experience (RII 0.717) as

affecting performance. Additionally, clients identified delays in approving payments for completed works as a significant factor (RII 0.689).

Overall, contractor-related factors ranked first in significantly affecting project performance at Asela II WPP, with an RII of 0.763. Thus, project performance was largely influenced by these contractor-related factors.

4.2.5 Finding of project consultant related factors

The results indicate that project consultant-related factors significantly affecting project performance include poor response to changes and modifications (RII 0.960), unclear and inadequate details in drawings (RII 0.960), and lack of consultant monitoring during the execution phase (RII 0.920) based on consultant perception at Asela II WPP. Overall, consultant-related factors ranked as the second most significant influence on project performance, with an RII of 0.760.

4.2.6 Finding of project client related factors

The results show that project client-related factors significantly affecting project performance include excessive owner interference, which received a client and consultant perception rating of RII 0.840. Overall, client-related factors ranked fifth in significance among all variables, with an RII of 0.687.

Overall, contractor-related factors (RII=0.763) ranked highest, followed by consultant-related (RII=0.760), resource related (RII=0.752), project development (RII=0.735), and consultants again (RII=0.744, possibly a duplication). These categories form the top five challenges, underscoring contractor inefficiencies as the most critical barrier to project success. The findings stress the need for improved design clarity, resource coordination, and leadership collaboration to enhance performance.

Finally, Table 4.4 outlines stakeholder perceptions (clients, contractors, consultants) of factors affecting project performance. Based on combined rankings, contractor-related issues (RII 0.763) are deemed most critical, followed by consultant-related factors (RII 0.760), resource related (RII 0.752), and project development (RII 0.735) and finally client related factors was the least ranked factors with (RII 0.687).

Spearman's Rank Correlation

Therefore, spearman rank correlation is use to consolidate the responses from the three stake holders to a factor affecting project performance. The value ranged from -1 to +1and indicated as; below (Fallahnejad, 2013) as cited by (kuhill and Seifu, 2019).

1. If -1 or +1 perfect negative or positive agreement /correlation.
2. Between -1 to -0.5 or 1 to 0.5, strong negative or positive correlation /agreement.
3. Between -0.5 to 0 or 0 to 0.5, weak negative or positive correlation and,
4. 0 no correlation /agreement

The relation between the three parties for the single cause of project delay was explaining in the table 4.6 below. Client to contractor with correlation coefficient 0.775 positively correlated and strong relations. Contractor to consultant correlation coefficient was 0.777 which is positively correlated and strong. In similar manner client with consultant, contractor with consultant; 0.793 coefficients correlated positively to each and strong.

Table 4.6 The top most significant variables of RII

Respondent	Correlation coefficient	Direction of correlation
Client vs. contractor	0.775	Strong relation to +Ve
Contractor vs. consultant	0.777	Strong relation to +Ve
Consultant vs. client	0.793	Strong relation to +Ve

Source, own survey, 2026

4.3 Inferential Statistics

This section discusses the results of inferential statistical analyses to assess factors influencing the performance of the Asela II Wind Power Plant (WPP) construction project. The was study employed both correlation analysis and multiple linear regression analysis, processed via SPSS, to evaluate how the selected five independent variables (contractor, consultant, resource, project characteristics, and client-related factors) affect the dependent variable (project performance, *Y*). Before analysis, the critical assumptions of the regression model were validated to ensure robustness.

This approach aimed to isolate the specific effects of individual factors, providing actionable insights into their relative contributions to construction performance. The regression and correlation results were obtained through inferential analysis, which included model fitness, variance analysis, and regression coefficients. Before conducting the correlation and regression analyses, several statistical tests were performed. The results of these tests are reported below.

1. Multicollinearity test

According to Gujarati (2003), "multicollinearity tests help identifies high correlations between explanatory variables, preventing the double effect of independent variables in the model". When independent variables are multicollinearity, they share predictive power, which can lead to paradoxical effects where the regression model fits well, but none of the explanatory variables significantly predict the dependent variable. To check for multicollinearity, the Variance Inflation Factor (VIF) and tolerance tests were employed. If the VIF value is less than 10, there is no multicollinearity; however, a VIF of 10 or greater indicates a serious multicollinearity problem, As Gujarati suggests" omitting variables with a VIF of 10 or more from the analysis". Tolerance measures how much variability of an independent variable is not explained by other independent variables in the model, calculated as $(1-R^2)$ for each variable. A very small tolerance value (less than 0.1) indicates a high multiple correlation with other variables.

Table 4.7 The top most significant variables of RII

Variables	**tolerance**	**VIF (Variance inflation factors)**
Project developments related factor	0.442	2.262
Project resource related factor	0.218	4.579
Project contractor related factor	0.504	1.986
Project client related factor	0.207	4.820
Project consultant related factor	0.361	2.769

Source; survey result, 2026

From the above table 4.7 as it shows that the VIF values for all variables are significantly less than 10, and the tolerance statistics are above 0.1, indicating that they were accepted for entry into the

regression model for variable estimation. Multicollinearity occurs when two or more independent variables in the regression model are correlated. This correlation increases the standard error of the predictor coefficients, leading to inflated variances. The Variance Inflation Factor (VIF) is a tool used to measure the inflation of variance due to multicollinearity. The interpretation of VIF values is as follows. "If any VIF values exceed 5 or 10, it implies that the associated regression coefficients are poorly estimated due to multicollinearity" (Ahmad, 2007). The results in Table 4.7 indicate no symptoms of multicollinearity, as the VIF values meet the accepted standards.

2. Normality test

The normality assumption states that the mean of the residuals should be zero, and it is used to determine whether a dataset is well modeled by a normal distribution. This assumption indicates that an "underlying random variable is normally distributed" (Gujarati, 2009). In this study, the researcher employed both normality test table of kolmogorov-smnirnov and histogram methods to test the normality of the data. If the residuals are normally distributed around a mean of zero, the histogram should display a bell-shaped curve, with standardized residuals plotted between -3.3 and 3.3. The figure below illustrates the data normality.

Table 4.8 Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized residual	.073	129	.085	.987	129	.259
Unstandardized predicted value	.077	129	.056	.981	129	.071
Project Performance (Dependent Variable)	.114	129	.000	.977	129	.051

Source; survey result, 2026

Normality of data distribution is commonly assessed using tests such as the Kolmogorov-Smirnov test or the Shapiro-Wilk test. In this study, the Shapiro-Wilk test was employed to evaluate normality. A P-value greater than 0.05 indicates a normal distribution, while a value below 0.05 suggests a significant deviation from normality.

As illustrated in the table, the Shapiro-Wilk test yielded a p-value above 0.05, confirming that the dataset adhered to a normal distribution. This finding indicates that the assumptions necessary for regression analysis are satisfied, suggesting that the results of the analysis will be reliable and valid. A normal distribution of data is crucial, as it ensures that the regression model can accurately predict outcomes and draw meaningful conclusions.

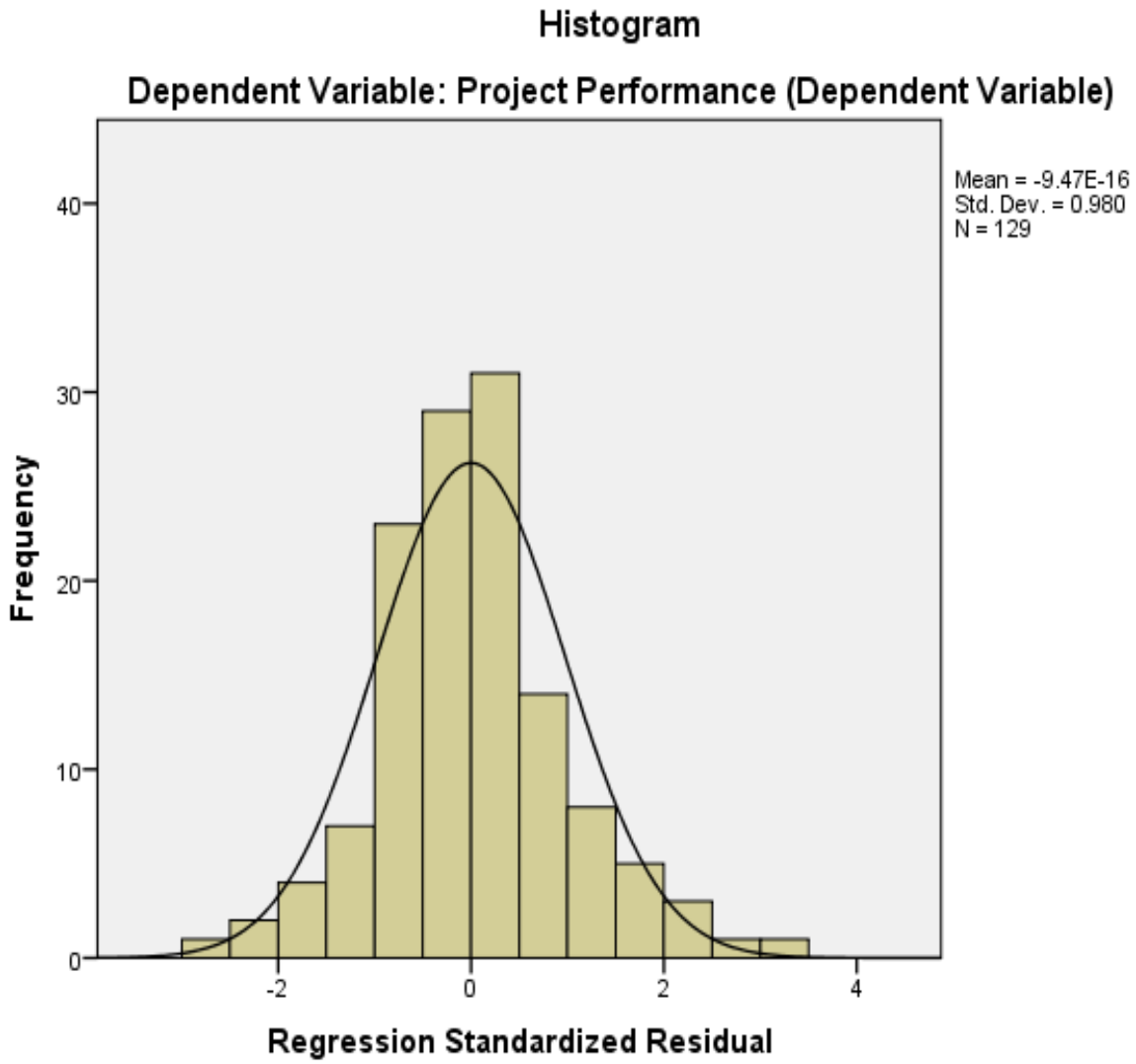


Figure 4-1 Histogram

Source; survey result, 2026

The histogram is one of the easiest and simplest graphical plots, displaying the frequency Distribution of observed values against their frequency. It visually indicates whether the

distribution is bell-shaped, offering insights into data gaps and identifying outliers. Additionally, it provides information about skewness or symmetry. Data represented by this ideal bell-shaped curve, as shown in the figure, is considered to have a normal distribution. According to Das (2016), "this indicates that the regression model meets the assumption of normality". A P–P plot (probability–probability plot) is a tool used to assess the agreement between two data sets by plotting their cumulative distribution functions against each other.

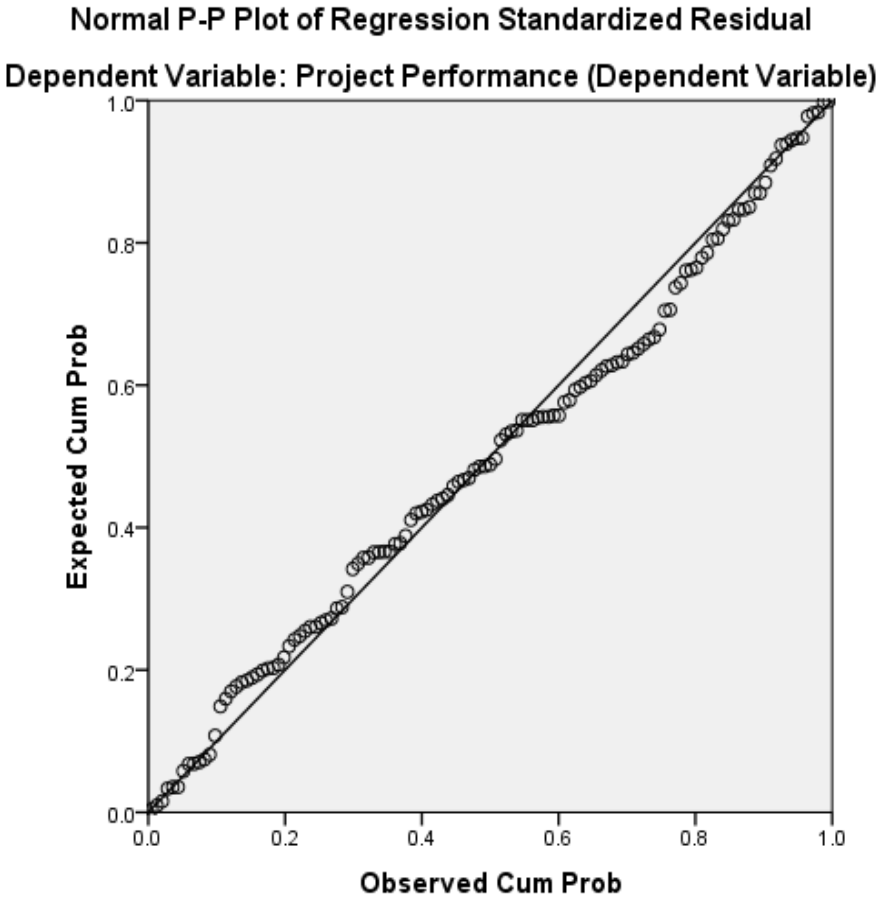


Figure 4--2 P-P plot

Source; survey result, 2026

This plot provides insights into outliers, skewness, and kurtosis, making it a popular method for testing the normality assumption. A P-P plot compares the empirical cumulative distribution function of a dataset with a specified theoretical cumulative distribution function. According to (Das, 2016) "If the plot resembles a straight line without curves, it indicates no outliers and suggests that the assumption is fulfilled". The Normal P-P plot of the survey data, presented in

Figures 4.2 and Table 4.8, demonstrates a normality pattern, confirming that the assumption of linearity is satisfied.

3. Linearity test

Table 4.9 Linearity test

ANOVA Table

Relationship	**Linearity test**	**F**	**Sig.**
Project development Vs. project performance	Linearity	17.62	< .001
	Deviation from linearity	1.613	.092
Project resource Vs. project performance	Linearity	321.60	< .001
	Deviation from linearity	1.584	.081
Project contractor Vs. project performance	Linearity	36.476	< .001
	Deviation from linearity	1.368	.186
Project client Vs. project performance	Linearity	426.361	< .001
	Deviation from linearity	.692	.788
Project consultant Vs. project performance	Linearity	7.174	< .001
	Deviation from linearity	2.393	.060

Source; survey result, 2026

The results indicate that the p-values for the linearity component of each independent variable are below 0.05. This implies a statistically significant linear relationship between each independent variable and project performance. On the other hand, the p-values for deviation from linearity for all variables exceed 0.05, confirming that the relationships between the independent variables and the dependent variable are linear. A p-value less than 0.05 generally indicate a significant relationship, suggesting a straight-line association between the independent variables and project performance.

A p-value less than 0.05 indicate that the observed relationship is unlikely to be due to chance. In contrast, a p-value greater than 0.05 supports the validity of the assumption of a linear relationship,

suggesting that there are no significant non-linear patterns in the data. Overall, these findings emphasize that leadership skills have a consistent and predictable impact on project success, following a linear trend. For further details.

4. Heteroscedasticity test

The test refers to the condition where the variance of the residuals is not constant across all values of the independent variable. This violation can affect the reliability of regression model estimates.

A heteroscedasticity problem exists when the scatter plot shows residuals greater than 3.3 or less than -3.3. As indicated in Figure 4 below, the data did not violate the heteroscedasticity assumption; instead, it exhibited homoscedasticity, demonstrating that the residuals are evenly distributed.

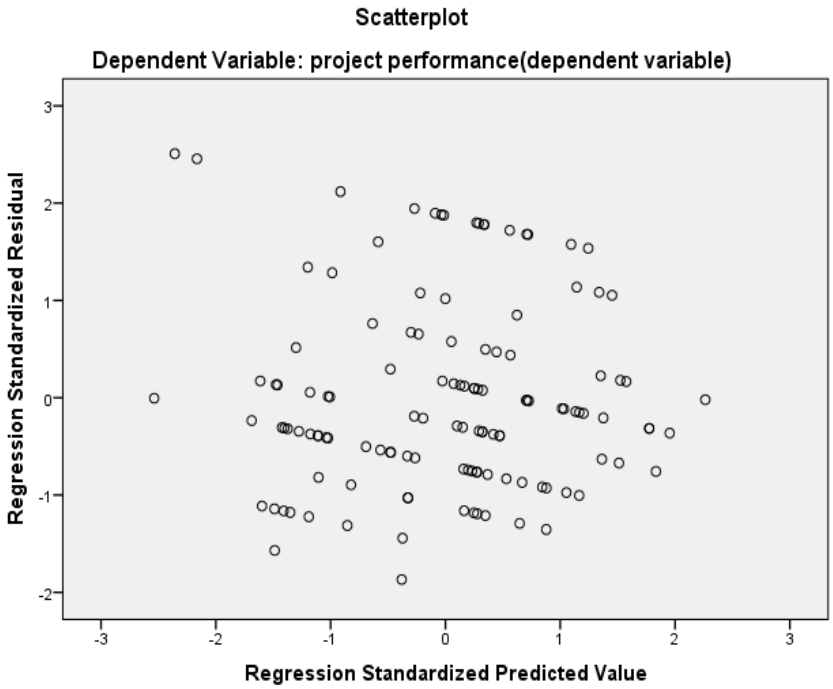


Figure 5 Scatterplot heteroscedasticity test result

Source; survey result, 2026

5. Autocorrelation

Tyas, (2013) noted that the autocorrelation test using the Durbin-Watson (DW) is "the test assesses whether there is autocorrelation in a regression model". The Durbin-Watson test produces a statistic for measuring autocorrelation that ranges from 0 to 4. Values close to 2 suggest low autocorrelation, while values closer to 0 or 4 indicate greater positive or negative autocorrelation,

respectively. For the assumption to be met, the Durbin-Watson value should be close to 2. Values below 1 and above 3 are considered problematic.

Table 13 below indicates that autocorrelation is not a concern, with a Durbin-Watson value of 1.828. Therefore, the criteria for this assumption were fulfilled.

Table 4.10 Autocorrelation result

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.898[a]	.808	.800	.36524	1.828

Source; survey result, 2026

4.3.1 Correlation analysis result

Table 4.11 Correlations analysis

		Project development related factors	Project resources related factors	Contractors related factors	project client related factors	Project consultant related factors	Project Performance (Dependent Variable)
Project development related factors	Pearson Correlation	1		.			
	Sig. (2-tailed)						
	N	129					
Project resources related factors	Pearson Correlation	.384**	1				
	Sig. (2-tailed)	.000					
	N	129	129				
Contractors	Pearson Correlation	.451**	.419**	1			

related factors	Sig. (2-tailed)	.000	.000				
	N	129	129	129			
Project client related factors	Pearson Correlation	.323**	.876**	.486**	1		
	Sig. (2-tailed)	.000	.000	.000			
	N	129	129	129	129		
Project consultant related factors	Pearson Correlation	.725**	.301**	.610**	.261**	1	
	Sig. (2-tailed)	.000	.001	.000	.003		
	N	129	129	129	129	129	
Project Performance (Dependent Variable)	Pearson Correlation	.340**	.838**	.466**	.881**	.223*	1
	Sig. (2-tailed)	.000	.000	.000	.000	.011	
	N	129	129	129	129	129	129

Source: Own survey data, 2026

Correlation is significant at the 0.01 level (2-tailed).

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

Table result indicates the relationship between the five independent and the dependent variable. The variables are positively related with project performance and with each other. Project clients related factor has the highest r= .881, $p < 0.01$ followed project resources related r= .838, $p< 0.01$, for project contractors r= .466, $p< 0.01$ for project development related r = .340, $p < 0.01$ and for project consultants r = .223, $p< 0.05$. From this, we can conclude that some independent variables have strong and positive linear relationship with project performance.

According to the results, there is a significant interrelationship among all the factors, with the majority of correlation coefficients indicating strong to moderate relationships. Therefore, it can be concluded that these factors highly influence the performance of the projects.

4.3.2 Multiple linear regression result

After verifying the model assumptions, the presentation and interpretation of the analysis were as follows below. This involves predicting or estimating the value of one variable (the dependent or predicted variable, referred to as Y) from one or more independent or predictor variables (referred to as X) (Keith, 2006).

Table 4.12 Model summary analysis result

a, Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.898[a]	.808	.800	.36524	1.828

a. Predictors: (Constant), Project consultant related factors, Client/owners-related factors, Contractors related factors, Project characteristics related factors, Project resources related factors

b. Dependent Variable: Project Performance (Dependent Variable)

Source; survey result, 2026

Table 4.13 ANOVA

b, ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	68.777	5	13.743	103.019	.000[b]
	Residual	16.346	123	.133		
	Total	85.123	128			

a. Dependent Variable: Project Performance (Dependent Variable)

b. Predictors: (Constant), Project consultant related factors, Client/owners-related factors, Contractors related factors, Project characteristics related factors, Project resources related factors

Source; survey result, 2026

Table 4.14 Regression Coefficient

C, Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.473	.227		-2.086	.039
	Project development related factors	.152	.077	.115	1.970	.050
	Project resources related factors	.336	.098	.291	3.462	.001
	Contractors related factors	.143	.066	.122	2.169	.032
	Client/owners-related factors	.669	.101	.575	6.628	.000
	Project consultant related factors	.163	.064	.171	2.573	011

a. Dependent Variable: Project Performance (Dependent Variable)

Source; survey result, 2026

4.4 Interpretation and Discussion of the Result

Table 4.13 illustrates that the R value is 0.898, indicating a positive correlation between project performance and all independent variables: contractor factors, consultant factors, resource factors, client factors, and project characteristics. This relationship accounts for 80.8% of project performance. The adjusted R-squared value of 0.800 reflects the model's goodness of fit, suggesting that these five independent variables can predict project performance at an 80% level. However, the remaining 20% could be affected by other variables that were not accounted for. The adjusted R-squared, or coefficient of determination, shows that 80% of the variation in construction performance is attributed to the independent variables, leaving 20% unexplained.

Table 4.14 indicates that the total sum of squares (85.123) is the sum of the explained regression sum of squares (68.715) and the residual sum of squares (16.408). This analysis of the total sum of squares is part of the ANOVA, which evaluates the significance of the results. The ANOVA table shows that the model is reasonably well-fitted, with a significant association between the independent variables and project performance, indicated by an F value of 103.0199 (mean square of regression divided by mean square of residual) and a p-value of 0.000 ($p < 0.05$). This suggests that these dimensions significantly impact the performance of the Asela II WPP project.

As shown in Table, five independent variables affect project performance: project development-related factors, contractor-related factors, client-related factors, consultant-related factors, resource-related factors, and development related factors with standardized of all independent variable had statistically significant effect/influence in predicting the variable at P-Value of less than 0.05 indicating strong statistical significance. The standardized coefficients provide valuable insights into the relationships between these variables and their outcomes. Specifically, the following coefficients were checked and the results were:

$\beta = 0.115$ ($p < 0.05$), $\beta = 0.291$ ($p < 0.05$), $\beta = 0.122$ ($p < 0.05$), $\beta = 0.575$ ($p < 0.05$) and $\beta = 0.171$ ($p < 0.05$).

Each of these values underscores the importance of the respective variables in contributing to project performance.

The multiple linear regression that was performed to test the spotted independent variables to answer the research questions based on the research problem and objectives coefficients that

involving one or more independent variables that best predict the value of dependent variable equation are below.

$Y= \beta o +\beta 1X1+ \beta 2X2+ \beta 3X3+.... +\beta nXn + Ɛ$

Y= -0.473+0.115Pch+0.291PR+0.122Pcont+0.575Pcli+0.171Pcons.

In the above equation (βo) also known as the marginal value that in that the impact that a unit changes in the individual independent variable have on different levels of project performance when all other variables kept constant and it reveals that the dependent variables will be -0.473 units if all the independent variables are kept zero. Among factors affecting construction project performance in Asela II WPP project as per the regression result, the first variable under study that significantly affecting project performance was client related factor at beta value 0.575 with p value less than 0.05 probability levels and it has a positive relationship with the construction project performance, followed by project resource related factors at beta value 0.291 and $p < 0.05$ probability levels and it has a positive relationship with the construction project performance and project consultant-related factors were identified as the third most influential factor, with a $p < 0.05$ and beta coefficients 0.171, also indicating a positive relationship with construction performance. A one-unit increase in this variable is expected to lead to a 17.1% increase in construction performance. Project contractors related factors at beta value 0.122 and $p < 0.05$ probability levels and it has a positive relationship with the construction project performance and project consultant-related factors were identified as the third most influential factor, with a $p < 0.05$ and beta coefficients 0.171.

4.4.1 Hypothesis testing

The hypotheses of the study to determine the influence of each variable (project development, project resource, project client, project contractors, project consultant) on the project performance which is known as dependent variable in Asela II WPP study area. The study employs inferential statistics, that of multiple linear regression and correlation analysis, in order to give credible evidence for either supporting or rejecting the hypothesized relationships between the independent variables and the dependent variable (project performance). Before conducting hypothesis testing, diagnostic tests were carried out to ensure the data are compliant with the assumptions of regression analysis.

Discussion of Each Independent Variable Hypothesis

4.4.1.1 Project development related factor significantly affect the project performance

Ha1: project development related factors significantly affect the project performance in Asela II WPP.

From the correlation analysis result showed a moderate positive relationship ($r = 0.340$, $p < 0.01$) and the regression results confirmed a significant effect ($B = 0.152$, Beta = 0.115, $t = 1.1970$, $p < 0.05$ with RII values 0.735). This indicates that for every one-unit increase in project development, project performance increases by 0.115 units and the effect is statistically significant. Based on these findings H1 is supported. So, project development related a factor has a significant positive effect on the project performance in Asela II WPP.

Specifically, a one-unit improvement in project characteristics was found to enhance construction performance by approximately 11.5%. This agreed with the findings of Chan et al. (2004), who identified "project-related factors as a key determinant of construction project success".

4.4.1.2 Project resource related factors significantly affect the project performance

Ha2: project resource related factors significantly affect the project performance in Asela II WPP.

From the correlation analysis result showed a highest positive relationship ($r = 0.838$, $p < 0.01$) and the regression results confirmed a significant effect ($B = 0.336$, Beta = 0.291, $t = 3.462$, $p < 0.05$ and RII = 0.752). This indicates that for every one-unit increase in project development, project performance increases by 0.291 units and the effect is statistically significant. Based on these findings H2 is supported. So, project resource related a factor has a significant positive effect on the project performance in Asela II WPP.

Project resource-related factors were ranked as the second most influential factor affecting construction project performance, with a p-value of 0.291. This indicates a positive relationship, suggesting that a one-unit increase in this variable is associated with a 29.1% increase in construction performance. It is recommended to implement quality assurance mechanisms for basic materials and work processes. Productivity may be hindered if essential materials, tools, or equipment are not available at the right time and location. According to Zarihun Kifle (2017), "material-related constraints include shortages, delays in fabrication, slow delivery, and noncompliance with specifications, unforeseen damages, and procurement issues".

4.4.1.3 Project contractors related factors significantly affect the project performance

Ha3: project contractors related factors significantly affect the project performance in Asela II WPP

From the correlation analysis result showed a moderate positive relationship ($r = 0.466$, $p < 0.01$) and the regression results confirmed a significant effect ($B = 0.143$, Beta = 0.122, $t = 2.169$, $p < 0.05$ and RII = 0.763). This indicates that for every one-unit increase in project development, project performance increases by 0.122 units and the effect are statistically significant. Based on these findings H3 is supported. So, project resource related a factor has a significant positive effect on the project performance in Asela II WPP. Contractor-related factors were ranked as the fourth most influential elements in construction project performance, with a p-value of 0.122, indicating a positive relationship. An increase in one unit in this variable is accompanied by a 12.2% improvement in construction performance. These further underlines the importance of the strong positive relationship between construction performance and contractor factors.

The studies carried out by Jamaludin et al. (2014), Assaf et al. (2001), and Chan et al. (2002) prove that an improvement in contractor factors has a positive effect on construction performance. The authors note that well-trained and competent workers are necessary for accomplishing project objectives efficiently.4.4.1.4 Project client related factors significantly affect the project performance

Ha4: project client related factors significantly affect the project performance in Asela II WPP

From the correlation analysis result showed a highest positive relationship ($r = 0.881$, $p < 0.01$) and the regression results confirmed a significant effect ($B = 0.669$, Beta = 0.575, $t = 6.628$, $p < 0.05$ and RII = 0.687). This indicates that for every one-unit increase in project development, project performance increases by 0.575 units and the effect is statistically significant. Based on these findings H4 is supported. So, project resource related a factor has a significant positive effect on the project performance in Asela II WPP.

A 1-unit increment on this variable will cause about 57.5% increment on construction Performance. These concepts were highlighted in the study by Dissanayaka and Kumaraswamy (1999), which stated that “the characteristics of the client make a significant contribution to the success of a project”.

4.4.1.5 Project consultant related factors significantly affect the project performance

Ha5: project consultant related factors significantly affect the project performance in Asela II WPP.

From the correlation analysis result showed a moderate positive relationship ($r = 0.223$, $p < 0.01$) and the regression results confirmed a significant effect ($B = 0.163$, $Beta = 0.171$, $t = 2.573$, $p < 0.05$ and $RII = 0.760$). This indicates that for every one-unit increase in project development, project performance increases by 0.163 units and the effect is statistically significant. Based on these findings H5 is supported. So, project resource related a factor has a significant positive effect on the project performance in Asela II WPP.

Callistus et al. (2014) concluded that "the factors affecting the quality performance of construction firms in Ghana, as viewed by consultants and contractors, include fraudulent practices and a lack of coordination between designers and contractors and contractors, poor monitoring and feedback are few of them. Lack of training on quality for staff, lack of management leadership as well as lack of previous experience of contractor was also identified".

Effective construction planning is crucial for project success. Delays in contractor identification and weaknesses in project leadership can impede performance. Chan and Kumaraswamy (2002) suggested specific technological and managerial strategies to improve construction performance related to contractors.

CHAPTER 5

SUMMARY, RECOMMENDATION AND CONCLUSION

5.1 Summary of Finding

This research paper was conducted at Asela II WPP for identifying factors influencing the construction projects performance and to see their relative influence and relation with in it. The project client, contractors, and consultants' perspectives on the frequency of occurrence, and impacts of various factors influencing construction project performance, are described in this study. This was achieved by providing the mentioned project participants with a structured questionnaire derived from a literature review. The survey was created using a probability sampling technique, specifically the stratified sampling method, and was distributed randomly. Five independent variables related to project performance and twenty-four documented factors of these variables were utilized. A total of 153 questionnaires were randomly distributed to the respondents of the population: 18 to clients, 12 to consultants, and 123 to contractors. Out of these, 129(84.5%) questionnaires were returned, representing an 84.5% response rate, with 100% from clients, 83% from consultants, and 82% from contractors. The results were analyzed to identify key factors, utilizing the Relative Importance Index (RII) to assess the perceptions of clients, consultants, and contractors regarding construction projects at Asela II WPP.

The study tried to found the perceptions of the project parties such as clients, consultants, and contractors on the relative importance factors that affect construction project performance. The major/main factors that affect construction performance were influenced by project development, resource-related, and contractor-related factors.

The finding shows that the three groups of respondents agreed on; Project team leaders working relationship with others, inadequate unclear and details in drawings design, lack of planning for acquiring and using of project equipment, lack of consultant monitoring during execution phase, unclear project scope definition, large number of subcontractors, lack of user involvement in defining project scope, tasks, and requirements, insufficient supply of materials, project team leaders experience is low, poor response to changes and modifications were ranked the most top ten significant important performance factor by contractors and owners.

In the Asela II WPP project, contractor-related factors and consultant-related factors emerged as the most influential elements impacting project performance, with average Relative Importance

Index (RII) values of 0.763 and 0.760, respectively. Conversely, project client-related factors were identified as the least influential, holding an average RII of 0.582.

5.2 Conclusion

The study primarily analyzes and identifies factors affecting construction project performance in the Asela II WPP, to rank these factors and assess their relationship with project performance based on the study's objectives and findings.

The ANOVA test yielded a maximum p-value of 0.05, which is below the alpha level of 0.05. This indicates that the overall independent variables project resource-related factors, client-related factors, consultant-related factors, contractor-related factors, and development-related factors have a statistically significant relationship with the dependent variable, i.e., construction project performance.

The analysis shows that 89.8% of the variation in construction project performance at Asela II WPP is explained by the linear relationship with all independent variables. Regression results reveal strong positive relationships: project client-related factors ($\beta = 0.575$), project resource-related factors ($\beta = 0.291$), project consultant-related factors ($\beta = 0.171$), and project contractor-related factors ($\beta = 0.122$). Additionally, project development-related factors ($\beta = 0.115$) also show a statistically significant relationship with project performance. It is clear from the results presented above that improvement in project owner related factors, resource related factors, consultant related factors and contractor related factors will definitely have a positive effect on construction project performance. This finding is in line with previous researches and indicates the significant effect of all independent variables on the overall performance of the project, thereby making all alternatives hypotheses valid. On the basis of the responses provided by the clients, consultants and contractors through questionnaires, the following critical factors influencing construction project performance have been identified and evaluated using the Relative Importance Index (RII). The first most critical factor identified is the working relationship of project team leaders. This has achieved the highest score in the RII evaluation process, emphasizing its importance in effective teamwork and communications amongst all parties associated with the project. The clarity and sufficiency of details in design drawings came in second. The significance of having accurate and thorough design documentation was highlighted by the RII for this aspect.

Factors Influencing the Construction Project Performance in EEP Project

Inadequate or unclear information might cause miscommunications, mistakes, and delays, which can negatively affect the construction project's overall performance.

Inadequate planning for the purchase and use of project equipment was the third cause found. This aspect highlights the need of efficient planning and resource management and is also rated with a noteworthy RII. Maintaining project timeframes and guaranteeing operational efficiency depend on adequate planning about equipment availability and usage.

In conclusion, the analysis of the questionnaire responses showed that improving construction project performance depends on the collaboration of project team leaders, the clarity of design drawings, and the planning of equipment utilization. By addressing these issues, building projects can be made more successful overall by enhancing teamwork, lowering mistakes, and optimizing resource management.

With an average Relative Importance Index (RII) of 0.763, contractor-related factors were found to have the greatest impact on project performance in the Asela II WPP construction project. This emphasizes how crucial contractors are to the effective completion of projects. With an average RII of 0.760, consultant-related factors were found to be the second most impactful. Given these insights, it is imperative for project owners, contractors, and team leaders to foster early and continuous involvement throughout the project lifecycle. Establishing smooth working relationships among all stakeholders, particularly emphasizing the experience and technical skills of project staff, can significantly enhance project success.

The study utilized a mixed-method design, combining descriptive and explanatory research approaches to identify factors affecting project performance at Asela II WPP. Through explanatory analysis, a multiple linear regression model was employed to ascertain which factors contribute to construction project improvement. Correlation analysis further supported this examination. The coefficient of determination was found to be 0.898, indicating that 89.8% of the variation in construction project performance at Asela II WPP is explained by the linear relationship with all independent variables. Additionally, the adjusted R-squared value of 0.800 underscores the model's effectiveness in capturing the significance of these relationships.

In conclusion, the findings of this study underscore the importance of contractor and consultant involvement, quality management, and effective stakeholder collaboration in enhancing construction project performance.

5.3 Recommendation

The following suggestions are put forth to improve the procedures of factors influencing construction projects in Asela II WPP and comparable other wind power projects in light of the findings and conclusions.

- The model explains 80.8% of the variance in the dependent variable, according to the R-squared value of 0.808. This means that the independent factors studied in this study account for most of the performance of construction projects. Nevertheless, this study does not account for the remaining 19.2% of performance-influencing factors. This implies that additional factors can have a big influence on project results and call for more research. Future research should investigate these unexplored variables to lessen the impact of performance-affecting factors in order to improve understanding.
- The high standardized coefficient of $\beta = 0.575$ which is project client related factors, suggesting a particularly strong influence on outcomes. This robust statistical evidence highlights the critical nature of these variables, inviting stakeholders to consider their implications in future project planning and execution. By leveraging these insights, decision-makers can enhance strategies, ultimately drive better performance and achieve desired project goals
- It is crucial for project owners, contractors, and team leaders to encourage early and ongoing involvement throughout the project lifecycle. By fostering strong relationships among all stakeholders and emphasizing the experience and technical skills of project staff, the likelihood of project performance can be significantly increased.
- To enhance construction project performance at the Asela II Wind Power Plant, it is recommended to focus on the perceptions of key project parties of clients, consultants, and contractors regarding critical influencing factors. Strengthening and integrating project development, resource-related, and contractor-related variables will significantly improve overall project outcomes. Moreover, project owners should ensure a sufficient supply of construction materials, placing strong emphasis on maintaining high-quality standards

throughout the project. This focus on quality is essential for achieving desired outcomes and minimizing delays.

5.4 Suggestion for Future Research

Future research should seek to investigate other elements that may influence project performance that were not included in this study, as it only examined five performance indicators that are pertinent to wind power projects. Economic conditions, social influences, market competition, international events, funding, and financial resources are examples of potential factors. Researchers can better understand the external determinants of project success and pinpoint opportunities for improvement by taking these variables into account.

Exploring additional performance factors can provide a deeper understanding of their impact on project outcomes. Employing a mixed-methods approach, including qualitative approach such as interviews and focus groups with stakeholders, can uncover contextual influences on project performance. Conducting the study in other wind power projects in Ethiopia and similar contexts elsewhere would allow for a comprehensive comparison of the various factors affecting project outcomes. These approaches can enhance the understanding of project performance and improve project success or outcome in the wind power project sector.

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APPENDIX 1

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

DEPARTMENT OF PROJECT MANAGEMENT

PROGRAM OF PROJECT MANAGEMENT

Questionnaires to project performance in Asela wind power project

Dear respondents;

The purpose of this questionnaire is to collect data for my thesis, which is a requirement for partial fulfillment for the Masters of art in project management, ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE, this questionnaire aims to assess project performance in the Asela Wind Power Project. I want to emphasize that your responses are extremely valuable for the successful completion of this paper. I would greatly appreciate it if you could answer all questions sincerely. Please rest assured that your identity will remain completely anonymous. Your responses will be kept strictly confidential and will only be used for the intended research. Your genuine, honest, and timely responses are vital for the timely accomplishment of this study. Thank you for your participation!

I thank you very much in advance for your cooperation and for sacrificing your Invaluable time.

Note that

- ✓ No need of writing your name
- ✓ Please select (✓) for your appropriate answer in the box

Factors Influencing the Construction Project Performance in EEP Project

APPENDIX 2

Part 1: **Demographic characteristics of respondents**

1. Gender/sex: A. Male ❑ B. Female ❑
2. Age: A. 20-25 ❑ B.26-30 ❑ C. 31-35❑D. Above 36years ❑
3. Education Status: A) Diploma❑B) Degree❑C) Masters and above
4. Your Responsibilities in organization: A) Executive level ❑B) middle management❑C) Non-executive level❑

5. How many years of experience you have on projects?

A) 0 to 5 years❑B) 6 to 10 years❑ C) 11 to 15 years❑ D) 16 to 20 years❑ E) Above20 years

6. What is your position in the plant/which organization do you represent?

A) Client B) Contractor C) Consultant

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

Yours Sincerely,

Yordanos Gizachew ketsela

Mobil phone: +251963695500, Email: yordanosgizachew1993@gmail.com

_____

Signature of the Investigator Date _____

Factors Influencing the Construction Project Performance in EEP Project

Part 2: Indicate your level of Significant to each of the following performance factors of projects at Asela wind power project.

5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1= Strongly Disagree

No	**Project construction performance at Asela WPP (D.V)**	Scale					remark
1	Project performance factors	1	2	3	4	5	
2	The project you are engaged in will be completed on time	1	2	3	4	5	
3	The project you are engaged in will be completed within budget	1	2	3	4	5	
4	The project you are engaged in will be completed with specified quality	1	2	3	4	5	

Factors Influencing the Construction Project Performance in EEP Project

Part 3: Indicate your level of Significant to each of the following selected factors which influence of project construction in Asela WPP and its effects on project performance.

1= Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

No	**(1) Project development related factors**	Scale					Remark
1	Shorter completion period given for the contract	1	2	3	4	5	
2	Project design changes	1	2	3	4	5	
3	Lack of user involvement in defining project scope, tasks, and requirements.	1	2	3	4	5	
4	Unclear project scope definition	1	2	3	4	5	
5	Project activities duration poorly estimated	1	2	3	4	5	
No	**(2) Project resource related factors**	Scale					Remark
1	Improper Quality control of materials	1	2	3	4	5	
2	Insufficient supply of materials	1	2	3	4	5	
3	Poor mechanism uses of material in project	1	2	3	4	5	
4	Lack of project material management system	1	2	3	4	5	
5	Poor planning for acquiring and using of project equipment	1	2	3	4	5	
No	**(3) Project contractor related factors**	Scale					Remark
1	Project team leaders working relationship with others	1	2	3	4	5	
2	Project team leaders experience is low	1	2	3	4	5	
3	Large number of subcontractors	1	2	3	4	5	
4	Lack of monitoring and follow up	1	2	3	4	5	
5	Delay in approving payments of completed works	1	2	3	4	5	
No	**(4) Project client related factors**	Scale					Remark

Factors Influencing the Construction Project Performance in EEP Project

1	Owner orientation toward reducing cost	1	2	3	4	5	
2	Poor owner experience	1	2	3	4	5	
3	Number of disputes between project parties and owner	1	2	3	4	5	
4	Excessive owner interferences	1	2	3	4	5	
5	Using company's historical data in estimating activities duration	1	2	3	4	5	
No	**(5) Project consultant related factors**	Scale					Remark
1	Poor response to changes and modifications	1	2	3	4	5	
2	Lack of consultant monitoring during execution phase	1	2	3	4	5	
3	Unclear and inadequate details in drawings Design	1	2	3	4	5	
4	Insufficient data collection and survey before design	1	2	3	4	5	
5	Poor response to changes and modifications	1	2	3	4	5	