ASSESSING CRITICAL FACTORS AFFECTING THE PERFORMANCE OF ROAD CONSTRUCTION PROJECTS (A CASE OF ROAD PROJECTS IN SIDAMA ROADS AUTHORITY)

M.Sc. THESIS

By

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March, 2025 G.C

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THESIS SUBMITTED TO
HAWASSA UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING,
INSTITUTE OF TECHNOLOGY OF
GRADUATE STUDIES, HAWASSA UNIVERSITY,
HAWASSA, ETHIOPIA

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN CIVIL ENGINEERING (SPECIALIZATION: CONSTRUCTION TECHNOLOGY AND MANAGEMENT)

March, 2025 G.C

HAWASSA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

ADVISORS' APPROVAL SHEET

Approval sheet I

This is to certify that the thesis entitled **"Assessing critical factors affecting performance of road construction projects (A case of road projects in Sidama Roads Authority)"** submitted in partial fulfillment of the requirements for the degree of Master's with specialization in Construction Technology and Management and has been carried out by Erdachew Eyob Id. No GPCoTMR0006/14 under our supervision. Therefore, we recommend that the student has fulfilled the requirements and hence here can submit the thesis to the Department.

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Approval sheet II

As member of the Board of Examiners of the M.Sc. Thesis Open Defense Examination, we certify that we have read and evaluated the thesis entitled **"Assessing critical factors affecting performance of road construction projects (A case of road projects in Sidama Roads Authority)",** prepared by **Erdachew Eyob Sime** Id No: GPD GPCoTMR0006/14 and examined the candidate. We recommended that the thesis be accepted as fulfilling the thesis requirements for the degree of MSc degree in Construction Technology and Management

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Acknowledgment

First and at most, a greatest thanks from the depth of my heart is to my almighty GOD, for his timely revealed Holly hands for guidance, wonderful goodness and mercy upon me and from whom I derive the strength and knowledge to do all that is worthy in my life; I testify that His Grace and power have been of immense assistance and encouragement in all of my endeavors, including this research.

I owe a special appreciation to my adviser, Dr. Ephrem Girma, for his unreserved advice, guidance and valuable suggestions in each and every step of my research work and thesis write up. I am also very much obliged to express my deepest gratitude and appreciation to my co-advisor Mr. Fasil for suggesting, guiding, and editing this document properly.

Additionally, I would like to thank my family who were standing by my side and my wonderful friends and Engineer who had assisted me ideally and morally for the realization of my thesis work.

Author's Declaration

I declare that this thesis is my original work, prepared under the guidance of Ephrem Girma PhD. All sources of materials used for the thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment for the requirement of MSc degree in Construction Technology and Management at Hawassa University and is deposited at the University's Library to be made available to the users under rules of the library. I further confirm that this thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Erdachewu Eyob Sime	_____	_____
Name of Student	Signature	Date

List of Abbreviations

BNQP- Baldrige National Quality Program

BPM- Building Project management

ECI- Early Contractor Involvement

ESI- Early Supplier Involvement

ERA-Ethiopian Roads Authority

FGD- Focus Group Discussion

IT- Information technology

KPS-Key performance indicators

NEPAD- New Partnership for Africa's Development

PMBOK-Project management body of knowledge

PMI-Project Management Institute

RII - Relative Importance Index

RSDPs - Road Sector Development Programs

SRA - Sidama Roads Authority

SPSS-Statistical package for the social sciences

TQM-Total quality management

UK- United Kingdom

UNCTAD- United Nations Commission for Trade and Development

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Abstract

The Construction Industry is one of the very fast-growing industries but it also faces many problems which impinge on the performance of their projects. For this reason, it is necessary to plan these projects properly to guarantee their success. The study was conducted with the objective of identifying critical factors affecting the performance of road construction projects in Sidama Roads Authority, developing a framework to improve the performance of road construction projects in SRA and giving suggestion and recommendation to mend the performance of road construction projects in SRA. The study adopted a descriptive research design. Mixed research approach was also employed in this study. A relevant literature was reviewed and self-administered questionnaire which contain A total of 54 performance factors with seven factor groups categorization. It was designed to collect relevant information from purposively selected 120 respondents of SRA (Bensa Daayye road district). Study population was pre-selected twenty (20) road construction projects which found in six road clusters of Bensa Daayye road districts. Additionally; Data were gathered through Focus discussion group. collected data was coded and entered into statistical packages for Social Scientists SPSS Version (27) and analyzed using descriptive statistics such as percentage, frequency and relative importance index (RII) was used to rank the identified factors. The findings were presented in form of tables while explanation was presented in prose and the findings revealed seventeen most significant factors that significantly affects the performance of road construction projects in selected twenty road construction projects in SRA those factors. Those factors were the main causes for the delay and cost overrun.

Thus, the output of this research will contribute to identify and understand the critical factors affecting the performance of road construction projects in SRA, by providing fully enough information to identify the areas where necessary action needs to be taken and by furtherly providing respective suggestion, recommendation and subjective framework to improve performance of road construction projects. In addition, it is recommended to Moreover, in addition to the studied critical factors, further in-depth investigation is recommended on many unaddressed critical factors.

Key Words: - Road construction projects, Critical factors, RII, Performance

CHAPTER ONE

1. INTRODUCTION

1.1 Background of study

Road constructions are usually major infrastructural projects that take a long period of time to be accomplished and commanding significant investments. Further, according to Khadaroo and Seetanah (2010), they are considered critical due to their direct and indirect role towards economic development. As such, it is quite unfortunate where such investments are not implemented successfully. This problem is even significant in developing countries whose road network is poor. Mohammed (2012) observes that there are a number of factors that inhibit successful implementation of road construction in developing countries.

The question of performance of road construction projects is there by a universal concern that affects a number of parties in a construction project. There are various factors that affect construction projects performance which include: closures, modification of drawings and changes in designs, poor management and guidance, poor relations, and coordination, lack of motivation, control, monitor or decision-making systems, inadequate infrastructure, political problems, cultural problems, and economic conditions (Alias et. al., 2017)

(Helen, 2016) in her study undertaken in Akure revealed that the top ten most important factors influencing the performance of construction projects are: delay in progress payment to Contractors, Client's interference during construction, Client's inability to brief the project objectives and escalation of materials prices. Other factors were Client's experience whether it is sophisticated or specialized; complexity of project; motivating skill of the project team leader; project team leader experience; Contactors commitment to ensure construction work is carry out according to arrangement as well as Client's inability to make project decision. Additionally, (Ludwig R., and Hilario B., 2020) found that lack of a skilled construction manager, poor planning/scheduling, influence on people's land alongside road construction project, poor interaction among construction parties, everyday changes in design, equipment shortage, force majeure, contract reform, delays in accomplishment of progress billing, construction materials limit, payment delay to contractors, and poor labor productivity are ten most frequent causes of delay in Road Construction Projects across 25 Developing Countries. Factors that affect project performance according to Ogwueleka (2010)

relate to inputs to a management systemthat have a direct or indirect impact on the success or lack of it in a project. The road works needed to work in the region are enormously vast, by recognizing the importance of the road transport in supporting social and economic growth and its role as a catalyst to meet poverty reduction targets, the regional state funds high amount of budget for road construction sector in order to fulfill these high amounts of rural road demand of the society. There are number of road construction projects which are suffered with many problems and factors such as not been completed with its planned budget, facing delay and low efficiency. So, the key factors that affects the performance of the road construction work should be identified and the improvement mechanism needed to develop in order to minimize further loose of resources. Thus; the study was included the six districts (06) clusters such as Daraara cluster, Girja cluster, Daayye cluster, Mejo cluster, Daarra cluster and Chirre cluster. Each clusters consists number of road construction and maintenance projects. So, the study aimed on assessing critical factors that affect the performance on affected cluster projects.

1.2 Statement of the problem

Odhiambo and Munturi, (2017) and Nwachukwu et al., (2010), termed a road construction project to be successfully completed if it passed four success test criteria namely, completed on time; completed within budget; completed inaccordance with the original set performance and quality standards; and client's satisfaction. Previous studies show and prove that the failure of any project is mainly related to the problems and failure in performance (Duggan and Elisa, 2019).

In Ethiopia, problems related to project performance has been a subject of concern and many road construction projects were not completed within estimated cost, time, quality and scope. Itis common to see unfinished, terminated, abandoned and delayed projects, costs over the allocated budget and below the required quality. (ERA, 2014) Many occasions and researches show that project performance does not get attention starting from the initial stages of the project construction. Then, it should not proceed along every step through the process of construction. In the majority of the road projects, the overall project performance practices of the federal road projects are poor and projects have observed with many challenges. The road construction sector plays a major role in the growth and development of Ethiopia. The road sector comprises various stakeholders to execute projects successfully. However, the sector is critiqued by its poor performance of delivering projects with poor quality, delay, cost overrun, safety, community dissatisfaction and other performance deviations. These performance problems result a huge

impact on the construction project success and proper functioning of construction organizations. The completion of projects beyond their budgets and scheduled times is one of the biggest problems faced by many infrastructure projects today (Simushi, 2017)

If the key factors of affect that attribute to poor performance of road construction projects continue to be taken very lightly, government will remain to lose a dose of resources on failing or being poorly executed road projects. There are 20 road construction projects which have considerable performance problems in Sidama Roads Authority (Bensa Daayye district) which comprises poor performances such as being not completed within budget line, on planned time frame, having low quality & safety standard, out of scope and dissatisfying the community. These projects constitute a group of human resources, construction equipment and materials. There is reasons or conditions that comprises to the poor performances on those road projects. Numerous researchers have identified the key factors affecting their local highway projects to identify opportunities for improvements. However, the current body of literature lacks that type of information in regards to Sidama Roads Authority. Thus, the aim of this thesis is assessing critical factors affecting the performance of road construction projects (a case of road projects in Sidama Roads Authority).

1.3 Research question

1. What are the critical factors that affect the performance of road construction projects in Sidama Roads Authority?
2. What can be suggested and recommended and how to develop framework to mend the performance of road construction to improve the performance of road construction projects in Sidama Roads Authority?

1.4 Objective of the study

1.4.1. General Objective

Assessing critical factors affecting the performance of road construction projects (a case of road projects in Sidama Roads Authority)

1.4.2. Specific Objective

1. To identify critical factors affecting the performance of road construction projects in Sidama Roads Authority.
2. To give suggestion & recommendation and to develop a framework to improve the performance of road construction projects in Sidama Roads Authority.

1.5. Research Scope and Limitations

The study focuses on assessing critical factors affecting performance of road construction projects. And it is carried out within the Sidama Roads Authority (Bensa Daayye District), in the six road clusters; focusing only on road construction works, excluding road maintenance, bridge, slab culvert construction works. The research was carried out from June 10, 2023 to February, 2025 GC academic year which helped to effectively capture data, analyze and conclude. Identifying the questionnaire items represents another limitation. There are financial shortage challenges throughout the research work.

1.6 Significance of the study

The output of this research will contribute to the understanding of the critical factors affecting the performance of road construction projects in Sidama Roads Authority (Bensa Daayye Road District) by providing full enough information as to identify the areas where necessary action needs to be taken to safeguard the interest of the society and to achieve total quality management standard. Thus, the study tries to give insights to set recommendation for challenges that observed on sample projects taken during the construction process in Sidama Roads Authority. It will also suggest developing of a holistic framework to improve the performance in construction projects. This study can be merged with others done in other areas/regions for comparison of factors affecting performance of road construction projects in order to facilitate worldwide exploration on the strategies to improve performance of road construction projects.

1.7 Organization of the Study

The study was organized into five chapters. The first chapter is introduction part and it consist background, statement of the problem, objective of the study, significance of the study and scope of the study. Chapter two reviews different important literatures related with performance of road construction projects. Chapter Three presents description of the study area and approaches and methods employed for data collection and analysis. The fourth chapter consist discussion and data analysis. The fifth chapter presents conclusion and recommendation.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Introduction

This chapter analyses past literature on factors affecting performances in the road construction sector with particular focus on critical factors affecting performance of road construction projects. Some of the key concepts used in the research are highlighted including some theoretical contributions from literature. A literature review helps in the development of understanding of previous research that has been done relating to the objectives, aims and helps in refinement of the ideas to which the research will be built. The literature review was obtained from secondary sources; relevant magazines and journals, institutional research publications and reports, financial text books, government publications and projects among others.

2.2 Theoretical review

2.2.1 Performance of road construction projects

The performance definitions reviewed in this study articulate the concept in achieving and accomplishing the planned targets. For instance, BNQP (2011) defines performance as "outputs and outcomes from processes, products and services that allow assessment and comparison relative to set goals, standards, past results, and other specifications".

For a long time, performance assessment has remained a problem for the construction industry. Various concepts and measures have been experimented to assess and measure performance of projects. Alarcon (2014) observed that most of these measures inhibit their assessment to preferred standards such as, time, cost or output. Contractors are required to evaluate performance and upgrade strategies to gain competitive advantage. To lift competitiveness, construction firms have to utilize performance evaluation mechanism to ensure sustainable performance.

Rose (2015) observed that performance measurement is the expression of progress. Expansion in business cannot be achieved if its performance is not evaluated, (Baldwin et al., 2011). Performance measurement is described by Neely (2008) as the method of evaluating previous activities to ascertain present performance. Poor performance, is on the other hand shown by substandard quality of work and low production, is widespread in construction projects. Other challenges linked with inadequate performance include; poor work ethics and miscommunication among stakeholders, late completion, cost increase, very high accident occurrences, and inconsiderateness to ecological issues.

Infrastructure can be a path of transformation in addressing some of the majority of regular development challenges of today's world: social stability, swift urbanization, environmental change including natural disasters. World Bank (2011) observes that without an infrastructure that facilitates green and inclusive expansion, countries will not only be in a difficult situation to meet fundamental needs, but will struggle to get competitive.

According to Aiyetan et al. (2008) the three most significant factors that adversely impact construction project delivery time performance include quality of management during construction, quality of management during design, and design coordination. In their study, Ghazala and Vijayendra (2011) study on causes of construction delays in Hong Kong found differences in perceptions as to causes of delays by different groups of participants in building and civil engineering works. In their investigation on the causes of delays in highway construction in Thailand, Miller and Lessard (2005) established that delays can be caused by all parties involved in projects; however, main causes come from inadequacy of sub-contractors, organizations that lack sufficient resources, incomplete and unclear drawings and deficiencies between consultants and contractors.

Seboru (2010), further citing other scholars also states that the time frame for major road projects worldwide to reach construction start stage have been observed to range from 10-30 years. Similarly, a study by United Nations Commission for Trade and Development (UNCTAD), (2011) on African construction industry's turmoils and their implications for New Partnership for Africa's Development (NEPAD) identified costly project delays as a major problem and identifies poor project time, quality and cost performance as a major issue

Al-Kharashi and Skitmore (2011) indicate that the main cause of delay in Saudi Arabia construction sector for public projects is the lack of qualified and experienced personnel. Morrissey (2010) identify ten most important causes of delay in Malaysian construction industry contractor's improper planning, contractor's poor site management, inadequate contractor experience, inadequate client's finance and payments for completed work, problems with subcontractors, shortage in material, labor supply, equipment availability and failure, lack of communication between parties, and mistakes during the construction stage.

The problems affecting Ghanaian contractors and consultants were researched by Ofori (2012) and found that challenges are the same as those noted generally in reports on construction industries in other third

world countries. The challenges identified by Ofori (2012) as particularly influencing the performance of Ghanaian contractors include lack of ability to obtain adequate working capital, insufficient organization, inadequate engineering competence and poor workmanship. Other challenges include an extremely unstable business environment (Dansoh,2005) characterized by high inflationary trends, poor organization practices and weak organization structures (Vulink, 2014).

The industry is multifaceted in its nature because it is executed by large number of parties such as clients, regulators, contractors, stakeholders, and consultants (Dadzie et al, 2012). It is one of the most unbalanced sectors within the wealth of the world. It faces unpredictable demand cycles, project–specific demands, uncertain circumstances, and it combines with several factors.

The road construction in transport sector in Kenya is witnessing a boom in view of the significant economic activity of the economy. The contribution by the road construction in transport sector is primate in cities and towns (Olima, 2011). According to Ahmed et al., (2012), the urban construction project especially in roads is bound to fail due to slow rate in completion.

Wakjira (2011) identified the major factors that causes cost overrun in Ethiopian Federal Road construction projects, material price escalation. Claims due to late removal of obstructions, failure to give possession of site, late issue of drawings, widening of road section at some towns and change in alignment, scope change, changes in quantity (inaccurate quantities), unforeseen ground condition, performance of additional length and additions (variations).

Zerfu (2009) also stated that poor design and technical specifications were among the major factors for the challenges faced by the Ethiopian Roads Authority (ERA) in road projects performance.

Turkey Wakjira (2012), in his study of the risk factors leading to cost overrun in Ethiopia federal road construction projects and its consequences, examined the effects of cost on the delivery of construction projects in the country.

The problem of projects delays and cost overruns can nearly be noticed in every project in Ethiopia road construction indicating that this problem didn't receive enough attention by both researches and responsible authorities. The accomplishment of the first 10 years Road Sector Development Program reveals that the execution of most of the Federal Road projects resulted in cost and time overruns. Mengistu F (2020)

2.2.2 Measurement of Project Performance

Karim and Morosszeyky (2009), stated that performance measurement systems have been one of the primary tools used by the manufacturing sector for business process re-engineering in order to monitor the outcomes and effectiveness of implementation. Brown and Adams (2000), obtained an evaluation framework to measure the efficiency of building project management (BPM) by using conventional economic analysis tools such as time, cost and quality.

Lehtonen (2001), stated that performance measurement systems are imminent in the construction firms. Samson and Lemma (2002), stated that effective and efficient management of contractor' organizational performance requires commitment to effective performance in order to evaluate, control, and improve performance today and in the future. Tangen (2004), remarked the choice of suitable measurement; the level of detail required; the time available for the measurement; the existence of available predetermined data; and the cost data; and the cost of measurement.

2.2.3 Key Performance Indicators

Karim and Marosszeky (2009), defined the purpose of KPL's as to enable a comparison between different projects and enterprises to identify the existence of particular patterns. Dissanayaka and Kumaraswamy (1999), used different representation values to evaluate time and cost performance such as project characteristics, procurement system, project team performance, client representation's 16 characteristics, contractor characteristics, design team characteristics, external condition.

Karim and Marosszeky (2009), stated that the development and use of key performance indicators to measure performance such as cost of pricing the tender as a percentage of contract value, cost of pricing the tender as a percentage of contract value, number of times base tender price changed, time from the first tender to actual award of contract, average delay in payment of base claim, average delay in payment of agreed variations, average time for approval of agreed variations.

Samson and Lema (2002), remarked that characteristics of emerging performance measurement indicators need analysis of both organizations and environment such as nature of work, global competition, quality awards, organizational role, external demands and power of IT. The indicators should be able to identify causes of problems, address all possible performance drivers, and identify potential opportunities for improvement.

2.2.4 Factors Affecting Performance of road construction Projects

Performance of road construction projects could be dependent on many factors. Success of construction projects relies upon on success of performance.

2.2.4.1 Stakeholders' factors and performance of projects

Various stakeholders' factors can significantly affect the performance of road construction projects. It can be contractor, consultant, Owners, External stakeholders which include regulatory bodies, financial institutions, and entities others. Construction contractors play an important role in the construction business as they execute most of the works. A competent construction contractor is one of the indispensable conditions of a proper process and completion of a construction project according to (Xiaohong, 2011). The infrastructure has historically been the domain of government, from buildings roadways to waterways to subways. Safety, training, hiring, and wage bargaining are each enmeshed within the huge public sector expenditures on construction industry services (Gerald, 2015).

The nature of the tasks assigned by the clients to consultants varies but generally consists of: project feasibility engineering investigations, coordination of designs and drawing works (Chitkara, (2005) and Anderson et al., (2009)). Consultants provide specialized expertise and guidance throughout the project lifecycle, including design, oversight, and quality assurance (Zou et al., 2010). effective communication and collaboration between consultants and contractors can enhance project outcomes. Research shows that consultants who actively engage in project management and problem-solving contribute to minimizing risks and improving project delivery (Ling et al., 2009). Political leaders and government officials influence project decisions through policy-making, funding, and public support (Chester, 2015). Strong support from political leaders can facilitate smoother project approvals and access to resources. Conversely, political instability or lack of support can lead to project complications and delays (Khan et al., 2019).

2.2.4.2 Contract Management Factors and Performance of projects

Several contract management factors can significantly affect the performance of road construction projects by influencing the key areas like time, cost and quality. Poor contract management can lead to project delay, cost overruns, and reduce quality, while effective contract management can improve project outcomes. Studies indicate that thorough geotechnical investigations and hydrological assessments are vital components of successful road construction (León et al., 2016; Schmitt et al., 2020).

Proper assessment provides a foundation for sound engineering decisions and mitigates risks associated with unforeseen subsurface conditions. quality control another ccontract management factors which is in road construction projects offers numerous benefits, including enhanced safety, cost savings, increased durability, and improved customer satisfaction. (Han et al., 2018) stated that quality control mechanisms are critical in ensuring that the construction meets the pre-established standards outlined in contract specifications. Studies suggest that effective quality management practices, aligned with site instructions, enhance overall project performance (Al-Bahar & Edwards, 1995).

Contract specifications for road construction projects define the requirements for materials, methods, and quality control throughout the project lifecycle, ensuring a standardized and reliable outcome. it can serve as a binding framework defining project expectations (Pinto, 2019). Poorly defined specifications may result in ambiguity and misinterpretations, leading to disputes and delays.

Research shows that well-structured decision-making processes foster a proactive approach to problem-solving, leading to improved project outcomes and stakeholder satisfaction.

Effective decision-making is pivotal in managing project complexities and addressing challenges promptly (Dey & Ogunlana, 2016). Ther is relationship between performance of projects and site meetings. regular site meetings are essential for communication among stakeholders and for addressing issues in real-time (Liu & Walker, 2015).

Challenges arise when there are discrepancies in the estimation of project costs and Bills of Quantities (BoQ) (Morris & Pinto, 2010). Inaccurate estimations can lead to budget overruns and funding shortages, thereby jeopardizing project completion. The scholar (Snyder, 2020) remarked Scope changes, or scope creep, are common in road construction projects and can have a profound impact on performance. Delays in approvals can stall progress, leading to knock-on effects on timelines and budgets. Streamlining these processes is paramount to enhancing operational efficiency. The presence of existing infrastructure such as electricity and water lines can pose significant challenges in road construction (Bello, 2014).

2.2.4.3 Risk Occurrence Factors and Performance of projects

There are various risk occurrence factors that affected the performance of road construction projects, among many risk occurrence factors design errors is the one, it refers to mistakes or omissions in the planning and architectural design stages, which can result in significant project delays and cost overruns. The literature emphasizes that such errors can stem from inadequate analysis, oversight, or

miscommunication among stakeholders (Nassiri & Sharifi, 2011).

The category of risks includes natural disasters such as floods, earthquakes, and unanticipated technological changes. These risks lie outside the control of project managers and can severely impact project timelines and safety (Baker et al., 2007).

The scholar (Teng et al., 2016) finds that projects located in disaster-prone areas often face heightened risks, requiring comprehensive risk assessments and mitigation strategies to ensure safety and sustainability.

(World Bank, 2019) study indicate that geopolitical risks often result in increased project costs, disruptions to work schedules, and can compromise both the safety of personnel and the integrity of the infrastructure itself. Government regulations encompass laws and policies that govern construction practices.

The research (Diallo & Lamborn, 2006), indicates that unrealistic deadlines often compromise project quality and safety while increasing the likelihood of cost overruns and project failure.

Insecurity is another factor it refers to risks related to crime, violence, and other threats in the project area, which can affect the safety of personnel and project assets (Perry et al., 2016). unsecured environments can lead to site closures, increased insurance costs, and project delays, ultimately jeopardizing the success and viability of projects (Morrison, 2017). The factor which has strong relation with performance is Inflation, according to (Hussey, 2011) it refers to the general increase in prices and decline in purchasing power over time, affecting the cost of materials, Labor, and overall project expenses.

Rising costs associated with inflation can lead to budget overruns and resource allocation issues, negatively impacting project timelines and quality (Khaled, 2020). The other factor that can affect the performance is Political instability, according to (Chester, 2015) it includes changes in government, civil unrest, or policy shifts that can disrupt the construction industry and its operations. As it was stated by (Khan et al., 2019) political instability can deter investor confidence and lead to project delays, increased costs, and even project abandonment.

2.2.4.4 Procurement factors and performance of projects

A number of researchers identified the importance of procurement factors (Walker and Vines 2000). defined the scope of procurement as the framework within which construction is brought about, acquired or obtained. Pre-bid meetings are organized discussions prior to the submission of bids where project

specifications, requirements, and clarifications are discussed. Sharing meeting minutes ensures that all potential bidders have equal access to information, fostering competition and transparency (Smith, 2005). Literature suggests that effective communication during pre-bid meetings can reduce misunderstandings and enhance the quality of submitted bids, contributing to improved project outcomes (Aaltonen et al., 2017).

Contract negotiation involves discussions aimed at reaching an agreement on the terms and conditions of service delivery. According to (Harvard Law School, 2010) effective negotiation should balance the interests of both parties while safeguarding project goals. (Cheung et al., 2013) states successful negotiation can lead to favorable contract conditions, thereby reducing risk exposure and enhancing project delivery. Ineffective negotiation may result in ambiguous terms, leading to conflicts and suboptimal performance.

Due diligence is another factor that affect performance of projects. According to (Gaiardelli et al., 2014) it refers to the investigation and verification process involved in selecting contractors and suppliers, assessing their financial stability, capabilities, and reputation in the industry. thorough due diligence can help prevent delays caused by contractor insolvencies or substandard performance. Studies indicate that organizations that invest in due diligence tend to foster better partnerships and achieve higher project success rates (Jin et al., 2017).

Insurance is the other factor that affect performance of projects, it covers various risks associated with the construction process (Herbert et al., 2008).

Maintenance of performance bonds and insurance is crucial for ensuring project completion and protecting against financial losses incurred due to defaults or unforeseen events. Notably, studies indicate that having adequate financial safeguards increases stakeholder confidence in project delivery (Kumar & Jain, 2015).

Administrative reviews is another factor which affect project success, it involves examining procurement processes to ensure compliance with regulations and project requirements. These reviews often assess bidding procedures, decision-making, and contract award processes (Boehm & Papalambros, 2000). Research shows that rigorous review processes lead to improved project accountability and performance (Luu et al., 2020). Under-quoting involves submitting bids that are significantly lower than the estimated project cost to win tenders. While this practice can increase competitiveness, it may compromise project quality (Mio et al., 2017).

While initially appealing, under-quoting can lead to a range of issues such as insufficient funds for project completion, compromised quality, and higher chances of contractor default (Egan, 1998). Consequently, it often results in long-term negative impacts on project performance, including delays and additional costs.

2.2.4.5 project financing factors and performance of projects

Several project financing factors can significantly impact the performance of road construction projects. it can be cash flow management, material price fluctuations, inadequate planning, and delays in payments to contractors, cash flows, availability of funds, timely payment of certificates, inadequate mobilization of resources, lack of equipment, financial discipline of contractors, proper use of advance payment by contractors. Other factors like client involvement, management skills, and the overall complexity of the project also play a crucial role in determining project success.

Cash flow management can be considered as a main determinant of project success in construction.

Inadequate mobilization of resources, including human resources, equipment, and materials, can hinder project progress significantly.

The availability of construction equipment is crucial to project efficiency and effectiveness. De Oliveira et al. (2021) argue that insufficient equipment can create bottlenecks that affect productivity and lead to delays in project timelines. Delay in equipment availability can also result in increased rental costs and ultimately diminish overall project profitability. Investing in the right equipment and ensuring timely availability is essential for optimizing the performance of road construction projects (Oyedepo et al., 2018).

The financial discipline exhibited by contractors is integral to the successful management of projects. Bahadur et al. (2019) assert that contractors who manage their finances prudently are better equipped to navigate challenges and delays. They recommend the implementation of financial monitoring systems to keep contractors accountable and ensure that funds are used appropriately. Poor financial management can lead to cash flow issues, causing delays and increasing project costs, thus negatively impacting performance.

Advance payments can significantly boost a contractor’s cash flow at the project's inception, allowing them to mobilize resources quickly (Browne et al., 2020). However, the effectiveness of these payments is contingent on how responsibly contractors utilize these funds. Ensuring that advance payments are used strictly for project-related expenses is essential for maximizing their beneficial impact on project

performance.

2.2.4.6 project manager and team related factors and performance of projects

Effective communication is fundamental to successful project management, particularly in the construction industry, where collaboration among diverse stakeholders is crucial. Studies have indicated that poor communication can lead to misunderstandings, conflicts, and project delays (Müller & Turner, 2007). In road construction projects, where coordination among contractors, suppliers, and government agencies is vital, communication skills are pivotal for achieving project goals (Jiang et al., 2019).

delegation is a critical managerial skill that can significantly impact team performance in construction projects. As highlighted by Verma et al. (2021), effective delegation allows project managers to distribute tasks according to team members' strengths, fostering a sense of autonomy and responsibility.

Coordination among team members and stakeholders is essential for seamless project execution. According to Gidado (2017), a project manager's ability to coordinate various functions such as scheduling, resource allocation, and task management can determine the overall efficiency of the project.

2.3 Empirical Review

2.3.1 Factors affecting performance of road construction projects

According to joseph M kisavi (2015) the performance of road construction projects in Kiambu County, Kenya was affected by project funding, contractor capacity, project planning and project monitoring and evaluation. Research by Khamis et al. (2021) indicates that adequate funding is essential for maintaining the project schedule and meeting quality standards. Limited financial resources can lead to delays in procurement and hinder the ability to hire skilled labor or obtain necessary materials, ultimately affecting overall project quality. According to (Hossain et al., 2019) timely provision of funds can enhance the performance of road construction projects by allowing contractors to maintain their operational momentum.

According to Pappas and Kofinas (2020), effective cash flow management ensures that resources are available for ongoing project activities and helps prevent cash shortages that can lead to project delays. Construction projects often entail significant upfront costs, and delays in revenue collection can adversely affect project timelines. A study by Forcada et al. (2019) underscores the importance of maintaining a positive cash flow throughout the project lifecycle to mitigate financial risks and uphold project performance.

According to Owusu-Manu et al. (2020), consistent and prompt payment of work certificates

significantly affect contractor cash flows and their ability to mobilize resources effectively. (Baker et al., (2018) argued delays in payments can lead to contractor disputes, project slowdowns, and even work stoppages, thus undermining project performance Therefore, maintaining timely and efficient payment processes is key to improving project delivery outcomes.

According to scholars (Mok et al., 2015) This involves using transparent and objective criteria for bid evaluation, which may include price, technical capability, and past performance. Other scholars (Ling et al., 2009) also stated accurate identification of qualified bidders can enhance project performance by ensuring that capable contractors are engaged, which is essential to delivering projects on time and within budget. misidentification of this can result in delays and costly contract disputes.

Ahsan and Gunawan (2010) studied the schedule and cost issues affecting international development projects. They undertook an empirical analysis of 100 projects sponsored by the Asian Development Bank in a number of Asian countries. Their study identified that most of the projects that were completed late suffered from cost overrun. Project funding was noted as a critical factor that determine whether a project is successful or not. According to Olatunji (2010), projects need to be viewed as strategic activities that are started to generate economic value and competitive advantage. As such even before initiating a road construction project, financiers should ensure that a project is sustainable. This could be achieved through raising funds from a variety of sources such as donations, venture capitalist, public-private partnerships, debt or equity among others.

Road construction projects should only be initiated where a significant portion of the budget and where possible, all the requisite resources are secured.

Hussin and Omran (2011) studied the project completion in Malaysia where they found out that about 70 percent of the projects in the country were not completed owing to challenges in their financing. Delays in project completion could also be attributable to changes in project timelines such as where the inception dates of the road construction project are reviewed after a contract is awarded. This is also likely to occur where the initial project timelines were unrealistic. Once finances for a road construction project are secured, Ngesa (2012) argues that it is important to ensure that the financier follows the agreed disbursement schedule.

The researcher noted that where the financier fails to pay a contractor on time, this will have a negative

impact on the project as the contractor is unable to meet the project cost. Such a contractor will for instance be unable to procure the materials required for construction as and when needed given the resultant cash flow challenges. Olatunji (2010) noted that project finance is one of the challenges in road construction projects that are often beyond the control of the parties in a road construction project though it has a significant impact on the smooth flow of a project's schedule of activities. Where payment for a road construction project is slow, some contractors minimize the number of resources committed or only avail such resources when payment is received. This creates unnecessary disruptions to the project thus causing delays in project completion.

Chepkoech (2012) argued that financing of road construction projects in Kenya is also impacted by political factors. Desai (2013) noted a similar scenario when studying road construction projects in the coast region of Kenya. The researcher observed that at times donors had pulled out of road construction projects due to heated political alignments. This resulted to limitation of resources for road construction projects that led to project delays and abandonment. Thugge, Heller and Kiringai (2012) laments that absorption of development budgets for a number of Government institutions are a critical concern since it results to a situation where funds that ought to have been utilized to improve the economy being diverted. For instance, Wafula (2017) noted that part of the funds that the Government allocates towards road maintenance end up being misappropriated and even where such funds are applied accordingly, delays in disbursements hurts the pace of development.

Road construction projects often take a long period of time before completion (Hamzah, 2012). Thereby, World Bank (2014) observes that progress payments are expected from the financier, in most cases a government institution. Alinaitwe et al. (2019) found that a lack of timely mobilization affects labor deployment and equipment availability, leading to increased overhead costs and project delays. Early and adequate resource mobilization is necessary to promote efficient project execution and prevent interruptions that could compromise project performance (Fahim et al., 2020).

The study by Seninde Stephen (2020) revealed five most significant and influential factors that affected performance of road construction projects in Uganda those are contractors, clients/owners, contractor's ability to mobilize to site, availability of funds, and cash flows, and three least influential factors;

inadequate mobilization of resources, inadequate geotechnical and hydrological studies and lack of equipment.

Hussin and Omran (2011) found out that technical experience of a contractor is a significant determinant of performance of road contracts in the construction industry in respect to adherence to time and cost estimates. The researchers noted that contractors who had past experience in similar engagements rank among the main considerations for bid evaluation for road construction projects. They noted that inexperienced contractors are likely to face challenges when it comes to site management, distribution of labor and technical expertise. This will not only have an impact on the project's time and cost, but also a significant bearing on the quality of the work undertaken. Thwala and Mvubu 33 (2008) actually noted that inexperienced contractors not only delay in completion of construction projects, but also undertake shoddy work.

Hamzah (2012) argues that the ability of a contractor to execute the project will depends on the quality of workforce that is employed. A project team should therefore have the mist of skills that are required from time to time. A number of activities are undertaken in a road construction project and thus the need to engage a variety of professionals. Marando (2012) emphasizes the need to hire skilled personnel who are entrusted with execution of some aspects of the project including continuous developing of their capacity through training

Studies indicate that little attention is given to the performance of the clients in the construction industry and there is a paucity of research that allows one to better understand the key roles of clients (Alinaitwe, 2008). Pheng and Chuan (2006), argue that poor project performance may not necessarily be due to the incompetence of anyone else but the client's actions before, during and after the project. Client's influence is one of the key contributing factors resulting in lack of commitment and contractor's inefficiency in the project (Hemanta et al., 2012). Clients or owners are the individuals or organizations that fund the project and outline the project objectives and requirements (Mao et al., 2010).

Saraf (2013) argues that award of road construction projects is mainly based on the capacity of a contractor as well as the bid price. An evaluation is usually undertaken of the contractors to assess their reputation and track record in completion of projects on time and meeting the specifications set. According to Nyamwaro (2011), a trade-off is often made between experience and price where choice of contractors who provide the lowest bids might not always result to a project being completed on time

and in adherence to budget.

Choice of contractors with poor capacity could lead to delays in project completion as some contractors have gone into bankruptcy during the construction period. Others have simply abandoned the projects either due to delayed payments or resource constraints on their end. Such projects end up experiencing significant delays and cost escalations since fresh contractors are often engaged to complete the work. Seboru (2015) observes that the quality of a construction project requires application of the appropriate equipment and resources most of which are expensive. Contractors endowed with the requisite materials and equipment are likely to implement road construction projects successfully and in conformance with the set quality standards.

2.4 Conclusions to the empirical review and knowledge gaps

The empirical studies that have been reviewed in the preceding section focused on the different factors that affecting road construction performance and findings are still debatable among different researchers. Some variables are Significant in one study also insignificant in another study and have been found to differ within countries as well.as between different countries.

Some of the studies identified the most relevant characteristics in a variety of nations and project types, while others examined the impact of these factors on the success and failure of construction projects and recommended solutions to improve and minimize their impact.

Therefore, to the knowledge of the researcher, although there have been a number of studies on critical factors that affecting road construction performance in Ethiopia in general and in study area particular. Hence, this research was aimed at filling the research gap on factors that affecting road construction performance and contributes to the body of knowledge. And also, from the previous empirical research found that the factors that affecting road construction performance has been found to differ between countries. This means there is no universal findings are highlighted by researchers pertaining to genuine road construction performance determinants among countries.

The case of Ethiopia is a good example for this situation. Therefore, this research is to fill the research gap that were not addressed by any one of the earlier studies, specifically problems associated with the analysis of critical factors that affecting road construction performance in Sidama roads authority and

also this study initiation is needed to fill the literature gap regarding to this issue and contribute to the body of knowledge.

Thus, the aforementioned problems motivated the researcher to carry out the current study and the researcher believes that it is timely to fill the above listed research gaps.

CHAPTER THREE
3.0 RESEARCH METHODOLOGY

3.1. Description of the study area

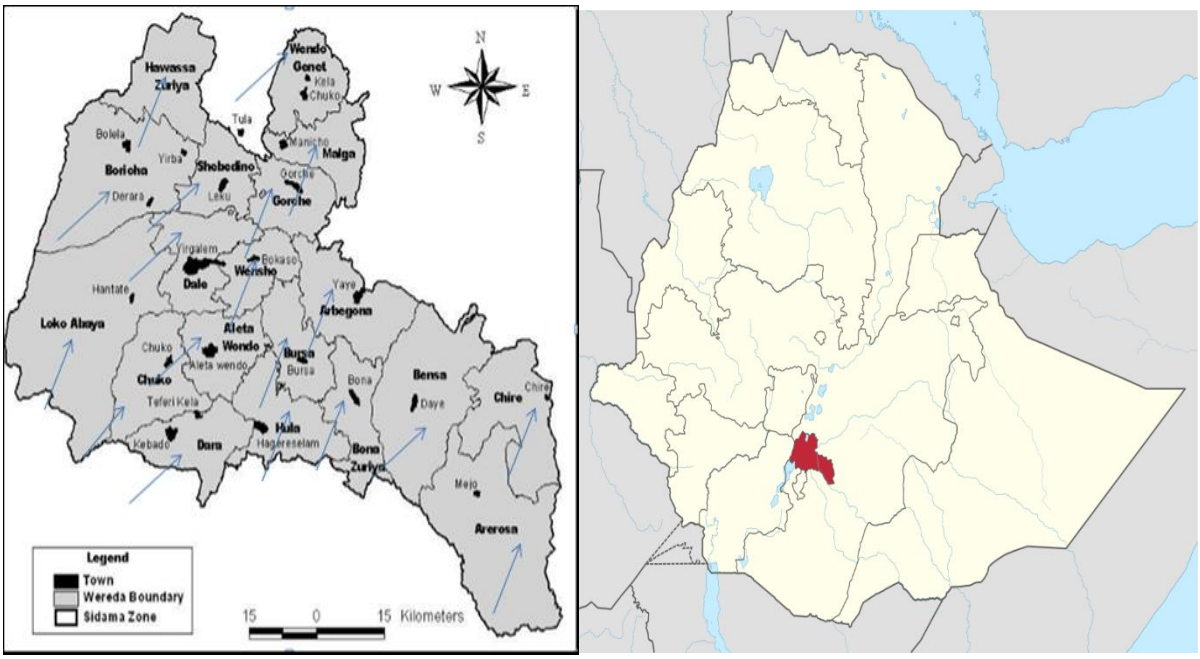
This study was conducted at Sidama Roads Authority which is located in Hawassa City. It administers different road construction project, road maintenance projects, bridge work and other structure works. Sidama Roads Authority administers Bensa Daayye road district that is located in Sidama region in bensa daayye town which is located 133 km away from Hawassa City. It focuses on construction of rural/gravel roads with in the region. the district administers all road construction, road maintenance projects and structure work which is located in all woreda of Sidama region. In 2014 E.C fiscal year there were thirty-eight (38) gravel road construction work projects, 37 gravel road maintenance work projects, 6 bridge work projects within the region. In 2015 E.C fiscal year the district had forty-two (42) active gravel road construction projects and forty-six (46) gravel road maintenance projects. This study was conducted on twenty road construction projects which had considerable performance problems mainly delay and cost and these road projects are located in six different road clusters under the district these are Daraara cluster, Girja cluster, Daayye cluster, Mejo cluster, Daarra cluster and Chirre cluster.

Table 3.1 list of twenty road construction projects.

No	Name of Cluster	Name of projects	Length of project (Km)
1	Daraara cluster	Boroshawala bilaatte road construction projects	20
		Doore-Bilaate megentiya road construction projects	13
		Daraara-Debub kege road construction projects	12
2	Daarra cluster	Qawaado-abera hula road construction projects	35.1
		Harro komolcha-aberra road construction projects	13.5
3	Chirre cluster	Tarattu-Bokkoola road construction projects	11
		Chire-Laalessa-Gubbo road construction projects	32
		Haliila-mello road construction projects	14
		Gubo-lodoma road construction projects	13
		Chire ba'lo-bantarbo road construction projects	17
4	Mejo cluster	Mejo-Gubo Hema road construction projects	22
		Mejo-Odigambo- road construction projects	20.5
		Sabbo-Lodoma road construction projects	9
		Mejo- arawe road construction projects	18
5	Girja cluster	Girja-weele road construction projects	28
		Girja-odiboko road construction projects	19

6	Daayye cluster	Shantawene dalacha burra road construction projects	16
		Huuro xiwirro gonjowe road construction projects	12
		Cabbe budusa osole road construction projects	16
		Maxaraancho echaama road construction projects	10

Source; our compilation survey data, 2024



Source: CSA 2012

Figure 3.1 Map of Sidama Region

3.2. Data source

The researcher used primary sources of data for its successful accomplishment in order to collect appropriate data by employing different tools of data collection that generates both qualitative and quantitative data sets. Because Primary data are fresh data that are gathered for the first time and thus happened to be original in character. For the study primary data were collected from the selected district road construction projects by using a survey questionnaire and field group discussion. Primary data was generated from following data sources. These are household survey as a major data source and complemented by focus discussion group (FDGs).

3.3. Data collection methods and Instruments

Primary data was used in the study. As primary data is first hand, information using questionnaires was distributed to those respondents expected to have key information in relation to the subject of the study.

Data were collected from professionals through the use of questionnaires that were administered to the target sample in (20) twenty road construction projects mostly through drop-and-pick-later method. Primary data was collected through self-administered questionnaires.

Questionnaires were preferred according to Cooper and Schindler (2011), they are effective data collection instruments that allow respondents to give much of their opinions in regard to the research. Concerning measurement scale, a Likert scale was used so that the respondent could select a numerical score ranging from 1 to 5 for each statement to indicate the degree of agreement or otherwise. In terms of data collection type and source, the researcher employed survey research technique using structured; enumerators administered questionnaire to obtain first hand data from target population.

Focus group discussion (FGD): In addition to the questionnaire, focus group discussion conducted on ten specific projects from total of twenty projects i.e. Tarattu-Bokkoola road construction projects, Chire-Laalessa-Gubbo road construction projects, Haliila-mello road construction projects, Gubo-lodoma road construction projects, Chire ba'lo-bantarbo road construction projects ,Mejo-Gubo Hema road construction projects, Mejo-Odigambo- road construction projects, Sabbo-Lodoma road construction projects, Mejo- arawe road construction projects, Girja-weele road construction projects, and Girja-odiboko road construction projects.

3.4 Study population

Barbie (2010) defined study population as the aggregation of elements from which a sample(s) is actually selected. The total number of gravel road projects which were planned to be completed within two budget years was 80. among 80 only 60 roads were completed in its planned time but the rest 20 road projects were totally not completed within the budget year which shows over delay and need extra budget. Because of this those 20 road projects were taken purposively for the study. thus, these 20 road construction projects were taken as study population. And 120 respondents were selected purposively by considering two main factors of respondents which is their education level and their corresponding experience. Thus, the study population considered was those 20 road construction projects and 120 key respondents were taken.

3.5. Sample size and Sampling Techniques

3.5.1 Sample Size

The sample is a finite part of a statistical population whose properties are studied to gain information

about the whole population. A good sample size should be adequate and representative of the underlying population. Due to pre identified and predestined number of projects which were selected for the study and it were discussed in part of statement of problem thus the sample size of study population was (20) twenty road construction projects. Non probability sampling techniques were considered to select the sample of respondents, which was 120 that were purposively selected.

3.5.2 Sampling methods (Technique)

In this study use of purposive sampling was relevant due to the small size of targeted respondent which can be easily addressed and the need to select the most productive or knowledgeable respondents (personnel) within the sampled road construction projects. Purposive sampling technique was used for the respondents based on the number of key personnel who has participated directly in those (20) twenty projects. All of those targeted respondets are fully responsible for each and every activity of the project works and they have awareness about the detail of all projects status including the length(Km) of road, its location, topography, current status of construction work (whether it is on earth work, or road bed was being prepared, material was being spreading and so on) of the projects. Top level respondents, head office officilals, and District Level Management had their own schedule to visit each projects status and to investigate about the projects work progress and discuss about the reports of the work and to resolve any problems which encountered on the progress of the work on th eprojects site. While the rest of the respondents were directly involved on the execution of site construction works. by their level of position at the end of the each week the respondents will prepare the reports about the progress of the project construction works and at the end of each month the weekly reports would be merged together for further report and other payments by collaborate work of Construction Foreman, Site Engineers Project, Managers and District Office Engineer. Thus, the respondents was considered and selected based on two main factors that aimed to get effective and efficient information or responses i.e. the education level of the respondents with their respective work experiences.

Table 3.2 lists of selected respondents and sample

No	Respondents	Sample	Selection criteria
1	Head Office Official	8	Purposive sampling
2	Top Level Management	5	Purposive sampling
3	Head Office Engineer	13	Purposive sampling
4	District Level Management	5	Purposive sampling
5	District Office Engineer	12	Purposive sampling
6	Project Managers	25	Purposive sampling
7	Site Engineers	20	Purposive sampling
8	Construction Foreman	16	Purposive sampling
13	Woreda's Road Desk Official	6	Purposive sampling
14	Woreda's Road desk Engineers	8	Purposive sampling
15	Surveyor	2	Purposive sampling
16	**Total**	**120**	

Source; our compilation survey data, 2024

3.6. Research design

Research design is the general approach selected to include the various components of the research in a comprehensible and logical way, thus making certain that the research problem is excellently addressed (Cooper & Schindler, 2012). In order to answer the research questions and achieve the stated objectives, the researcher was used descriptive research designs. It helps to analyze the existing situation under consideration. Further, in this study the research used mixed research approach.

3.7. Research Approach

This research used mixed research approach in specific for all objectives this involved use of numerical data to evaluate the criticality and qualitative approach were used for focus discussion group. The mixed methods research approach is an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks (Muleya et al., 2020). The core assumption of this form of inquiry is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach. The basic methodology considered

to achieve the objectives of this research was discussed according to each specific objective here in.

3.7.1 Identifying the critical factors affecting performance of road construction projects

Literature review about the performance of road construction projects was conducted through reading the different journal papers, and other important documents to assess critical factors affecting the performance of road construction projects. In addition, field discussion group was conducted; the factors considered in the questionnaire were summarized and categorized according to other previous studies. The factors affecting performance of road construction projects identified were 54 in number and categorized as seven main factors (Project financing factors, Procurement factors, contract management factors, risk occurrence factors, Project stakeholders' factors, Project manager and team related factors and Organizational factors) and their sub factors were evaluated.

A structured questionnaire survey approach was employed to study the criticality of the various attributes and factors affecting performance. The relative importance index (RII) was used for ranking the various factors. The average of the RII for the various factors was computed and used as a baseline point above which they were considered as the factors that have the most criticality effect on the performance of road construction projects. The criticality of identified factors affecting the performance of road construction projects were categorized as low or high critical, using a Likert scale, where integers ascending or descending between 1 to 5 were used for determine critical factors.

The relative importance index was computed as suggested by (Cheung et al., 2004; iyer and Jha, 2005; Ugwu and Haupt, 2007), by using the following equation.

$RII = \sum = W/A*N$…… (equation 3.1)

Where; W is the weight given to each factor by respondents ranging from 1 to 5

A = the highest weight = 5

N = the total number of respondents

The findings were presented in chapter four sections 4.4.1

3.7.2 Giving suggestion & recommendation and developing a framework to improve the performance of road construction projects in Roads Authority

To accomplish specific objective two, firstly the factors above the RII baseline point having critical influence on the performance of road construction were obtained from the results in specific objective one. Thus, the factors above baseline point which were considered as a significant to be employed to develop the framework and to give general suggestion and recommendation in order to improve performance of road construction projects.

3.8. Method of data Analysis and presentation

Before the actual data analysis, the primary data from the questionnaires was checked to identify missing values and any inconsistencies as well as to check for completeness, accuracy, uniformity and consistency through editing, coding (reduce quantity), classification (homogeneous groups) and tabulation (logical order). This research used descriptive data analysis method to analyze the sample data. The data collected using focus discussion group was analyzed using qualitative analysis techniques and the questionnaire was analyzed quantitatively. Data was entered into SPSS version 27 statistical tool which is developed for analyzing survey data. Self-administered questionnaire comprising of statements and responses ranging from 1 to 5 is formulated and the respondents were administered using the questionnaires.

3.8.1. Strategies of ensuring data

3.8.1.1. Validity test

Validity refers to the extent to which an instrument measures what is supposed to measure, data need not only to be reliable but also true and accurate. If a measurement is valid, it is also reliable (Mugenda and Mugenda, 2003). To ensure content validity, the instrument that will be applied in this study will be reviewed by research supervisors and other research experts to ensure that it will be broad and adequately covered the research area. Additionally, construct validity to ensure that the instrument is suitable for measuring the phenomenon under study will be attained by designing questions that are easily understandable by the respondents and free from ambiguity.

3.8.1.2 Reliability test

According to Morissan (2012), reliability is an indicator of the level of reliability or trust. A measurement is called reliable or has reliability if it consistently provides the same answer. Reliability testing will be carried out using the Cronbach Alpha method, measured based on the

Cronbach Alpha scale from 0 to 1.

Table 3.3 Cronbach Alpha value and its Interpretation

Alpha value	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.7 \leq \alpha \leq 0.9$	Good
$0.6 \leq \alpha \leq 0.7$	Acceptable
$0.5 \leq \alpha \leq 0.6$	Poor

Source; own survey data, 2024

The test using this coefficient must be greater than or equal to 0.6, which the value is considered to be able to reliably test whether the questionnaire will be used (Triton, 2006) Alpha (Cronbach) is a model of internal consistency, based on the average inter-item correlation. Used for multiple Likert questions in questionnaire determine if the scale is reliable. According to this standard from the data analysis, the Cronbach's alpha was presented in tables.

Table 3.4 Reliability test of variable's using Cronbach's Alpha

No	**Factors affecting performance**	**Cronbach's alpha**
1	Procurement factors	0.949
2	Contract management factors	0.932
3	Risk occurrence factors	0.915
4	Project financing factors	0.728
5	Project stakeholders' factors	0.901
6	Project manager & team related factors	0.722
7	Organizational factors	0.752

Source; own survey data, 2024

For all individual factors, Cronbach's alpha is greater than 0.70 which is shown below that signifies greater internal consistency between the items and measures the intended dimensions of the variables.

3.8.1.3 Piloting of the instruments

A preliminary test was done on the data collection instruments and procedure to identify the likely challenges. The researcher took necessary action in time before the actual data collection. Filled questionnaires were tested on ten (10) numbers of respondents to determine their validity, reliability and accuracy in getting the desired results.

3.9. Ethical Considerations

The researcher used major consideration of the study privacy and the confidentiality of the respondent and protects everything that may harm the dignity of the population of data respondents and all the assisting people and deal with the participatory and honestly. In the first meeting with different individuals in the study area's proper introduction was made about the background of the researcher, the essence and objective of the study and their significant contribution. The researcher gave respect for the respondents and use ethical or nondiscriminatory language while conducting discussion and exchanging information among different entities. Appropriate awareness was created for each respondent regarding their rights and confidentiality of the information. The researcher also announced the respondent withdrawal right from the activities. Then the investigator was asking their consent and conducts the research accordingly. Generally, every activity was being performed with different individuals was undertaken carefully and seriously. To carry out this study, the researcher used both individual and institutional data thus, the data was kept its confidentiality and the information gathered for these organizations were only be used for an academic purpose.

CHAPTER FOUR

4 PRESENTATIONS, ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter provides as detailed analysis of the findings and interpretation of the results. This concerns data presentation, analysis and interpretation of the results. The purpose of this study was assessing critical factors affecting the performance of road construction projects in SRA; The objective of the study covered aspects, such as main and critical factors that affected performance of road construction projects. In this study, data have been collected and analyzed with descriptive statistics. The results were explained using percentage, tables, and diagram followed by interpretation. The background characteristics of the respondents captured by this study presented at the beginning of this chapter. The rest of the chapter presents the findings of the study as per the research objective and interprets the findings that drawn from the quantitative and qualitative data collected. The data was analyzed using computer-based software SPSS V27 and the results have been presented in tables and figures. The findings are provided in the context of descriptive and as per the study objectives. The suggestion and recommendation are presented as per the objectives and research questions of the study.

4.2 Response Rate

The questionnaires were distributed to 120 respondents and out of these respondents, all of them had returned that accounts 100% response rate and these questionnaires collected through a self-administered survey and they were properly filled and ready for analysis. Here among the respondents 28 were female while 92 were male. The analysis of the response rate was conducted as shown in the table 4.1 as follow.

Table 4.1: Response Rate

Category	Frequency	Percentage
Response	120	100%
Non response	0	0%
Total	120	100%

Source: Own Survey data, 2024

As presented in the table 4.1 the response rate comprised of 120 respondents who were 100% of the total response rate. The non-response comprised of zero respondents and the response rate of 100% of the respondents indicate that the gathered data met generalization standards since according to Cooper

&Scheduler (2003) a response rate above 50% of the total sample size can be generalized to represent the opinions of the entire population. The gathered data was hence enough to explore those major critical factors affecting performance of road construction projects in SRA.

4.3 Demographic Information of Respondents

The findings are presented in the context of Sex, age, Education level, profession and Working Experience and also according to the findings gathered from the respondents on the subject matter.

Table 4.2: General Background Information of Respondents

No	Variables	Items	Frequency	Percent (%)
1	**Gender**	Male	92	76.7
		Female	28	23.3
2	**Age**	20-25	19	15.8
		26-30	45	37.5
		31-35	39	32.5
		Above 36	17	14.2
3	**Education**	Diploma	16	13.3
		Bachelor degree	77	64.2
		Masters level	27	22.5
4	**Profession**	Construction technology & management	30	25
		Civil Engineer	82	68.3
		Surveyor	8	6.7
5	**Position**	Head Office Official	8	6.7
		Top Level Management	5	4.2
		Head Office Engineer	13	10.8
		District Level Management	5	4.2
		District Office Engineer	12	10
		Project Managers	25	20.8
		Site Engineers	20	16.7
		Construction Foreman	13	10.8
		Woreda’s Road Desk Official	7	5.8
		Woreda’s Road desk Engineers	8	6.7
		Surveyor	4	3.3

Source: Own computation from the study’s survey (2024)

Gender Respondent

The findings show that (76.7%) are male whereas (23.3%) are female respondents as Table demonstrates: The results presented in Table 4.2 show that the majority of the respondents are male. This also indicates that there are more male professional employees than females in SRA. On general, there is gender imbalance among professional employees in the organization.

Age of Respondent

The age is commonly identified variable in the research on demographic characteristics. Worker's age has been found to have a negative impact on the performance of road construction projects. This means that younger workers have more positive impact on the performance of the projects than the elders. In this study, respondents were asked to indicate their age in the appropriate space provided. The result shows that the age group between 26 and 30 years were (37.5%) respondents this implies the respondents of this age can be well experienced and updated with new ideas and information concerning execution of road construction works thus this by default helps to get best responses for the questionnaire and FGD questions. This was followed by (32.5%) respondents in the age group of 31 and 35 years, while the age group between 20 and 25 were (15.8%) respondents. The age group above 36 years had (14.2%) respondents. This data implies that most of the employees in Sidaama Roads Authority are in the productive age and can contribute much more for the achievement of organization and positively influence to give relevant responses for research questionnaire.

Educational Level Respondents

Another common demographic variable studied was educational level. The study also set out to establish respondents‟ level of education and found that the majority of the respondents have a bachelor's degree as evidenced by (64.2%), while (22.5%) of the respondents have master's degree and (13.3%) of the respondents have the diploma level. This is an indication that about most of the employees at SRA have the university education level of at least first degree. This implies that majority 64.2% of the respondents are undergraduates who firstly are well educated to answer the questionnaires.

Profession of Respondents

The respondents were asked to indicate their professions in SRA, the majority of the respondents were Civil Engineers that were (68.3%), and followed by Construction Technology & Management (25%) and lastly the Surveyor with (6.7%). This implies that in the Authority Civil Engineer professionals are greater than the other professional. Which enables to get professionally supported responses to the questionnaire which means the right profession for the requests by default.

Year of experience of Respondents

The respondents were also asked to provide information on their work experience in the road construction profession, the findings show that the largest number of respondents had stayed between 6-10 years of services within the road construction profession constitute (41.7%). This is followed by those

respondents with 2-5 years of services who were (39.2%), (12.5%) of the respondents had spent between 11-15 years and (6.7%) respondents had spent more than 15 years in the road construction profession. This finding show that the majority of employees were well experienced. Experience is the greatest knowledge which it leads to perfection through trial and error. That allow them to provide credible and valuable information to answer each the specific objective questions.

Position of Respondents

The respondents were asked to indicate their position in SRA, the majority of the respondents were Project Managers that were (20.8%), and followed by Site Engineers (16.7%), Head Office Engineers (10.8%) Construction Foreman (10.8%), District Office Engineers (10%), Head Office Official (6.7%), Woreda's Road Desk Engineers (6.7%), Woreda's Road Desk Officials (5.8%), District Management (4.2%), Top level management (4.2%), Surveyor (3.3%), and This implies that the project managers are the most dominant position than others in SRA this implies they have deep knowledge and relatively more responsibilities about the whole activities of the project works thus this enabled them to give reliable and best response for the questionnaires and FDG questions.

4.4 Result and discussion

The factors affecting performance of road construction projects were assessed and categorized as seven main factors (procurement factors, contract management factors, risk occurrence factors, project financing factors, Project stakeholders' factors, Project manager & team related factors and organizational factors and their sub factors totaling to 54 in number were identified and analyzed under here.

4.4.1 Identifying the critical sub-factors affecting performance of road construction projects

Here under table 4.3 the critical sub-factors affecting performance road construction projects in SRA were computed by using relative importance index and listed with their respective rank.

Table 4.3: Ranking of the critical sub-factors of all the main factors on the performance of road construction projects in SRA

1.0	**Procurement Factors**	**RII**	**Overall rank**
1.1	Prebid meetings and minutes shared	0.817	24
1.2	Correct identification of the best evaluated bidder	0.892	7
1.3	Contract negotiation	0.832	21
1.4	Carrying out adequate due diligence	0.718	42
1.5	Performance bond and insurances cover maintained	0.647	45
1.6	Administrative Reviews	0.752	36
1.7	Under quoting during bidding process to win tenders	0.835	20
2.0	**Contract management factors**		
2.1	Inadequate estimation/ Bills of Quantities	0.760	35
2.2	Change of scope of Works	0.732	39
2.3	Design drawings/review	0.718	41
2.4	Contractor's ability to mobilize to the site	0.863	14
2.5	Site instructions and Quality control	0.873	12
2.6	Effective approval processes/responses	0.677	44
2.7	Contract specifications	0.858	15
2.8	Site meetings and Management of meetings	0.800	28
2.9	Effective decision making	0.843	18
2.10	Inadequate geotechnical investigations and hydrological studies	0.922	1
2.11	Relocation of existing services (Electricity and water etc.)	0.572	54
3.0	**Risk occurrence factors**		
3.1	Errors in design	0.807	27
3.2	Natural/external risks (Floods/earth quake, technological charges)	0.790	30
3.3	Geopolitical instability (Regional)	0.778	32
3.4	Government regulations and political factors	0.630	46
3.5	Personnel risks (Lack of skills and experience)	0.867	13

3.6	Set dates and deadline risks	0.848	17
3.7	Insecurity	0.587	51
3.8	Inflation	0.877	11
3.9	Political instability	0.603	48
4.0	**Project financing factors**		
4.1	Cash flows	0.905	3
4.2	Availability of funds	0.895	6
4.3	Timely payment of certificates	0.902	4
4.4	Inadequate mobilization of resources	0.880	10
4.5	Lack of equipment	0.827	22
4.6	Financial discipline of Contractors	0.610	26
4.7	Proper use of Advance payment by Contractors	0.853	16
5.0	**Project stakeholders' factors**		
5.1	Contractors	0.898	5
5.2	Consultants	0.822	23
5.3	Clients/Owner	0.772	33
5.4	External stakeholders	0.795	29
5.5	Insurers	0.595	50
5.6	Project Affected Persons (PAPS)	0.840	19
5.7	Political Leaders	0.888	8
5.8	Community beneficiaries	0.598	49
6.0	**F. Project manager and team related factors**		
6.1	Communication skill	0.740	38
6.2	Ability to delegate the Authority	0.758	31
6.3	Ability to coordinate	0.725	40
6.4	Perception of role and responsibility	0.617	47
6.5	Commitment	0.812	25
6.6	Trouble shooting	0.583	52
6.7	Ability to trade off	0.577	53

7.0	**G. Organizational factors**		
7.1	Lack of scientific standards/references	0.765	34
7.2	Lack of design drawings	0.885	9
7.3	Lack of surveyor	0.747	37
7.4	Lack of total quality management	0.910	2
7.5	Lack of use of technology	0.718	43

- **The most and the least critical factors affecting the performance of road construction projects in SRA**

From the analysis of the sub factors of all the main factors affecting performance of road construction projects, the study categorized out ten most critical factors on the performance of road construction projects and the ten least critical factors on the performance of road construction projects in SRA as presented in tables 4.7 and 4.8 respectively.

Table 4.4 Ten most critical factors affecting the performance of road construction projects in SRA.

No	**Most critical factors**	**Category of factors**	**RII**	**Overall Rank**
1	Inadequate geotechnical investigations& hydrological studies	Contract management factors	0.922	1
2	Lack of total quality management	Organization factors	0.910	2
3	Cash flows	Project financing factors	0.905	3
4	Timely payment of certificate	Project financing factors	0.902	4
5	Contractors	Project stakeholders' factors		5
6	Availability of fund	Project financing factors	0.883	6
7	Correct identification of the best evaluated bidder	Procurement Factors	0.882	7
8	Political leaders	Project stakeholders' factors	0.877	8
9	Lack of design drawings	Organization factors	0.873	9
10	Inadequate mobilization of resources	Project stakeholders' factors	0.868	10

Table 4.5 Ten least critical factors affecting the performance of road construction projects in SRA.

No	Least critical factors	Category of factors	RII	Overall Rank
1	Effective approval processes/responses	Contract management factors	0.677	44
2	Performance bond and insurance cover maintained	Procurement Factors	0.647	45
3	Government regulation and political factors	Risk occurrence factors	0.630	46
4	Perception of role and responsibilities	Project manager and team related factors	0.617	47
5	Political instability	Risk occurrence factors	0.603	48
6	Community beneficiaries	Project stakeholders' factors	0.598	49
7	Insurers	Risk occurrence factors	0.595	50
8	Insecurity	Risk occurrence factors	0.587	51
9	Trouble shooting	Project manager and team related factors	0.583	52
10	Ability to trade off	Project manager and team related factors	0.577	53

Source: Own computation from data analysis (2024)

4.4.1.1 Criticality of the sub-factors of each main factors affecting the performance of road construction projects

According to the methodology, the relative importance index (RII), its average and ranking of impact of sub-factors on performance of road construction projects were computed to determine the factors having the most significant impacts on the performance of road construction projects as suggested by Cheung et al., (2004); iyer and Jha, (2005); Ugwu and Haupt, (2007) and the analysis for the various sub-factors is presented in the next section.

1.0) Procurement sub-factors

Table 4.6 Ranking according to criticality of procurement factors affecting the performance of road construction projects in SRA.

1.0	**Procurement Factors**	**RII**	**Rank in group**
1.1	Correct identification of the best evaluated bidder	0.892	1
1.2	Under quoting during bidding process to win tenders	0.835	2
1.3	Contract negotiation	0.832	3
1.4	Prebid meetings and minutes shared	0.817	4
1.5	Administrative Reviews	0.752	5
1.6	Carrying out adequate due diligence	0.718	6
1.7	Performance bond and insurances cover maintained	0.647	7
	Average	**0.785**	

Source: Own computation from data analysis (2024)

Table 4.3 part 1 presents findings which reveal that correct identification of the best evaluated bidder was the most important procurement sub-factor as it was ranked first with RII value of 0.892, followed by under quoting during bidding process to win tenders with RII value of 0.835.

Results of focus discussion group participant showed that it is not productivity and public benefit based there is partially bribed practices. In addition, that they also revealed Pre-project planning through procurement and bidding practices, total quality management practice, proper design, construction, right operation and maintenance are required.

Contract negotiation RII value of 0.832, and pre-bid meetings and minutes shared with RII value of 0.817 are the procurement factors with their RII values above the average RII value of 0.785, whereas administrative reviews of 0.752, carrying out adequate due diligence with RII value of 0.718 and lastly Performance bond and insurances cover maintained had RII value of 0.647 these are the factors below the RII average which has low effect on the performance of road construction projects.

2) Contract management sub-factors

Table 4.7: Ranking according to criticality of contract management factors affecting the performance of road construction projects in SRA.

2.0	**Contract management factors**	**RII**	**Rank in group**

2.1	Inadequate geotechnical investigations and hydrological studies	0.922	1
2.2	Site instructions and Quality control	0.873	2
2.3	Contractor's ability to mobilize to the site	0.863	3
2.4	Contract specifications	0.858	4
2.5	Effective decision making	0.843	5
2.6	Site meetings and Management of meetings	0.800	6
2.7	Inadequate estimation/ Bills of Quantities	0.760	7
2.8	Change of scope of Works	0.732	8
2.9	Design drawings/review	0.718	9
2.10	Effective approval processes/responses	0.677	10
2.11	Relocation of existing services (Electricity & water etc.)	0.572	11
	Average	**0.783**	

Source: Own computation from data analysis (2024)

As the rank of contract management sub-factors presented in Table 4.3 part 2.0 revealed that Inadequate geotechnical investigations and hydrological studies as the most critical factor with the highest RII value of 0.922 It was followed by Site instructions and Quality control with RII value of 0.873, Contractor's ability to Mobilize to site with RII value of 0.863, Contract specifications with RII value of 0.858, effective decision making with RII value of 0.843, and Site meetings and Management of meetings with RII value of 0.800 were the factors above the average RII value of 0.783, and the rest Inadequate estimation/ BOQ with RII value of 0.760, Change of scope of Works with RII value of 0.732, Design drawings/review with RII value of 0.718, Effective approval processes/responses with RII value of 0.677 RII.

Another FGD participants from the projects stated that there is no enough geotechnical investigations and hydrological studies before commencement of road construction projects and also during selection of quarry site. And also, there is no use of enough road design standard and is not being executed according to design drawings in the organization because, there is lack of defined proper plan and …

Similar findings were made by Fapohunda and Stephenson (2010), who noted that experienced contractors are able to foresee possible challenges that might be encountered in a project and thereby

undertake necessary plans to proactively deal with such.

3.0) Risk occurrence sub-factors

Table 4.8 Ranking according to criticality of risk occurrence factors affecting the performance of road construction projects in SRA.

3.0	**Risk occurrence factors**	**RII**	**Rank in group**
3.1	Inflation	0.877	1
3.2	Personnel risks (Lack of skills and experience)	0.867	2
3.3	Set dates and deadline risks	0.848	3
3.4	Errors in design	0.807	4
3.5	Natural/external risks (Floods/earth quake, technological charges)	0.790	5
3.6	Geopolitical instability (Regional)	0.778	6
3.7	Government regulations and political factors	0.630	7
3.8	Political instability	0.603	8
3.9	Insecurity	0.587	9
	Average	**0.754**	

Source: Own computation from data analysis (2024)

As the rank of risk occurrence sub-factors presented in Table 4.3 part 3.0 the revealed Inflation as the most critical with the highest RII value of 0.877, It was followed by Personnel risks (Lack of skills and experience) with RII value of 0.867, Set dates and deadline risks with RII value of 0.848, Errors in design 0.807, Natural risks with RII value of 0.790 and Geopolitical instability (Regional) factors with RII value of 0.778 as the risk occurrence factors having influence on the performance of road construction projects since they are above the average RII value of 0.754. Government regulations and political factors with RII value of 0.630, Political instability with RII value of 0.603, and then lastly Insecurity with RII value of 0.587 do not have significant influence on the performance of road construction projects since they are below the average as presented in Table 4.3, part 3.0.

4.0) Project financing sub-factors

Table 4.9: Ranking according to criticality of Project financing factors affecting the performance of road construction projects in SRA.

4.0	**Project financing factors**	**RII**	**Rank in group**
4.1	Cash flows	0.905	1
4.2	Timely payment of certificates	0.902	2
4.3	Availability of funds	0.895	3
4.4	Inadequate mobilization of resources	0.880	4
4.5	Proper use of Advance payment by Contractors	0.853	5
4.6	Lack of equipment	0.827	6
4.7	Financial discipline of Contractors	0.610	7
	Average	**0.839**	

Source: Own computation from data analysis (2024)

The analysis of the project financing sub-factors revealed Cash flows was the most influential project financing subfactor since it was ranked first and had the highest RII value of 0.905, followed by timely payment of certificates with RII value of 0.902, Availability of funds with RII value of 0.895, and Inadequate mobilization of resources with RII value of 0.880, are the most influential and significant project financing sub-factors since their RII values were above the average RII of 0.839. Proper use of Advance payment by Contractors with RII value of 0.853, Lack of equipment had RII value of 0.827.

The findings agreed with Maisori M (2018) who stated that the cash flow challenges at mobilization and implementation phase have direct impact on project performance. Material management is one of the most important factors in construction industry. Productivity can be affected if required materials, tools, or construction equipment for the specific are not available at the correct location and time. and financial discipline of Contractors with RII value of 0.610 were less influential and insignificant since their RII values were below the mean RII as presented in Table 4.3 part 4.0.

This is in line with the findings by Wambugu (2013), who studied the factors that affect completion of rural electrification projects in Kenya. He noted that poor planning and financial discipline had an adverse effect on the timely closure of the rural electrification projects in Kenya as well as the quality of the projects so undertaken. The researcher found out that with proper planning, a contractor gains

a thorough understanding of the project since the scope is clarified.

5.0) Project stakeholders' sub-factors

Table 4.10: Ranking according to criticality of Project stakeholders' factors affecting the performance of road construction projects in SRA.

5.0	**Project stakeholders' factors**	**RII**	**Rank in group**
5.1	Contractors	0.898	1
5.2	Political Leaders	0.888	2
5.3	Project Affected Persons (PAPS)	0.840	3
5.4	Consultants	0.822	4
5.5	External stakeholders	0.795	5
5.6	Clients/Owner	0.772	6
5.7	Community beneficiaries	0.598	7
5.8	Insurers	0.595	8
	Average	**0.776**	

Source: Own computation from data analysis (2024)

Project stakeholder's sub-factors were also analyzed and their RII values and RII average determined. Table 4.3 part 5.0, presents the ranking of the project stakeholders' sub-factors that affect the performance of road construction projects in SRA. The results, therefore, revealed that majority of the respondents agreed to Contractors as most influential stakeholders' sub-factor since it was ranked first and had the highest RII value of 0.898, which is in line with Dissanayaka and Kumaraswamy (2009) who asserted that contractors characteristics and position in a project as an initiative to evaluate and improve the time and cost performance of road construction projects. Followed by Political leaders with RII value of 0.888, Project Affected Persons (PAPS) with RII value of 0.840, Consultants with RII value of 0.822

This result is also similar with discussion of Isaack (2021) states that pressure from any political party demonstrates a socio-political scenario which plays a significant role in determining the prospects of highway construction projects, as in an attempt to please voters or satisfy the needs of their electorate, protests are staged on construction sites, affecting the execution of projects and External stakeholders with RII value of 0.795, these all influence the performance of road construction projects significantly since their RII values are above the average RII value of 0.776

computed. Whereas the Clients/Owner with RII value of 0.772, Community beneficiaries with RII value of 0.598 and Insurers with RII value of 0.595 do not have significant influence on the performance of road construction projects since their RII values are less than the average RII value. Similarly, studies also reported that assessing the influence of stakeholders' involvement on the performance of road construction projects in Kiambu County, it will be noted that the study did not find any significant influence of stakeholders' involvement on the performance of road construction projects in the county, this however contrasted findings Maina (2013).

6.0) Project manager and team related factors

Table 4.11: Ranking according to criticality of Project manager and team related factors affecting the performance of road construction projects in SRA

6.0	**Project manager and team related factors**	**RII**	**Rank in group**
6.1	Commitment	0.812	1
6.2	Ability to delegate the Authority	0.758	2
6.3	Communication skill	0.740	3
6.4	Ability to coordinate	0.725	4
6.5	Perception of role and responsibility	0.617	5
6.6	Trouble shooting	0.583	6
6.7	Ability to trade off	0.577	7
	Average	**0.687**	

Source: Own computation from data analysis (2024)

Project manager and team related sub-factors were also analyzed and their ranking with RII values and RII average determined. The results, therefore, revealed that majority of the respondents agreed to Commitment as most critical Project manager and team related sub-factor since it was ranked first and had the highest RII value of 0.812.

This was in agreement with a study by Ondieki (2011), the researcher found that it was critical for continuous monitoring and evaluation of road construction projects particularly by the stakeholders. This was found to create project ownership by the host community and at the same time put pressure for accountability upon the contractor. Followed by Ability to delegate the Authority with RII value of 0.758, Communication skill with RII value of 0.740, and Ability to coordinate with RII value of 0.725, are the most influential and significant project manager and team related sub-factors since

their RII values were above the average RII of 0.687. Whereas, Perception of role and responsibility with RII value of 0.617, Troubleshooting with RII value of 0.583, and Ability to trade off with RII value of 0.577 do not have significant influence on the performance of road construction projects since their RII values are less than the average RII value.

7.0) Organizational factors

Table 4.12: Ranking according to criticality of Organizational factors affecting the performance of road construction projects in SRA

7.0	**G. Organizational factors**		
7.1	Lack of scientific standards/references	0.765	34
7.2	Lack of design drawings	0.885	9
7.3	Lack of surveyor	0.747	37
7.4	Lack of total quality management	0.910	2
7.5	Lack of use of technology	0.718	43

Source: Own computation from data analysis (2024)

The analysis of the Organization sub-factors revealed that Lack of total quality management as most critical organizational sub-factor since it was ranked first and have the highest RII value of 0.910, Another study finding Nashwan M, et, al. (2012) shows that total quality management can increase the performance of construction project by reducing the time and cost, and increase the quality of project implementation. Focus discussion group participants from the projects described that there are no quality management standards. Lack of design drawings with RII value of 0.885, are the most influential and significant project financing sub-factors since their RII values were above the average RII of 0.805, whereas Lack of scientific standards/references with RII value of 0.765, Lack of surveyor with RII value of 0.747 and Lack of use of technology RII value of 0.718 were less influential and insignificant since their RII values were below the mean RII as presented in Table 4.4 part 7.0.

The finding also agreed with Stake, (2005) who stated that the use of IT improves better coordination and communication among project teams and participants. It increases the speed of communication and decreases documentation errors.

4.4.2 A framework, suggestion and recommendation to improve the performance of road construction projects in Sidama Roads Authority.

4.4.2.1 A framework to improve the performance of road construction projects in Sidama Roads Authority.

Table 4.13 factors to be included in the framework to improve the performance of road construction projects in Sidama Roads Authority

Procurement Factors	**RII**	**Overall Rank**
Correct identification of the best evaluated bidder	0.892	7
Under quoting during bidding process to win tenders	0.835	20
Contract negotiation	0.832	21
Prebid meetings and minutes shared	0.817	24
Contract management factors		
Inadequate geotechnical investigations and hydrological studies	0.922	1
Site instructions and Quality control	0.873	12
Contractor's ability to mobilize to the site	0.863	14
Contract specifications	0.858	15
Effective decision making	0.843	18
Site meetings and Management of meetings	0.800	28
Risk occurrence factors		
Inflation	0.877	11
Personnel risks (Lack of skills and experience)	0.867	13
Set dates and deadline risks	0.848	17
Errors in design	0.807	27
Natural/external risks (Floods/earth quake, technological charges)	0.790	30
Geopolitical instability (Regional)	0.778	32
Project financing factors		
Cash flows	0.905	3
Timely payment of certificates	0.902	4
Availability of funds	0.895	6

Inadequate mobilization of resources	0.880	10
Proper use of Advance payment by Contractors	0.853	16
Project stakeholders' factors		
Contractors	0.898	5
Political Leaders	0.888	8
Project Affected Persons (PAPS)	0.840	19
Consultants	0.822	23
External stakeholders	0.795	29
Project manager and team related factors		
Commitment	0.812	25
Ability to delegate the Authority	0.758	31
Communication skill	0.740	38
Ability to coordinate	0.725	40
Organizational factors		
Lack of total quality management	0.910	2
Lack of design drawings	0.885	9
RII Baseline point (Average)	**0.844**	

Source: Own computation from data analysis (2024)

The study investigated and revealed the least and most significant factors that mainly affected the performance of road construction projects. It was analysis and computed by calculating relative importance index (RII), its average (Baseline point) and ranking criticality of factors at and beyond the baseline point (Average).

Table 4.13 shows the overall rank of the sub-factors with their respective RII values. The factors RII values are compared with the base point (average) RII values.

The factors which have RII values which is greater than the base point(average) RII values were identified and selected as critical factors that mainly affect the performance of twenty selected road construction projects in SRA; thus, based on that results the following framework were developed to mend the performance problems of those twenty road construction projects of SRA. They were Inadequate geotechnical investigations and hydrological studies with RII of 0.922, Lack of total quality management with RII of 0.910, Cash flows with RII of 0.905, Timely payment of certificates with RII of 0.902, Contractors with RII 0.898 Availability of funds with RII of 0.895, Correct identification of the best evaluated bidder with RII of 0.892, Political Leaders with RII of 0.888, Lack of design drawings

with RII of 0.885, Inadequate mobilization of resources with RII of 0.880, Inflation with RII of 0.877, Site instructions and Quality control with RII of 0.873, Personnel risks (Lack of skills and experience) with RII of 0.867**,** Contractor's ability to mobilize to the site with RII of 0.863 and Contract specifications with RII value of 0.858. As described in the above in section 4.4.2 the framework was developed from the result of the table 4.13. thus, based on that result the following framework was developed and presented.

Figure 4.1 presents a frame work of factors to improve the performance of road construction projects in Sidama Roads Authority.

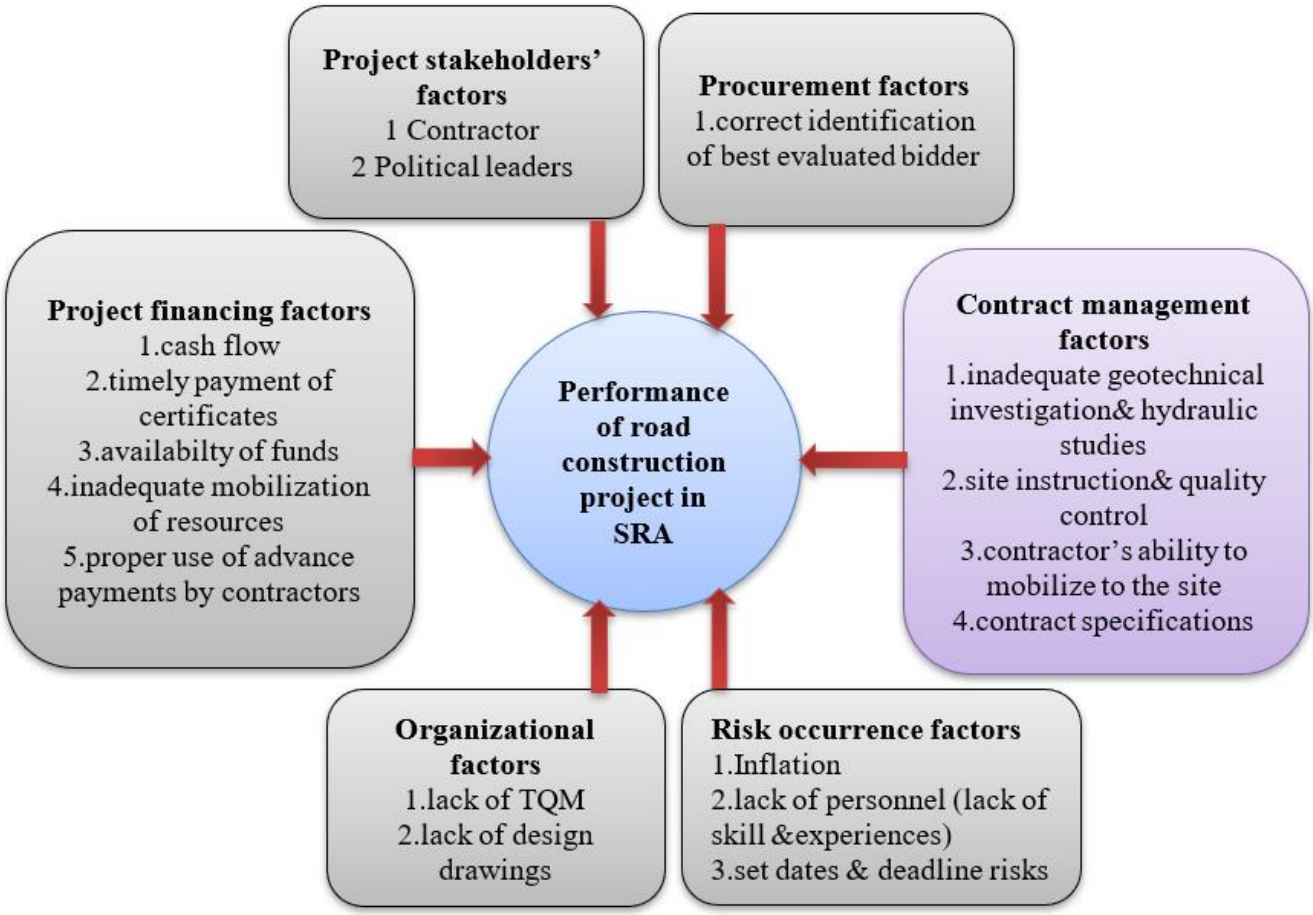


Figure 4.1: Flow chart of the framework to improve the performance of road construction projects

4.4.2.2 A Suggestion and Recommendation to mend the performance of road construction projects in Sidama Roads Authority.

Based on above analysis Table 4.13 results the following suggestion and recommendation formulated and forwarded in order to mend performance of road construction projects.

- Before commencement of any projects, availability of enough amount of fund should be ensured in order to fully achieve or execute the pre-planned project works and also cash flow for each and every project should be planned and executed according to the plan this should be done without using one's project cash to the other projects. Timely payment of certificate should be done for directly and indirectly involved road construction work partners such as for rental machineries owners (who executes the road construction work), vehicles, workers, suppliers and stakeholders. The resources such as gravel road surface paving materials/aggregates, vehicles, and machineries should be mobilized to the project's construction site adequately in order to prevent delay and extra costs. there should be regular communication between the stakeholders and there should be consideration of offering financial incentives for early or on-time payments to contractors. This can encourage stakeholders to prioritize timely payments. from the early beginning of construction work follow-up mechanism should be arranged to control the progress of estimated work with respect to its contractual payment. This will further help to control and handle negative impact of project financing factors on the performance of road construction projects.
- There should be implementation of a robust cash flow monitoring system to keep track of actual versus projected cash flow. This allows for early identification of cash shortfalls or surpluses. And there should be flexible financing options, including lines of credit or short-term loans, to bridge any temporary cash flow gaps. This can ensure that the project has sufficient liquidity at all times.

  Diversified funding sources should be searched such as public funding, private investments, from road fund, grants, or loans, to ensure ample financial backing for the project. After that obtaining early commitment from stakeholders and financial institutions for necessary funding. Letters of intent or funding agreements can provide assurance of funds availability.
- Resource mobilization plan that outlines the required equipment, materials, and personnel needed at different stages of the project should be developed. This plan should have timelines and contingency options. Clear contractual guidelines should be developed to guarantee the proper

use of advance payments by contractors by providing specific guidelines in the contract on how advance payments can be utilized. Requesting a contractor to submit regular reports detailing how advance payments are being utilized for monitoring and reporting. This promotes accountability and ensures that funds are being allocated correctly. Milestone-Based Release of Funds should be applied by structuring advance payments in a way that releases further funds based on the achievement of specific project milestones. This ensures that funds are tied to performance metrics.

- Organizational factors such as lack of total quality management and lack of design drawings. not only some road construction projects but also all road construction projects should have design drawings and the work should be implemented according to design drawings by this means total quality management can be achieved. Total quality management factors such as deficit leadership of managers, lack of quality-oriented culture, poor communication and coordination, inadequate resources, lack of top management support, lack of training and education for the employees, lack of plan for the projects, lack of skill, lack of commitment, inadequate use of empowerment and team work and other factors should be solved in order to enhance performance of road construction projects in SRA.
- Risk occurrence factors such as Inflation; should be avoided and managed by accelerating the projects work schedule, adjusting bids, amending the budget, using alternative construction materials, by implementing lean construction practices, regular review and adjustments, supply chain management etc. set dates and deadline risks can be avoided by applying effective risk management principles by identifying and assessing risks, developing a comprehensive risk management plan, implementing targeted mitigation strategies, continuously monitoring progress. Personnel risks (Lack of skills and experience) should be avoided by providing implement proper training as with any new environment, to be aware of the policies in place and the imminent hazards they'll face, by insuring a competent person is on site, set up a proper perimeter, the worksite should have ample space on all sides for work to be done, by cones and other barricades ensures drivers know when the worksite begins and ends, by increasing work site visibility.
- Procurement factors should be fair, transparent, and free of malpractice, such as corruption, nepotism and favoritism. competitive tendering/bidding process should be adopted so that correct

identification of the best evaluated bidder is done. Procurement administration should be based on productivity and public benefit rather than bribed practices.

- Contract management factors (inadequate geotechnical investigations and hydrological studies, site instructions and quality control, contractor's ability to mobilize to the site, contract specifications). inadequate geotechnical investigations and hydrological studies should be solved by the following mitigation strategy, i.e. comprehensive pre-construction survey (by requiring detailed geotechnical investigations and hydrological studies as a part of the bidding process this should include soil testing, ground water analysis, and potential geological hazards.), standardized protocols, third party review and adaptive project design. there should be awareness among all the stakeholders on the importance and extent of investigations required in order to prevent inadequate geotechnical investigations and hydrological studies, and also data collection for road construction works should collect neatly and consider hydrological data for preparation of action plan and the design.
- Prior to selection of quarry site geotechnical investigation should be done in order to get qualitative and quantitative type of gravel material for road surface paving. there should be progressive and arranged site supervision and follow up by district and main office operation and regulatory administration team in order to address site instructions and quality control problems by visiting the projects by schedules and also investigating work progress reports. contractor's ability to mobilize to the site should be clearly and neatly weighed during bidding process, contract specifications should be implemented for the projects.
- Project stakeholders' factors such as contractors and political leaders. selection criteria of contractors should be managed in the early stage of bidding to select eligible contractor, work progress on construction site should be managed and followed up with respect to contract specifications. performance of contractor should be managed, monitored and followed up. strong positive relationship should be created between the contractor and the client, conflict resolution and effective communication with contractor should be done in order to enhance the performance of road construction projects. political leaders should not intervene during execution of road construction works on some projects by requesting to move construction machineries from one project to another project for political ambition. and also, they should not require projects works to be carried out for media show purposes instead of solving problem of public road demand.

- Engaging all stakeholders throughout the project lifecycle to ensure open communication, address issues as they arise, and foster a collaborative environment. And implement a robust system for tracking progress against contract specification, including regular reporting on key performance indicators, related to geotechnical investigation, quality control, mobilization, and specific adherence.

  In order to build supportive environment that fosters successful outcomes and minimize disruptions proactively engaging contractors through clear communication, training, incentives, and conflict resolution mechanisms, as well as by establishing strong relations with political leaders through transparency, alignment of interest and public engagement

  Owners are recommended to facilitate payment to contractors in order to overcome delay, disputes and claims. Continuous coordination and relationship between project participants are required through project life cycle in order to solve problems and develop project performance. It is recommended to minimize disputes between owner and project parties. There should be integrated TQM principles, focusing on training and engagement, and establishing structured processes for handling design drawings. There should be detailed cash flow projections by creating detailed cash flow forecasts that align with project timelines and milestones by applying effective cash flow management. And historical data and market analysis should be used to anticipate fluctuations in cash flow requirements.
- While site instructions and quality control should be handled through clear communication protocols, by providing quality control plan, training and certification and by use of technology (utilizing digital tools e.g. project management software to track site instruction and quality control issues). contractor's ability to mobilize to the site (pre-qualification of contactors should be conducted, clear mobilization schedules be provided, incentives of early mobilization), contract specification (detailed and clear specification by developing comprehensive contract specification with regular updates and flexibility provisions which includes provision for modifying contract specification if unforeseen conditions arise. And there should be ensuring of contract specifications are detailed, clear, and comprehensive to avoid misunderstandings and conflicts during the construction process. And involving all relevant stakeholders in the review and approval of contract specifications to ensure alignment with project requirements.

CHAPTER FIVE

SUMMARY OF FINDING'S, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter states the summary of the study findings and results. Based on the key findings and results, conclusions are drawn and recommendations are made.

5.2 Summary of findings

The study was intended to assess critical factors affecting the performance of road construction projects (a case of road projects in Sidama Roads Authority). This research has an aim to identify critical factors affecting the performance of road construction projects; to develop a framework to improve the performance of road construction projects and it also aim to give suggestion and recommendation to mend performance of road construction projects and in Sidama Roads Authority.

The questionnaire was distributed to target 120 respondents out of which 120 of them were properly filled and returned questionnaire on the specified time period. Hence, response rate is 100% which implies the majority of the respondents have participated in the process of data collection. The respondents were chosen by purposive sampling.

The results of demographic information of respondents indicated that majority of the respondents were male; the major respondents were in 26 to 35 years of age; majority of the respondents were first-degree holders. In addition, most of the employees were Civil engineers, the majority of the respondent's position was Project Managers and most of the respondents had been worked in the sector for 5 to 10 years. The questionnaire was analyzed by using SPSS version 27 rom analysis. Seventeen (17) most critical factors that affected performance of road construction projects in SRA were identified by using RII values. This was done by listing out and ranked by using Relative importance index.

5.3 Conclusion

The performance of road construction project is affected by many factors, based on survey of questionnaires, Relative Importance Index (RII) and Average Index (AI) method are used to analyze the level of criticality. The study attempts to identify and rank key factors that affect performance of road construction projects in Sidama Roads Authority and it revealed seventeen critical factors that significantly affects the performance of road construction projects. These critical factors which have significant influence on the performance were; inadequate geotechnical investigations and hydrological studies, contractor's ability to mobilize to the site and contract specifications among contract management factors; cash flows, timely payment of certificates, availability of funds, inadequate mobilization of resources, and proper use of advance payment by contractors are among project financing factors; lack of total quality management and lack of design drawings among organizational factors; contractors and political leaders among project stakeholders' factors; inflation, personnel risks (lack of skills and experience), and set dates and deadline risks among risk occurrence factors and correct identification of the best evaluated bidder was among procurement factors.

Those factors play a major role, due to impact and effect of these factors, the road construction projects in SRA were completed late & did not adhere to the set budgets and failed to adhere to be set quality standards.

The findings from this paper increases the awareness of participants about critical factors affecting the performance of road construction projects in this study area. thus, emphasis should be given to them in order to enhance performance i.e. project being completed on time, within budget and to the required quality. the rest of factors had insignificant impact on the performance of road construction work. In general, based on the result of analysis the study provided suggestion ang recommendation to improve the performance road construction projects.

5.4 Area for further research

This study may serve as a base for future studies in road maintenance projects and in structure works. And also, there are numbers of issues that can be explored further. There is adequate opportunity for further research on perceived factors affecting performance of road maintenance projects in SRA. It is recommended that in order to create a better understanding of the critical factors affecting performance of road maintenance projects in SRA more needs to be studied in terms of challenges affecting performance of road maintenance projects in SRA and ways in which these challenges can be overcome.

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Institute of Technology School of Graduate Studies

Faculty of Civil Engineering and Built Environment

Master of Science in Construction Technology and Management

Assessing Factors Affecting the Performance of Road Construction Projects (A Case of Road Projects in Sidama Roads Authority)

Questionnaire

Appendix-I

Dear participant,

My name is Erdachew Eyob and I am student of Master of Science in Construction Technology and Management in Hawassa University Institute of Technology, currently conducting a research study titled ‘‘assessing factors affecting performance of construction projects a case study of road projects in Sidama Roads Authority. The purpose of the study is assessing critical factors affecting the performance of road construction projects (a case of road projects in Sidama Roads Authority) to achieve this objective the study requires the gathering of data about factors affecting the performance of road construction projects in Sidama Roads Authority. You have been identified as a respondent in this research study and this questionnaire is required to be filled with exact relevant facts as much as possible. The data collected will be used for academic purpose only and it will be confidential. Your valuable input will greatly contribute to the overall findings and recommendations of this research. I am grateful in advance for your cooperation in completing the questionnaire. If you have any questions, please contact me with: -

Email: - **erdefruitful@gmail.com** **phone: -** **+251-916-015-957**

Thank you very much for your cooperation!

1. You don’t need to write your name.
2. The student (researcher) has schedule.

3. All information given would be treated with utmost confidentiality.

4. Please fill the blank space with tick inside the box

Part (1): General Information of respondents:

1. Gender Male ( ) Female ( )

2. Which one best describes your age bracket?

20 – 25 years ( ) 26 – 30 years ( ) 31 – 35 years ( ) above 36 years ( )

3. Indicate the level of your education?

Diploma ( ) Bachelor's degree ( ) Masters ( ) PHD ( )…

4. What is your professional background?

Construction technology and management ( )

Civil Engineer ( ) Road construction Engineer ( ) Mechanical Engineer( )

Business Administration ( ) Accountant( ) Surveyor( )

If there is other, please specify….

5. Position in the Sector

Head Office Official ( ) Top Level Management ( )

Head Office Engineer ( ) District Manager ( )

District Office Engineer ( ) Project Manager ( )

Site Engineer ( ) Construction Foreman ( )

Fuel Distributer ( ) Machine Operators ( )

Dump truck Operators ( ) Accountant ( )

Technical Auditor ( ) Woreda's Road Desk Official ( )

Woreda's Road desk Engineer ( ) If other, specify …….

6. How many years you have been experienced in your profession?

<5 years ( ) 6 – 10 years ( ) 11 – 15 years ( ) >16 ( )

Part (2) The Critical factors that affect the performance of road construction projects:

I. Procurement Factors

Clearly state your opinion with regard to the implementation of road construction projects by the Sidama Roads Authority. Do you think that the procurement processes and practices affects the performance of road construction projects?

Yes ( ) NO ( ) Not Sure ( )

Using the scale of 1 to 5, rate the level of criticality of the following procurement factors that have affected the performance of road construction projects in Sidama Roads Authority:

1=Very little critical; 2=little critical; 3=fair critical; 4=great critical; 5=Very greatly critical

A	**(1) Procurement factors (Procurement practices)**	1	2	3	4	5
A1	Pre bid meetings and minutes shared.					
A2	Correct identification of the best evaluated bidder					
A3	Contract negotiation					
A4	Carrying out adequate due diligence					
A5	Maintenance of performance bond/security and insurance cover					
A6	Administrative Reviews					
A7	Under quoting during bidding process to win tenders					

II. Contract Administration/ Management Factors.

Clearly state your opinion with regard to the implementation of road construction projects by the Sidama Roads Authority. Do you think that the Contract Administration/ Management Factors affect the performance of road construction projects?

Yes ( ) NO ( ) Not Sure ( )

Using the scale of 1 to 5, rate the level of criticality of the following contract administration/management factors that have affected the performance of road construction projects in Sidama Roads Authority:

1=Very little critical; 2=little critical; 3=fair critical; 4=great critical; 5=Very greatly critical

B	**(2) Contract Administration/ Management factors**	1	2	3	4	5
B1	Inadequate estimation/ Bills of Quantities					
B2	Change of scope of Works					
B3	Design drawings/review					
B4	Contractor's ability to Mobilize to site					
B5	Site instructions and Quality control					
B6	Effective approval processes/responses					
B7	Contract specifications					
B8	Site meetings and Management of meetings					
B9	Effective decision making					
B10	Inadequate geotechnical investigations and hydrological studies					
B11	Relocation of existing services (Electricity and water etc.)					

III. Risk Occurrence Factors

Clearly state your opinion with regard to the implementation of road construction projects by the Sidama Roads Authority. Do you think that the Contract Administration/ Management Factors affect the performance of road construction projects?

Yes ( ) NO ( ) Not Sure ( )

Using the scale of 1 to 5, Rate the level of criticality of the following risk occurrence factors that have affected the performance of road construction projects in Sidama Roads Authority: 1=Very little critical; 2=little critical; 3=fair critical; 4=great critical; 5=Very greatly critical

C	**(3) Risk occurrence Factors**	1	2	3	4	5
C1	Errors in designs					
C2	Natural /External risks (Floods/earth quake, technological changes)					
C3	Inflation					
C4	Government regulations and political factors					
C5	Personnel risks (Lack of skills and experience)					

C6	Set dates and deadline risks					
C7	Insecurity					
C8	Political instability					
C9	Geopolitical instability (Regional)					

IV. Project Financing Factors

Clearly state your opinion with regard to the implementation of road construction projects by the Sidama Roads Authority. Do you think that the procurement processes and practices affects the performance of road construction projects?

Yes ( ) NO ( ) Not Sure ( )

Using the scale of 1 to 5, rate the level of criticality of the following Project Financing factors that have affected the performance of road construction projects in Sidama Roads Authority:

1=Very little critical; 2=little critical; 3=fair critical; 4=great critical; 5=Very greatly critical

D	**(4) Project Financing factors**	1	2	3	4	5
D1	Cash flows					
D2	Availability of funds					
D3	Timely payment of certificates					
D4	Lack of equipment					
D5	Inadequate mobilization of resources					
D6	Financial discipline of Contractors					
D7	Proper use of Advance payment by Contractors					

V. Project stakeholders' factors

Clearly state your opinion with regard to the implementation of road construction projects by the Sidama Roads Authority. Do you think that the procurement processes and practices affects the performance of road construction projects?

Yes ( ) NO ( ) Not Sure ( )

Using the scale of 1 to 5, Rate the level of criticality of the following Project stakeholder's factors that

have affected the performance of road construction projects in Sidama Roads Authority:
1=Very little critical; 2=little critical; 3=fair critical; 4=great critical; 5=Very greatly critical

E	**(5) Project stakeholders' factors**	1	2	3	4	5
E1	Contractors					
E2	Consultants					
E3	Clients/Owner					
E4	External stakeholders					
E5	Bankers					
E6	Insurers					
E7	Project Affected persons (PAPS)					
E8	Political Leaders					
E9	Community beneficiaries					

VI. Project manager and team related factors

Clearly state your opinion with regard to the implementation of road construction projects by the Sidama Roads Authority. Do you think that the procurement processes and practices affect the performance of road construction projects?

Yes ( ) NO ( ) Not Sure ( )

Using the scale of 1 to 5, Rate the level of criticality of the following Project manager and team related factors that have affected the performance of road construction projects in Sidama Roads Authority: 1=Very little critical; 2=little critical; 3=fair critical; 4=great critical; 5=Very greatly critical

F	**Project manager and team related factors**	1	2	3	4	5
F1	Communication skill					
F2	Ability to delegate the Authority					
F3	Ability to coordinate					
F4	Perception of role and responsibility					

F5	Commitment					
F6	Trouble shooting					
F7	Ability to trade off					

VII. Organizational factors

Clearly state your opinion with regard to the implementation of road construction projects by the Sidama Roads Authority. Do you think that the organizational factors affects the performance of road construction projects?

Yes ( ) NO ( ) Not Sure ( )

Using the scale of 1 to 5, rate the level of criticality of the following organizational factors that have affected the performance of road construction projects in Sidama Roads Authority:

1=Very little critical; 2=little critical; 3=fair critical; 4=great critical; 5=Very greatly critical

G	**Organizational factors**	1	2	3	4	5
G1	Lack of scientific standards/references					
G2	Lack of design drawings					
G3	Lack of surveyor					
G4	Lack of total quality management					
G5	Lack of use of technology					

End of Questionnaire!

Appendix II

FGD Questions prepared for selected professionals

1. As worker and professional are there any calibration systems to check former and current status and capability of machineries in an organized manner? --------

If Yes, How? ----------

If No, Why? ----------

3. Is there any sort of evaluation method and time period to check the total quality management and organizational factors? ----------

If Yes, What are the methods and time period? ----------

If No, Why? ----------

4. What do you think about contract management and procurement practices/system with respect to bidding and other circumistances in your organization? ----------

5. Do you think all of the roads in your organization have design standard and is being executed according to design drawings? ---------- Why? ----------

6. How quarry site is selected and how its quality is managed in your organization? ----------

7. In your opinion what do you suggest to improve performance of road construction projects in your organization? ----------

8. How project financing factors cash flow, funds, and proper use of advance payments by contractors is being handled and managed in your organization? ----------

End of Focus discussion groups

Thank you for your cooperation!