

SCHOOL OF COMMERCE

MASTER'S PROGRAM IN PROJECT MANAGEMENT

EFFECTS OF CONSTRUCTION MATERIAL MANAGEMENT PRACTICES ON THE CONSTRUCTION PROJECT COST: THE CASE OF OROMIA CONSTRUCTION CORPORATION

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Addis Ababa, Ethiopia

Declaration

I, Melaku Getachew declare that this thesis titled “Effects of Construction Material Management Practices on the Cost of Construction Project: The Case of Oromia Construction Corporation” is my own original work and it has not been submitted previously for any degree or examination at any other university. All sources of information used in this study have been properly acknowledged and referenced.

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Certification

This is to certify that the thesis titled “Effects of Construction Material Management Practices on the Cost of Construction Project: The Case of Oromia Construction Corporation” submitted by Melaku Getachew to Addis Ababa University School of Commerce, Department of Project Management, is carried out under my supervision and the thesis meets the required standards. It is suitable for submission for the award of Master of Arts in Project Management (MPM).

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Approval Sheet

We, the undersigned members of the Board of Examiners have examined the thesis submitted by Melaku Getachew and approved this thesis titled “Effects of Construction Material Management Practices on the Cost of Construction Project: The Case of Oromia Construction Corporation”. It is accepted as fulfilling the requirements for the degree of Master of Arts in Project Management (MPM).

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List of Acronyms

BIM - Building Information Modeling

ERP - Enterprise Resource Planning

GDP - Gross Domestic Product

JIT - Just-in-Time

MENA - Middle East and North Africa

MPM - Master of Arts in Project Management

MRP - Material Requirements Planning

OCC - Oromia Construction Corporation

PMI - Project Management Institute

RBV - Resource-Based View

SPSS - Statistical Package for the Social Sciences

TOC - Theory of Constraint

TQM - Total Quality Management

VIF - Variance Inflation Factor

Abstract

This study examined the effects of construction material management practices on project cost at Oromia Construction Corporation (OCC). Four practices were tested: material planning, procurement, waste reduction and logistics. A quantitative approach with descriptive and explanatory design was used. Data were collected from 172 employees using structured questionnaire with 95% response rate and the reliability checks showed strong internal consistency with Cronbach's alpha values greater than 0.7. Descriptive results showed procurement and cost performance in the Agree range, though planning, waste reduction and logistics scored in the Moderate range. Correlation analysis found strong positive relationships between all four practices and cost performance, though waste reduction had the strongest correlation (r=0.705), followed by planning (r=0.699), procurement (r= 0.661) and logistics (r= 0.626). The regression model explained 59% of the variation in project cost (R = 0.770, R^2 = 0.593, adjusted R^2 = 0.583) and the regression coefficients showed that every practice had significant positive effect on cost performance. Material planning had the largest effect (B = 0.341, p = 0.002), followed by waste reduction (B = 0.321, p = 0.004), logistics (B = 0.228, p = 0.020) and procurement (B = 0.153, p = 0.028). The study concluded that material management practices directly shape project cost and recommended that the corporation should strengthen planning before projects start, train workers on waste reduction, improve procurement timing and build better communication for logistics.

Keywords: *Material planning, material procurement, material waste reduction, material logistics, construction project cost, Oromia Construction Corporation*

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

The construction industry is very important for the economy over the world. This is because it helps build things like roads and houses create jobs and ads to the country's economy. For construction projects to be successful they need to be managed especially when it comes to construction materials (Wanjogu, C., Muturi, W., & Ngugi, K. 2015). Construction materials are a part of the total cost of a project usually around 50% to 70% (Cassandro, M., Rossi, F., & Leone, P.,2024).

So managing these materials is crucial for the project to be successful.

When construction materials are managed well it means that the right materials are available when they are needed and they are of quality. This helps the project run smoothly and makes it more likely to be successful (Zegeye, T., & Darsa, F., 2024). Managing construction materials involves planning, buying, storing and handling materials. These activities help companies control how materials are used from the time they are bought to the time they are used (Abdullah, F., Rahman, 2018).

The Project Management Institute says that managing resources and materials well is very important for a project to be successful. It helps reduce waste prevents delays controls costs and makes the project more efficient. Other people, like Wanjogu(2015) have also said that managing materials well helps a project be more efficient and reach its goals. On the hand if materials are not managed well it can cause problems like not having enough materials delays in buying materials having too many materials wasting materials and increasing the cost of the project.

All these problems can make the project less successful (Zegeye, T., & Darsa, F., 2024). Construction companies over the world are starting to use new technologies like Building Information Modeling, Enterprise Resource Planning and Just-in-Time systems. These technologies help with planning, buying and storing materials. They help everyone working on the project communicate with each other. Some studies have shown that these technologies can reduce waste help control costs and make projects more successful.

For example studies by Hosny and Banerjee (2021) have found that these technologies are very helpful for construction companies. Construction materials and construction projects are very important and managing construction materials well is crucial, for the success of construction projects(Hosny, O., El-Dash, K., & Ahmed, S., 2023). Many countries that are still developing have a lot of trouble with managing materials using technology and keeping their supply chains strong (Project Management Institute, 2021). In Africa construction projects are often late. Cost more money than they should because of bad planning poor purchasing systems and wasting materials.

Some research done in Kenya and Nigeria found that managing materials poorly has an impact on how much a project costs how long it takes and the quality of the work(Ayalew, M., & Daba, B.2019).

These findings show that it is really important to make material management better so that projects turn out well. We need to make material management better (Jiang, Y, 2023). Material management is very important for projects. If we do a job with material management then our projects will turn out well. Material management is the key to making sure that our projects are successful (Bekele,2023). We have to do a job with material management if we want our projects to turn out the way we want them to. Material management is really important, for this reason.

. In Ethiopia the construction industry has grown a lot because of people moving to cities a growing population and the government spending money on roads and other infrastructure(Jiang, Y., Bekele, M., & Zhang, L.,2023).

However with all this growth many construction projects are still having trouble getting things done on time. Some studies by Ayalew and Daba and Alemayehu(2021) found that construction projects in Ethiopia have problems with planning what to buy keeping track of inventory storing things and wasting materials. Also not having foreign currency relying on imported materials having trouble transporting things and supply chains being disrupted make it even harder to manage materials and cause projects to be late and cost more money(Zegeye, T., & Darsa, F.2024). Oromia Construction Corporation is a construction company in Ethiopia that works on many important infrastructure projects.

Even though the company wants to do high-quality work it has trouble planning for materials buying them keeping track of inventory storing things and handling materials.

These problems can make it harder for the company to do its job well cost money take longer be less productive and not do as good of work. So this study is looking at how material planning, procurement management, inventory management, storage management and material handling affect how well a project is done.

By looking at how these parts of material management affect project performance the study hopes to give the company some ideas on how to make things better and do a job on its projects, within Oromia Construction Corporation.

1.2. Statement of the Problem

Construction material management is an important part of managing a project because construction materials usually make up 50–70% of the total cost of the project (Reddy & Kumar, 2020). To manage a project well you need to have practices in place for planning, buying and moving materials around as well as keeping track of what you have in stock storing things properly and reducing waste. This is crucial for keeping costs down and finishing the project on time (Love et al., 2020; Wu et al., 2024).

However when construction material management is not done well it can cause a lot of problems including costs going over budget projects taking longer than expected losing productivity and wasting resources. This is an issue in construction projects all around the world (Salihu et al., 2022).

Construction material management is an issue that affects construction projects worldwide including those in Ethiopia (Jiang et al., 2023). In Ethiopia the construction sector has grown a lot because of cities getting more money being invested in infrastructure. Even with all this growth many construction projects in Ethiopia still have problems like costs going over budget taking longer than expected not having enough materials wasting too much and not using resources efficiently(Ayalew & Daba, 2019). The Oromia Construction Corporation, which is one of the construction companies owned by the government in Ethiopia also faces these kinds of challenges. They have problems with buying materials on time keeping track of what they have storing things and moving materials around.

Construction material management is a challenge because it is hard to manage construction materials effectively. This is especially true when you have to deal with things like getting materials from countries not having enough foreign currency problems with transportation and disruptions to the supply chain(Zegeye & Darsa, 2024). Construction material management is an issue for the Oromia Construction Corporation and for construction projects in Ethiopia as a whole.

There is a gap in our knowledge about construction material management. Many studies have looked at how materials managed and how projects are doing but they have not broken down construction material management into smaller parts like planning for materials getting materials, managing logistics controlling inventory and reducing waste. Most studies focus on the picture of project management problems, like delays or how the whole project is doing, instead of looking at how specific things like construction material management affect how much a project costs (Tadesse & Bitew, 2021; Mekonnen & Tarfasa, 2022). We do not know much about which parts of construction material management make a difference in how a project costs at government construction companies in Ethiopia. We also need a way to study construction material management (Wanjogu et al., 2015).

Most studies far have just described what is going on without really testing how construction material management affects project costs (Daba, 2019). Many studies have relied on descriptions or qualitative assessments, which do not show how strong the connection is between construction material management and project costs. We need studies that use numbers to understand how construction material management practices affect project costs at construction companies in Ethiopia (Ayalew & Daba, 2019).

Another problem is that most studies have been done in countries like Kenya and Nigeria or in countries, which are very different from Ethiopia. This means we cannot just apply what we learned from those studies to construction companies in Ethiopia (Wanjogu et al., 2015; Adeyinka et al., 2014). Also not many studies have focused on the Oromia Construction Corporation, which a major player in building infrastructure in Ethiopia.

The construction industry is always changing because of technology changes in how things are bought rising prices, problems with getting supplies and increasing costs of materials. Construction material management is a part of this industry (Wanjogu et al., 2015). Older

studies might not be relevant anymore because they do not take into account changes in the economy and supply chains. So we need studies that show how construction material management practices are affecting project costs now. Construction material management is important for the Oromia Construction Corporation and for construction projects, in Ethiopia. This study wants to fill in the gaps we know about by looking at how material planning, procurement management, logistics management, inventory control and waste reduction practices affect project costs at Oromia Construction Corporation. Material management practices are very important. We need to understand how they affect project costs in Ethiopian construction companies. Material management is key to making sure projects are done on time and on budget. We need to know more, about how different material management practices impact project costs.

1.3. Research Questions

The study aimed to answer the following central questions related to the effect of construction Material management on the cost of the construction project at OCC.

1) What is the effect of construction materials planning on the cost of construction project?
2) How does construction materials procurement affect the cost of the construction project?
3) How does the cost of a construction project is affected by the logistic of construction materials?
4) What is the effect of Material waste reduction on the cost of construction project?

1.4. Objective of the Study

1.4.1. General Objective of the Study

The main objective of this research is to examine the effect of construction material management on the cost of construction project with in the Oromia construction corporation (OCC).

1.4.2. Specific Objectives of the Study

The specific objectives of the research are: -

1. To assess the effect of construction materials planning on the cost of construction project.
2. To determine effect of construction materials procurement on the cost of construction project.
3. To determine the effect of construction materials logistic the cost of construction project.
4. To determine the effect of construction materials waste reduction on the cost of construction project.

1.5. Significance of the Study

The significance of this study is for different stakeholders in the Ethiopian construction sector including the Oromia Construction Corporation (OCC). The study has dealt with current practices, challenges and opportunities related to material planning, procurement, logistics and waste reduction which can help OCC in its effort in material management. Organizations can use the findings of this study to enhance operational efficiency, reduce cost and improve project delivery outcomes. For contractors and suppliers, the research shows best practices in material management that can lead to improved coordination and supply chain effectiveness. In addition, the theoretical understanding of material management in construction addressed in this study will enrich the existing literature with empirical findings from the Ethiopian context.

The research also promotes the adoption of innovative material management strategies including improved forecasting, waste control and logistics planning. Future researches will also use the findings of this study as foundation for future academic research in the areas of cost control and materials management and related topics in developing countries.

1.6. Scope of the Study

The scope of the study covers contextual, geographical, methodological and time-related areas.

Contextually: - the study focusses on analyzing the effect of core material management practices namely material planning, procurement, logistics and waste reduction on the cost efficiency of construction projects. The study looks at problems and chances that are specific to the construction sector in Ethiopia. These include issues like logistics being hard to manage infrastructure not being consistent and not having resources.

Geographically: The research focuses on construction projects by the Oromia Construction Corporation (OCC) in parts of Ethiopia. This includes cities like Addis Ababa and Oromia well as remote areas. The study does this because logistical and infrastructure challenges can be different in these areas. The goal is to understand how managing materials works in regions and how it affects the cost of construction projects. The research covers both centers and rural locations. This helps to see the variation, in material management across regions.

Methodologically:- the study use of quantitative research approach with descriptive and explanatory research design using structured questionnaires to gather data from key OCC personnel including project managers, procurement and property administration team, site engineers and office engineers/ cost estimators. A stratified random sampling was used to make sure broad representation across departments. The collected data was analyzed using SPSS software using descriptive statistics and inferential statistics along with inferential statistics such as correlation analysis and multiple linear regression models to examine the relationships between material management components and construction cost.

1.7. Limitation of the Study

This study looked at how construction material management practices affect the cost of projects at Oromia Construction Corporation. It focused on planning for materials managing how things are bought managing how things are moved around and reducing waste. It did not

look at things that can affect the cost of projects such as how productive the workers are, how equipment is used how projects are paid for and what is happening in the economy. The study only happened at one government construction company so the results may not be true for construction companies. The study was also limited because it did not have a lot of time, money or access to information so it could not. Look at as much data as it wanted to. The study was limited to Oromia Construction Corporation. It only looked at construction material management practices, like material planning, procurement management, logistics management and waste reduction practices at Oromia Construction Corporation.

1.8. Definition of Key Terms

Project: A project is a temporary and unique endeavor undertaken to create a specific product, service, or result in defined objectives, scope, time, cost and quality constraint.

Construction Material Management: Material management is systematic and integrated process that includes the planning, sourcing, procurement, delivery, handling, storage and control of construction materials aiming to make sure that required materials are available at the right time, in the right quantity and quality and at an optimal cost.

Material planning: It is systematic process of identifying the types, quantities and timing of materials needed at each stage of a construction project to ensure an uninterrupted workflow, supports cost efficiency and facilitates timely procurement that aligns with project schedules and resource constraint.

Logistics (Construction Logistics): Construction logistics refers to the planning, coordination and movement of materials, equipment and resources to and in the construction site; effective logistics management minimizes delay, reduces transportation and handling cost and enhances the workflow and efficiency of project activities.

Project Cost: This refers to the total financial resources estimated to be required for the successful completion of a project including both direct cost such as labor, materials and equipment and indirect cost including overhead, permits and contingency allowances. As a key financial metric, it supports budgeting, cost forecasting and the assessment of project feasibility.

Procurement: Procurement is the process of identifying, acquiring and managing the external resources such as materials, services, or works required for effective project execution and it involves supplier selection, contract negotiation, delivery scheduling and quality assurance to make sure that project needs are met efficiently and in accordance with specified standards.

Material Waste Reduction: This refers to strategic approach aimed at minimizing material losses through effective planning, precise estimation, efficient storage practices and adequate personnel training having a goal to enhance cost efficiency and promote sustainability by reducing the occurrence of unused, damaged, or wasted materials.

Cost performance: Cost performance is a measure of how effectively the project expenditures are managed relative to the planned budget. It assesses the alignment between actual and estimated cost, reflecting the project's financial efficiency. Strong cost performance indicates efficient resource use, effective budgeting and sound project management and poor cost performance indicates cost overrun and potential inefficiencies in financial control.

1.9. Organization of the Study

The study is organized in five chapters; the first Chapter is an introductory part of the study presenting the background of the study, statement of the problem, research questions and research objectives, significance of the study, scope of the study, limitation of the study, organization of the study and definition of key terms. Chapter two deals with definition and concept to be reviewed in order to enhance the knowledge about the area followed by Theoretical framework, Empirical Literature review and Conceptual framework. Chapter three discusses the methodology used in this study and chapter four describe and discussed research findings and analysis of data. The fifth chapter summarize the study and makes conclusion based on the findings and proposes the recommendations and areas for also research are also presented.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter presents the results of Literature review focusing on Theoretical Framework, Empirical Literature Review, conceptual framework & research hypothesis. Topics in this chapter include material management concept, Project cost, material management in construction industry and material management practice, theoretical framework; Material management in Construction industry and material management practices and Empirical Literature review of the effect of material management on cost of a construction project and conceptual framework of the of the study.

2.1. Theoretical Review

2.1.1 Systems Theory

Systems Theory was developed by Ludwig von Bertalanffy(2018). It says that organizations are like systems that have many parts that are connected. These parts have to work for the organization to be effective. In the construction business managing project materials is like a system that works with other parts like buying things moving things around keeping track of inventory, money and actually doing the project. If one part of the system is not working well it can affect the project (Ludwig von Bertalanffy (2018)).

The theory says that construction projects need everything to work together smoothly like information, resources and activities to get the desired results. Planning for buying materials and keeping track of what we have in stock and storing things and moving them around are all things. These things affect how the project goes. For example if we do not plan well for buying materials we might not have the things we need which can stop the construction work increase the costs and make the work less productive(Wanjogu et al., 2015).

If we do not manage our stock well we might end up with much stock, which can increase the costs of storing things and waste materials. Material management is very important for a project. Systems Theory is important for this study because it helps us understand how parts of material management like planning for materials and keeping track of inventory and storing

things and moving them around affect the cost of the project(Project Management Institute, 2021).

The Systems Theory says that if all the material management activities, like planning for materials and keeping track of inventory and storing things and moving them around work together it can help us use our resources better reduce waste and make the project better overall(Project Management Institute, 2021). Many construction companies now use systems, like Enterprise Resource Planning and Building Information Modeling to improve communication and coordination, among people working on the project. This helps people working on the project to work together better and make the project go smoothly.

At Oromia Construction Corporation managing materials involves departments like buying things storing things, money and doing the project. Problems like delays in buying things mistakes in inventory and problems with moving things can affect the cost of the project(Cassandro et al., 2024). Systems Theory helps us see how making things better in material planning buying things moving things around and reducing waste can lead to project costs. The theory supports the idea that how well the project does is affected by how the whole material management system works, not just individual parts working on their own. Systems Theory and material management are related and understanding Systems Theory can help us improve material management, at Oromia Construction Corporation.

2.1.2 Resource-Based View (RBV)

The Resource-Based View, which was introduced by Barney in (1991) says that how well a company does depends a lot on how it gets, manages and uses its valuable resources. The Resource-Based View says that companies get an advantage when they have resources that are valuable hard to find and cannot be copied or replaced. In construction projects materials are one of the important resources because they make up a big part of the project costs and affect how the project is done (Hosny et al. (2023).

The Resource-Based View theory says that companies need to develop skills to manage their resources well to do than others. When it comes to managing construction materials these skills include planning, getting the materials keeping track of inventory coordinating logistics

and reducing waste. Using construction materials efficiently can save money increase productivity and make the project more successful as Reddy and Kumar found out in (2020).

The Resource-Based View says that managing materials should not just be something we do it is actually a way for companies, like IBM and Toyota to create value for their customers and for the companies themselves the Resource-Based View is important because it helps companies to create value by managing materials in a way the Resource-Based View is a way of thinking that says managing materials is a key part of what companies do to create value(Hosny et al. 2023)

. For example companies that have a system for getting materials can get them at a good price and have them delivered on time. Similarly companies that manage their inventory well can save money on storage avoid running out of materials and reduce waste as Shah and his team found out in (2023). These skills help companies do better with project costs and compete with others.

Many studies have shown that the Resource-Based View is important in construction management. Banerjee and his team found out in 2021 that using ERP systems helped companies see their resources control costs (Hosny et al. 2023). Hosny and his team also found out in (2023) that using BIM-based material management systems helped companies use their resources better and reduce waste. These findings show that managing material resources well can make a difference in how well a project does.

For Oromia Construction Corporation construction materials are a resource that needs to be managed well to deliver projects at a low cost. Problems like getting materials losing materials and having logistics issues can reduce the value of material resources and affect project costs. Therefore the Resource-Based View provides a foundation for understanding how managing materials well can help with project costs. The theory supports the idea that companies can do better on projects, by developing skills to manage resources better.

2.1.3 Transaction Cost Economics (TCE)

Transaction Cost Economics or TCE was developed by Williamson in (1985). It explains how organizations can save money when buying goods and services by managing their deals.

The theory says that organizations spend money when they buy things like when they find suppliers make deals check if suppliers are doing their job and solve problems as Williamson said in (2015). Good management of these costs really helps organizations do better. When it comes to construction projects managing what you buy is really very important according to Mallawaarachchi and Senaratne in (2015). Construction companies often have to work with suppliers, transport providers and subcontractors to get the materials they need for construction projects. If construction companies do not manage what they buy well it can cost them money because of delays prices changing, arguing with suppliers and suppliers not doing their job. These problems with suppliers often make construction projects cost money and take longer to finish.

The Transaction Cost Economics theory or TCE, for short says that organizations should buy things in a way that saves them money while making sure they get what they need which's what Nwankwo said in (2022) about the Transaction Cost Economics theory.

This can mean working with suppliers for a time being clear about how you buy things and managing contracts better. Good systems for buying things make it less uncertain and help projects cost less. This theory is especially useful in Ethiopias construction industry(Zhang et al. (2023). There buying things is often hard because of not having foreign money problems in the supply chain, transportation issues and the market changing (Zhang et al., 2023).

These things make it cost more to buy things and make it hard to get what you need. In OCC delays in buying things and relying on materials from countries often make extra costs and uncertainties. So TCE is a theory, for looking at how managing what you buy affects how well a project does. The theory supports the idea that saving money on buying things by managing them can make projects more efficient and have better results(Cassandro et al. ,2024). TCE and procurement management are. Tce can help organizations improve their procurement processes. By using TCE organizations can reduce costs. Improve their performance.

2.1.4 Analytical Models

Construction material management is a part of building things. There are some tools that can help us understand and improve how we manage construction materials. These tools are the

Lean Construction through the Last Planner System, the Supply Chain Operations Reference Model and ABC Analysis(Koskela, 2019.). They help us plan and buy materials, control inventory manage logistics and reduce waste, which can help us save money on projects.

The Lean Construction Theory is one of these tools. It was developed by Ballard and Howell. It is all about reducing waste and getting the most value out of the construction process. This means working managing workflows and always looking for ways to improve(Zhang et al. (2023). In construction material management Lean Construction helps us get materials to the site on time reduces inventory, minimizes waste and uses resources efficiently. Some researchers, like Zhang and his team found that using practices can improve project costs by reducing things that do not add value and making operations more efficient. Another team, led by Love found that managing material flow well can reduce construction waste and costs (Salihu et al. 2022). The Last Planner System is important to this study because it focuses on planning materials and reducing waste which're key parts of construction material management at the Oromia Construction Corporation.

The Supply Chain Operations Reference Model is another tool that helps us evaluate and improve how we manage our supply chain. It was developed by the Supply Chain Council(Mahagaonkar & Kelkar, 2017). Has five main steps: plan get materials make things deliver them and return things if needed. This model helps organizations manage buying materials, inventory, logistics and relationships with suppliers. In construction projects good supply chain management means getting materials on time and minimizing costs and problems. Some researchers found that integrated supply chain practices can improve project efficiency and cost control. The SCOR model is relevant to this study because it shows how good procurement and logistics management can improve project costs(, Cassandro et al, 2024).

The ABC Analysis Model is a way to manage inventory by categorizing materials based on their value and importance. Some researchers found that this model helps construction companies use resources efficiently and prioritize inventory management(, Cassandro et al.,2024)). Using this model can reduce inventory costs prevent stock shortages and minimize waste. In the context of the Oromia Construction Corporation ABC Analysis can improve inventory control by making sure critical materials are monitored and managed well. This

model provides a framework for understanding how inventory management practices affect project costs.

These three models. The Lean Construction Model, the SCOR Model and ABC Analysis. Provide a foundation for studying the relationship, between construction material management practices and project costs at the Oromia Construction Corporation. They help us understand how to manage materials reduce waste and save money on projects.

2.2. Concept of Material Management

Construction material management is a method of ensuring the cost-efficiency and timeliness of material supplies necessary to carry out a project involving the activities like material requirement identification, planning, procurement, warehousing and delivery of materials to sites in the required quantities and quality (Zairra & Narimah, 2017). Material management by Salihu *et al*. (2022) refers to the coordination of on-site and off-site operations in order to have continuous flow of materials required in construction; material management is important part of the supply chain including the control and organization of material movement from suppliers to end use. The major goals of material management in construction were discussed by Mahagaonkar & Kelkar (2017) including optimizing cost of procurement. This provides continuous material supply, ensuring quality, building relationships with vendors and effective inventory and storage system.

The process involves actions like estimating quantities, budgeting, planning, scheduling, ordering, receiving, inspection, storing and supplying materials to where they are required. Salihu *et al*. (2022) also indicated that effective material management calls for accurate forecasting, prompt procurement and proper handling to avert delay or losses. According to Love *et al*. (2020), material management aims to reduce waste, improve efficiency, make sure smooth workflow and achieve cost-effectiveness; poor material management can lead to resource shortage, project delay, excessive cost and quality issues. It includes activities such as demand forecasting, material requirement planning,

inventory control, procurement, transportation, handling and disposal of surplus or obsolete materials.

Shah *et al*. (2023) have defined material management as synchronizing all processes that are essential to procure and make materials available at affordable cost at the time and place of requirement. Material management is important where there is large amount of material used at a high cost. Poor material management may also result in delayed delivery of material or risk purchase at elevated prices resulting in delay and cost overrun. Increased number of projects in single locality, the local market could not meet the large demand of building materials, as a result, a contractor can face a deficiency of building material in the market or material price increase that contributes to cost overrun. For giant and highly sophisticated projects where special materials are required, the risk of delay in importation with the construction industry depending on the global market to supply them with such materials (Wu *et al*., 2024).

2.2.1. Project Cost

Project cost refers to the total monetary resources required to complete construction project including both direct cost (labor, materials and equipment) and indirect cost (administration, permits, utilities, contingencies). Cost management is key component of project success and involves budgeting, cost estimation, monitoring and cost control processes and it is a key component of project management referring to the total financial resources required to complete project in the scope, quality and time constraint defined at the outset. Kerzner (2013) defines project cost as the total financial outlay required for a project including direct and indirect cost and focuses the need for effective planning, monitoring and control to keep cost under control. He shows the concept of "project cost control," where tracking and adjusting the project's budget are performed regularly to avoid overrun. According to the Project Management Institute (PMI, 2021), cost management involves four key processes; resource planning, cost estimation, budgeting and cost control. Effective cost management make sure that a project is completed in the allocated budget and meets financial expectation. In the construction, cost overrun is prevalent issue caused by poor planning, mismanagement of materials, design changes

and unexpected risks. Material management plays important role in controlling construction cost as showed by Chan and Kumaraswamy (2002), inefficient material handling, late deliveries, material wastage and overstocking can lead to high increases in project cost. On the other hand, efficient procurement, optimal inventory management and waste minimization can reduce expenses and enhance cost predictability.

According to Love *et al*. (2020), project cost includes both tangible elements, such as equipment, materials and labor and intangible factors including allowances for risks, delay and unforeseen changes. These intangible components have significant influence on total project expenses. The author stated that accurate cost estimation is key for mitigating cost overrun because error in forecasting can lead to cascading financial and operational issues. Shah *et al*. (2023) states that project cost is the result of several interconnected factors such as the precision of project scope, the strength of risk management strategies and external influences like market volatility, inflation and regulatory frameworks.

Chan *et al*. (2022) explain that project cost is determined by the alignment of planned activities. The study shows how global supply chain disruption such as material shortage and shipping delay and macroeconomic factors like inflation and currency fluctuation impact construction project cost. These factors often result in increased procurement expenses, extended timelines and budget overrun. Ben Mahmouda *et al*. (2023) also observed that digital platforms such as ERP and BIM, can enhance the accuracy of project cost estimation. The tools which are especially valuable in volatile markets where cost variation is more likely.

2.2.2. Materials Management in Construction Industry

Material management in construction industry is concerned with planning the movement of materials from where they are acquired to where they are used on-site. This makes them available in the correct quantities and quality at the proper time. According to Sogaxa and Email (2022), it is the process of providing the correct materials, to the correct destination, at the correct time and in the correct amount all aimed at cost

reduction. Wu *et al*. (2024) pointed out that effective materials management regulates materials through these phases efficiently, minimizing delay and wastage of resources.

As observed by Ben Mahmouda *et al*. (2023), material management in construction involves planning, procurement, handling, storage and control of materials to make sure that they are available at the right time, place, quantity and quality. The authors argue that poor material management practices often result in delay, material shortage, excessive waste and financial losses. Likewise, Salihu *et al*. (2022) stated that the lack of an integrated material management system is a major contributor to inefficiencies in construction projects. Studies by Wu *et al*. (2024) showed that ineffective material planning is a common issue in many construction projects. Similarly, Ben *et al*. (2023) showed significant relationship between material procurement practices and project performance, concluding that delay in procurement was one of the leading causes of time and cost overrun in construction projects in developing countries.

Zhang, Lu, & Wang (2023) showed that the implementation of modern technologies such as Material Requirements Planning (MRP) system can improve the efficiency of material management.

These systems help project managers to predict demand plan deliveries and keep inventory levels just right. In addition Wu and others in their (2024) study said that managing materials well should start early even before construction begins.

Also Hosny and others, in (2023) found out that handling and storing materials properly on construction sites can save money. When materials are not stored correctly they can get damaged, stolen or wasted which all add to the project cost.

They suggested spending money on storage spaces and teaching workers how to handle materials correctly to reduce loss. In developing countries, the issue of material waste is very important. Chong *et al*. (2021), in their study of Southeast Asian construction sites, found that the average material waste ranged from 7% to 15% of the total material used. The authors attributed this waste to poor site layout, improper material delivery schedules and lack of awareness among site workers. Their findings are consistent with the work of Wu *et al*.

(2024), who focused the application of lean construction principles to reduce material waste through better coordination and planning.

In Ethiopia, Alemayehu (2022) conducted study on public building projects in Addis Ababa and reported that poor procurement planning, lack of storage facilities and frequent design changes affected material efficiency and led to project cost escalations and recommended adopting supply chain management principles and investing in training to enhance material management practices in local construction firms.

2.2.3. Material Management Practices

Material management practices are a set of coordinated procedures meant to guarantee that materials used in the process of construction are effectively planned, ordered, delivered and used. These practices are key to a cost-saving, delay-reducing and quality-maintaining process on the construction site regarding planning, procurement, logistics and waste reduction comprise effective material management.

2.2.4. Planning

Material planning involves determining which materials are required, quantifying them and ordering them to arrive in a way that supports project milestones. According to Tanko, Abdullah and Ramly (2017), accurate recording of each material and plant location is important to avert stock outs and uninterrupted workflow. Strategic material planning allows project managers to schedule procurement, preclude last-minute orders and alleviate storage loads. Wu *et al*. (2024) also placed special importance on including waste budgeting in the planning to manage direct and indirect cost. Planning techniques like Building Information Modeling (BIM) and Material Requirement Planning (MRP) enhance the precision of planning by projecting requirements and curbing over ordering.

System Theory (von Bertalanffy, 1968) supports the need for integrated planning across different project subsystem; In material planning, this involves coordination among the design team, procurement officers, construction managers and suppliers. Wu *et al*. (2024) found that projects with comprehensive planning frameworks that incorporate feedback loops and adaptive measure are more likely to maintain budgetary discipline. In addition,

research by Salihu *et al*. (2022) showed that poor material planning leads to stockouts, idle labor time and increased material handling cost.

2.2.5. Procurement

Procurement is the process of sourcing, purchasing and acquiring materials required for construction. It includes activities such as vendor selection, negotiation, contracting and delivery scheduling. The Resource-Based View (RBV) theory, introduced by Barney (1991), states that strategic procurement capabilities such as reliable supplier networks and cost-effective purchasing methods can benefit a competitive advantage for construction firms. Ben Mahmouda *et al*. (2023) conducted a comprehensive review across MENA countries and identified six key mechanisms for improving procurement outcomes: supplier qualification, development programs, information sharing, contract alignment, collaborative teamwork and performance-based evaluation. These mechanisms improve procurement efficiency, reduce lead times and enhance material availability.

The aim of material management through procurement is to obtain quality materials at the right time and place and in a agreed budget. Adeyinka *et al* (2014) asserts that procurement is concerned with coordinating purchases of materials and making delivery schedules to a supplier. Another principal aim of procurement under materials management is to procure quality resources that are available in the right place and time and sufficient budget Nwankwo (2022). According to the study, project managers ought to control the process and have to make sure the standard requirement; quality and timeliness were maintained in the material purchasing.

2.2.6. Logistics

Material logistics is important component of construction material management, concerned with the systematic planning, flow and control of materials from the point of origin to the construction site. Its primary goal is to make sure the timely delivery of the right materials in the correct quantities and conditions to support smooth project execution. Effective logistics system contributes to construction project efficiency by

minimizing downtime, reducing transportation cost and ensuring optimal material availability (Zhang, Lu, & Wang, 2023); the successful implementation of construction logistics requires coordination among various project functions including procurement, inventory management, site supervision and supplier engagement. According to Ben Mahmouda *et al*. (2023), integration of logistics with procurement and project scheduling enhances operational efficiency, especially in large and complex projects.

Theoretical frameworks such as Lean Construction, Just-in-Time (JIT) and System Theory offer important information about construction logistics. Lean Construction focusses reducing non-value-adding activities; including excessive transportation, delay and redundant handling (Zhang *et al*., 2023). Just-in-Time (JIT) logistics, was developed in manufacturing, has proven to be highly effective in construction when properly implemented and it involves delivering materials to the site exactly when they are needed, thereby reducing the need for extensive on-site storage, lowering inventory cost and minimizing material deterioration. However, this system demands high coordination and reliability from supply chain partners (Ben Mahmouda *et al*., 2023).

Thunberg and Persson (2014) applied the Theory of Constraint (TOC) to construction logistics and focused identifying and resolving bottleneck that affect material flow. Common constraint includes delayed supplier deliveries, restricted site access and poor storage planning resolving these constraint enables smoother material transitions and uninterrupted project activities. Logistics in construction is especially challenging in developing countries due to infrastructural limitations such as poor road networks, limited warehousing and inadequate transport facilities which contribute to delay, increased cost and resource wastage. In the Ethiopian context, Alemayehu (2022) showed that most construction projects face logistical inefficiencies due to fragmented coordination, underdeveloped transport infrastructure and dependency on imported materials that are often subject to customs and foreign exchange delay.

Moreover, logistics planning must also consider environmental factors such as weather, site layout and safety conditions. Ogunde *et al*. (2017) focused that efficient logistics enhances productivity and also reduces risks related to material handling and on-site

congestion. Advanced planning and visualization tools such as BIM are increasingly being used to optimize delivery schedules; simulate material flow and improve decision-making (Hosny *et al*., 2023). Through the adoption of lean methods, technological tools and system thinking, construction firms can overcome logistical challenges and enhance project delivery.

2.2.7. Material Waste Reduction

Material waste reduction is a key element of effective construction material management. It aims to minimize the quantity of unused, excess, or damaged materials throughout the project lifecycle. Waste increases project cost and also affects environmental sustainability and resource efficiency. According to Wu *et al*. (2024), construction waste can share 10–20% of project cost in developing countries, making proactive waste reduction strategies essential. The Total Quality Management (TQM) philosophy supports continuous improvement across all project stages. Hosny *et al*. (2023) found that the application of BIM tools in Egyptian construction sites led to a 16–20% reduction in reinforced concrete waste.

Material waste arises from several factors including poor planning, inaccurate estimation, inadequate storage, over ordering, design changes and improper handling. Jiang and Li (2014) identified direct link between weak procurement practices and increased waste. Showing the need for accurate demand forecasting and timely delivery to reduce inventory pressure and spoilage. Nagapan *et al*. (2012) also argued that waste is not limited to physical materials, but also includes non-physical inefficiencies such as overproduction, waiting time, unnecessary transportation and poor coordination. These forms of waste are often overlooked yet contribute to increased cost and project delay.

In Ethiopia, Wu *et al*. (2024) reported that construction projects suffer from high levels of material waste due to insufficient supervision, lack of waste control policies and weak implementation of site audits. Material losses from theft, deterioration and misplacement are common due to limited site organization and inadequate storage facilities. Developing and enforcing a waste management policy, coupled with training and monitoring, improves resource use. Lean construction principles focus the reduction of waste by

eliminating non-value-adding activities. These include rework, excess handling and unnecessary movement. Zhang *et al*. (2023) show that applying lean techniques such as pull scheduling and standardized processes enhances workflow and reduce material loss.

Reusing and recycling materials is another key strategy; recovered materials from demolition or surplus can be redirected to other parts of the project or future works. This reduces the need for new procurement and lowering environmental impact. Ajayi *et al*. (2017) documented that integrating sustainability practices about construction workflow supports long-term cost saving and enhance corporate social responsibility.

2.2.8. Theoretical Background

This section discusses the theoretical foundation of the study, especially those related to the material management practices that influence the cost of construction project. Four complementary theories are discussed under this section namely: System Theory, Resource-Based View, Theory of Constraint and Lean Construction Theory which explain how integrated planning, strategic procurement, bottleneck resolution and waste elimination contribute to cost efficiency in construction projects.

2.2.8.1. System Theory

System Theory, articulated by von Bertalanffy (1968), conceptualizes organizations as complex system composed of interdependent subsystem that must function in coordination to achieve effectiveness. When applied to construction material management, this theory states that planning, procurement, logistics and waste reduction are not isolated activities, but, interconnected functions requiring smooth integration. Disruption in one area, such as inadequate planning generates consequences across others including procurement delay, logistical inefficiencies and increased waste.

Wu and his team found out in (2024) that construction projects that do not have a system for managing materials often have problems with coordination between the design teams, the people who buy things and the people in charge of the site. When this happens it leads to mistakes when trying to guess what materials will be needed buying things that're not necessary and schedules for delivering materials that do not match up.

System Theory says that if companies set up ways to share information and talk to each other they can find problems on and change the way materials are moved around.

Salihu and his team said something in (2022) they said that if project managers look at material management as a system they can see how the things they decide in one part of the project will affect what happens later on which helps to prevent costs from getting too high. Construction projects, like these need material management systems to work well. Material management is important for construction projects to succeed.

2.3. Empirical Literature Review

2.3.1. The Effect of Construction Material Management on the Cost of Construction Project

Construction material management really affects how a construction project costs. It is very important to manage construction materials. Managing construction materials is key to keeping costs under control, in construction projects. The way construction material management is handled can. Break the cost performance of construction projects. Empirical studies consistently show that efficient logistics, planning, procurement and waste control of construction materials reduce cost overrun and enhance project profitability(Wu *et al*., 2024). On the other hand, ineffective material management contributes to 10%–20% increases in total project cost (Banerjee *et al*., 2021; Wu *et al*., 2024). A growing body of research shows that poor material management practices such as over ordering, late delivery, excess stockpiling and poor storage result in direct cost increases and indirect financial losses due to project delay, rework and material deterioration (Hosny *et al*., 2023). In a multi-site analysis conducted in Egypt, Hosny *et al*. (2023) found that up to 16% of reinforced concrete material was wasted due to poor forecasting and weak delivery coordination.

In Ethiopia, Alemayehu (2022) conducted an empirical investigation of public construction projects in Addis Ababa and concluded that ineffective procurement planning and lack of storage infrastructure led to material loss and inflation of project budgets. The study focused that one of the key drivers of material mismanagement was the reliance on outdated manual system and the absence of digital tools to track

consumption and coordinate logistics. Globally, the integration of technological tools such as Building Information Modeling (BIM), Enterprise Resource Planning (ERP) and Material Requirement Planning (MRP) has shown a statistically significant effect on reducing cost. Smith and Love (2019) for example has showed that the adoption of ERP system reduced procurement error by over 30%. This directly translating about cost savings in Australian infrastructure projects.

Wu *et al*. (2024) also found that projects implementing BIM for material planning and JIT procurement experienced 9–12% lower material waste and shorter delivery cycles, the finding that affirm the importance of integrating ICT-based tools in material lifecycle planning to mitigate cost risks. Zhang *et al*. (2023) found that material handling and site layout optimization reduced material movement cost by 18%. They also focused that delay in internal transfers, improper scheduling of deliveries and poor site accessibility are hidden cost factors often overlooked in budget planning.

From a strategic procurement perspective, Salihu *et al*. (2022) examined how supplier coordination, centralized purchasing and timely ordering affect project expenditure in the Nigerian public works projects, and found that emergency procurement inflated material unit cost by up to 27%, often due to unplanned demand or forecasting error. Cost savings through waste reduction have also been focused in empirical literature. Love *et al*. (2020) argue that adopting sustainable procurement and waste tracking system lowers cost and also aligns with wider regulatory and environmental goals. Their longitudinal study of 30 projects in the UK found that projects that actively tracked material waste achieved average cost savings of 8–11% compared to those without such system.

These studies are concentrated to developed economies, but they still are relevant lessons for Ethiopia. For organizations such as the Oromia Construction Corporation (OCC), the cost-saving potential of material management is especially key due to high import dependency, foreign exchange constraint and infrastructure limitations. Wu *et al*. (2024) documented in their East African study that material delay caused by customs clearance and limited supplier availability created cascading effects on cost, especially when coupled with inflation and volatile exchange rate. As project complexity and competition

rise, firms that fail to prioritize efficient material management risk budget overrun, time delay and reputational loss.

2.3.2. Causes of Ineffective Material Management

Ineffective material management in construction is common problem in low-resource settings due to poor planning, weak procurement system, lack of supervision and limited use of digital tools (Salihu *et al*., 2022) identified the primary causes of material management failure in Nigerian infrastructure projects as poor forecasting, soloed departmental communication and reactive procurement strategies. Wu *et al*. (2024) observed that in Ethiopia, significant material waste and cost overrun result from a lack of warehouse space, insufficient training and reliance on manual inventory system, material shortage and excesses were found to be common due to the absence of real-time tracking mechanisms.

Hosny *et al*. (2023) found that project sites with no defined waste control policies experience higher probability of material misuse. Workers often had little awareness of cost implications due to insufficient site-level monitoring and training. Zaha Ahmed (2019) analyzed the root causes of procurement inefficiencies and identified the top issues as non-transparent vendor selection. Inadequate specification of material requirements and failure to align purchasing with project milestones. Ben Mahmouda *et al*. (2023) focused the importance of performance-based contracting and collaborative supplier partnerships. They documented that lack of trust, poor communication and fragmented supply chains were among the leading barriers to effective material flow.

Also, Alemayehu (2022) reported that imported material delay-caused by foreign exchange shortage, customs bottleneck and transport disruptions-led to emergency purchases at inflated cost, especially on government-funded projects in Ethiopia. Material management inefficiency was found to have its root cause in a lack of communication by a study carried out by Zaha Ahmed in 2017.

It was also often indicated by incomplete drawings and a poorly defined project scope that fails to allow proper material identification. Irregular material availability, trying to match competitors' prices and failure to meet material specifications were also mentioned. Material damage, re-handling and a failure of supplier quality assurance were among the most key issues encountered at the stage of construction (Ahmed, 2017).

2.4. Conceptual Framework

The conceptual framework illustrates the hypothesized relationship between construction material management practices (material planning, material procurement, material logistics and material waste reduction) and construction project cost. Material planning involves forecasting and scheduling material requirements, effective planning makes sure timely availability, preventing delay and emergency procurement cost. Material procurement on the other hand, includes sourcing, purchasing and supplier coordination and efficient procurement reduces material cost, prevents overstocking and avoids budget overrun from reactive purchasing.

Material logistics is about moving, storing and managing materials on site. Good logistics helps prevent damage, loss and wasted labor which can add up to costs. Material waste reduction is also important. This means finding ways to reduce waste when storing, handling and installing materials. When we control waste well we buy material and spend less on disposal. This helps keep project costs under control. The framework shows that these four practices. Material logistics, material waste reduction and the other two not mentioned. All play a role, in affecting construction project costs both on their own and together. Improved material management practices are expected to reduce project cost, though deficiencies in any area are anticipated to increase cost.

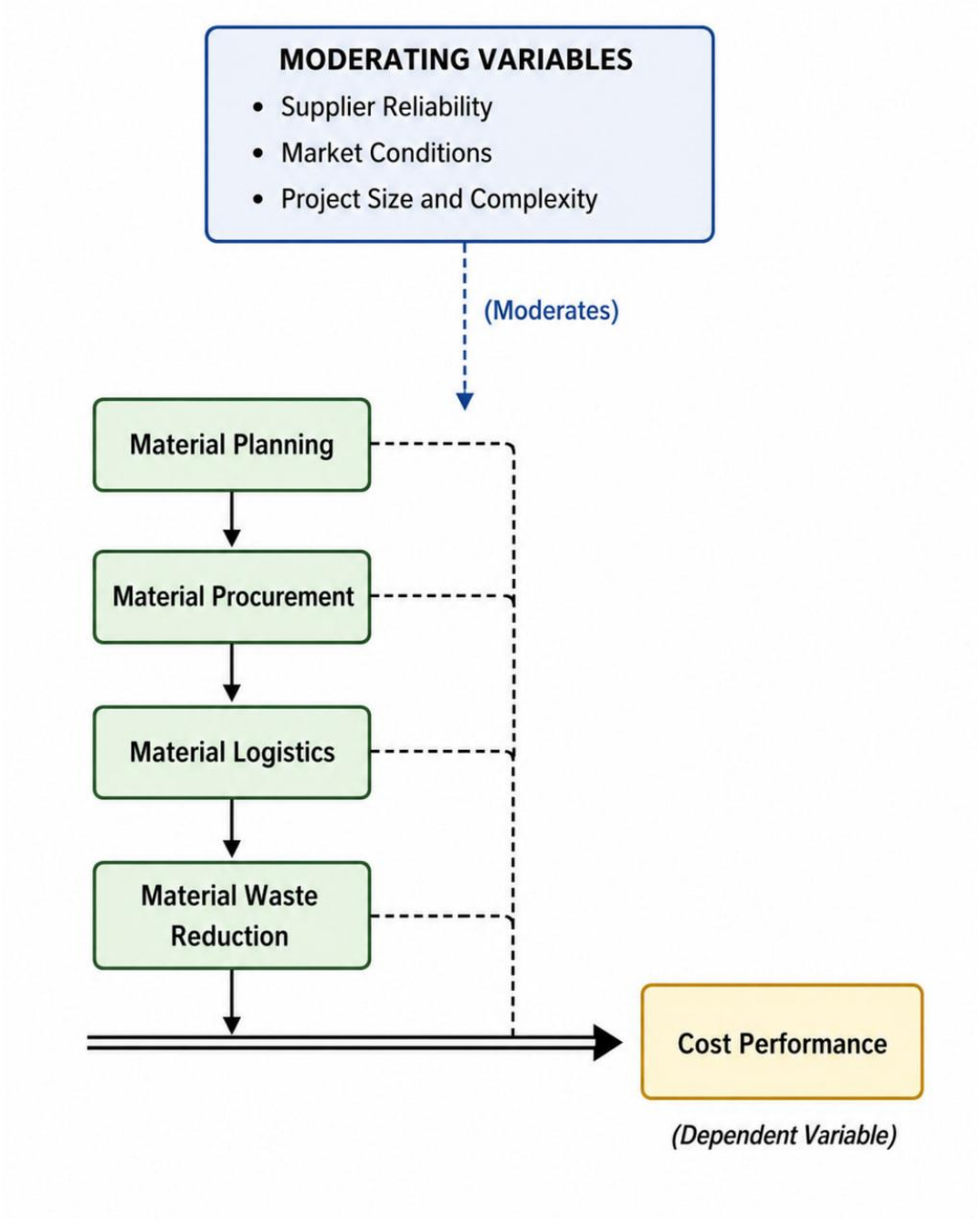


Figure 2- 1 Conceptual Framework of the Study

2.5. Research Hypothesis

Based on the review of relevant literature and the conceptual framework of this study, the following research hypotheses are formulated: Based on the system theory well organized material planning improve coordination among project activities and insures on time material availability. Since construction projects operate as interconnected systems, ineffective planning in one activity can negatively affect procurement, logistics and overall project performance. Organized planning minimizes delays, emergency purchases and unusability of resources. So that it will improve cost performance. Previous studies confirm that inadequate planning contributes significantly for overruns of construction cost.

Effective material planning makes sure that the required quantities of materials are available at the right time and place, thereby preventing project delay, reducing idle time of labor and equipment and minimizing cost overrun, whereas poor planning leads to material shortage, rushed procurement and schedule disruptions, all of which negatively impact cost performance (Ayalew & Daba, 2019).

Based on the above theoretical arguments and empirical findings the following hypothesis is proposed

H_1: Material planning has significant and positive effect on construction cost performance.

Based on the resource-based view effective procurement abilities create operational efficiency and cost advantage. On time procurement and having reliable supplier reduces price escalation and material shortages and will lead to improved cost performance. Efficient procurement systems also support better budget control through competitive sourcing and proper coordination of material deliveries.

Efficient procurement practices including timely ordering, competitive sourcing and reliable supplier selection contribute to cost stability and budget adherence. On the other hand, delayed and reactive procurement practices have been consistently identified as major contribut,ors to material price escalation and cost overrun in Ethiopian construction firms (Girmay & Tsegaye, 2018).

Based on the above theoretical arguments and empirical findings the following hypothesis is proposed

H_2: Material procurement has significant positive effect on construction cost performance.

From the perspective of theory of constraints logistical bottle necks increase delays and operational cost. Efficient logistics management improves the movement, handling and storage of materials throughout the construction process. Organized transportation, proper handling of materials low storage disruption and material loss will improve project cost performance.

Effective logistics management, comprising transportation, handling and site storage, make sure that materials reach the construction site in good condition and are preserved until use; Inefficient transportation system and inadequate site storage conditions are known to increase material waste, damage and theft, thereby inflating project cost (Alemayehu, 2022).

Based on the above theoretical arguments and empirical findings the following hypothesis is proposed

H_3: Material logistics has significant positive effect on construction cost performance.

Lean construction view states that reducing material waste will eventually eliminates non value adding cost improves efficiency. Effective waste control minimizes unwanted expenditure and improves cost performance

Proactive waste reduction strategies, such as accurate quantity estimation, just-in-time delivery and proper material handling protocols directly lower the volume of wasted materials and associated disposal cost. The absence of such waste control mechanisms has been shown to contribute to high budget losses in public construction projects in Ethiopia (Wu, Alemu, & Bekele, 2024).

Based on the above theoretical arguments and empirical findings the following hypothesis is proposed

H_4: Material waste reduction has significant positive effect on construction cost performance.

CHAPTER THREE:

3. RESEARCH DESIGN AND METHODOLOGY

This chapter of the research gives details regarding the methods used to answer the research question. It discusses the research design, approach, sampling size and technique, method of data collection and analysis, validation, reliability and consideration of ethics.

3.1. Research Design and Approach

3.1.1. Research Design

This study used two kinds of research designs: explanatory. The descriptive design was used to describe the construction material management practices that're already in place at Oromia Construction Corporation. This includes things like planning for materials buying materials moving materials around and reducing waste. The explanatory design was used to see how these practices affect the cost of projects at Oromia Construction Corporation. The study focused on Oromia Construction Corporation so that we could get a really good understanding of what is going on there. We collected all the data at one time from the people who work at Oromia Construction Corporation to see what is happening now and how things are related to each other at Oromia Construction Corporation. We did this because we wanted to know about the situation at Oromia Construction Corporation and how construction material management practices at Oromia Construction Corporation affect project costs, at Oromia Construction Corporation as suggested by John W. Creswell and J. David Creswell in their book in (2018).

3.1.2. Research Approach

A research methodology describes the systematic approach that directs study from broad theoretical assumptions to the particular methods employed to collect, analyze and interpret data. There are three types of research approaches: qualitative, quantitative, or mixed methods designs. Qualitative research focuses on how people give meaning to social or human experience through inductive reasoning. On the other hand, quantitative

research, is concerned with testing hypothesized theories by measuring the relation between variables through statistical methods. Mixed methods research combines qualitative and quantitative methods in single research design to leverage the strengths of each methodology (Chetty, 2016; Creswell, 2014).

This study adopted quantitative research approach, utilizing a structured questionnaire to collect numerical data from targeted respondents in the Oromia Construction Corporation (OCC). And it was used to examine the effect of material management practices namely planning, procurement, logistics and waste reduction on project cost performance.

3.2. Types and Sources of Data

Meron Gudetas questionnaire from (2021) needs to be checked to see if it is a tool. We need to see proof that it's reliable and valid. This means we need to see things, like Cronbachs alpha and content validity. Meron Gudetas(2021) questionnaire should be tested to make sure it works well. A good research tool always measures what it is supposed to measure, like Uma Sekaran and Roger Bougie said in (2019). We cannot be sure if Meron Gudetas work was published in a journal because we do not have the full reference. John W. Creswell and J. David Creswell said in (2018) that using a tool makes the research better.

So Meron Gudetas questionnaire needs to have the reference and proof that it is valid to make sure the research is good. Meron Gudetas questionnaire is really important. We have to make sure that Meron Gudetas(2021) questionnaire is something we can count on. It needs to be reliable and valid. We should include the full journal citation and the evidence that shows Meron Gudetas questionnaire is valid. This is necessary for Meron Gudetas research to be good and strong.

3.3. Sampling Design

3.3.1. Population and Sampling Frame

This study used a way to pick people to be in the study. It is called random sampling. The goal of this method is to make sure that the people in the study are like the people in the population. The population was divided into groups like departments or jobs. This was done so that every type of person in the population would be included in the study. This way of picking people made the results of the study more accurate. It also made sure that the results would be relevant, to the population. The people who did this study wanted to make sure they did not make mistakes when they picked the people for the study. They did this by using a method that is known to work Creswell & Creswell 2018; Kothari, 2004).

Simple random sampling was applied in each stratum, giving every individual equal chance of selection to reduce selection bias and increasing the reliability and generalizability of the results (Sekaran & Bougie, 2016; Etikan & Bala, 2017). This combined approach was appropriate in construction-related research, where variations among stakeholders' roles and experiences had to be adequately captured (Taherdoost, 2016).

The four strata selected Project Managers, Procurement and Property Administration Team, Site Engineers and Office Engineers/Cost Estimators were deliberately chosen for the key roles they have in the material management process. Project Managers oversee the planning and budgeting process including decision-making on material selection and project cost controls. Procurement and Property Administration Team was directly responsible for sourcing, purchasing and managing material inventory making them central to material procurement efficiency and site Engineers interacted with material delivery, usage and site logistics; their information was essential for evaluating material wastage and on-site handling. Office Engineers/Cost Estimators were involved in quantity estimation, cost planning and reporting. They influence how well materials were planned and budgeted before execution. The proportionally sampling from these strata

using simple random sampling in each group, enabled the study to make sure balanced representation, reduced sampling bias and increased the reliability of findings.

Table 3- 1 OCC Human Resource

Department	**Total Population of Each Stratum**
Project manager	50
Project procurement and property administration team	40
Site engineer	120
Office engineer / cost estimators	120
Total	**330**

Source; Own Survey Data, 2026

3.3.2. Sample Size Determination

As shown below in table 3.2, 54.84% from each stratum was taken as sample to represent the whole population. The level of confidence for the research was 95%. Therefore, the sample size was computed by using the following formula which was developed by Yamane Taro (1967):

$$n = \frac{N}{1+N(e)^2}$$

Where: n= is the sample size

N= is the population size

e= is margin error at 0.05

$$n = \frac{330}{1+330(0.05)^2} = 181$$

The sample size taken from each stratum based on proportion of their population size.

This sample was allocated to each department using proportional to size method as indicated below:

Table 3- 2 Sample Size

Department	**Population size**	**Sample size**
Project manager	50	27
Project procurement and property administration team	40	22

Site engineer	120	66
Office engineer / cost estimators	120	66
Total	**330**	**181**

Source; Own Survey Data, 2026

3.4. Data Collection Instruments

To collect primary data, the researcher employed self-administered questionnaires. As defined by Bailey (1994), self-administered five-point Likert scale questionnaires ranging from 1 (strongly agree) to 5 (strongly disagree) to help respondents to express varying levels of agreement are standardized data collection tools that respondents complete on their own, without direct assistance from the researcher. Given the study's focus on examining the impact of construction material management on project cost, the question

aires were distributed among four key respondent groups: project managers, procurement and property administration personnel, site engineers and office engineers or cost estimators. The questionnaire contains five-point Likert scale items ranging from 1 (strongly agree) to 5 (strongly disagree). This is to enable respondents to express varying levels of agreement and to improve clarity and interpretability of the collected data.

3.5. Method of Data Analysis

This study employed both descriptive and inferential analysis to analyze data. Descriptive statistics were used to provide an overview of trends in the data, while inferential analysis was used to investigate relationships among variables. Correlation and regression analyses were conducted. Correlation analysis was utilized to identify the existence and strength of associations between variable pairs, while regression analysis was applied to determine the direction, magnitude, and significance of causal relationships between the independent and dependent variables (C. R. Kothari, 2004). The data were analyzed using IBM SPSS Statistics software.

3.5.1. Multiple linear regression model

The multiple linear regression model used in this study is expressed as:

$$\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon}$$

Where:

Y = Cost Performance (Dependent Variable)

$\boldsymbol{\beta_0}$ = Constant (Intercept)

$\boldsymbol{\beta_1, \beta_2, \beta_3, \beta_4}$ = Regression coefficients

$\mathbf{X_1}$ = Material Planning

$\mathbf{X_2}$ = Material Procurement

$\mathbf{X_3}$ = Material Logistics

$\mathbf{X_4}$ = Waste Minimization

$\boldsymbol{\varepsilon}$ = Error term (other unobserved factors)

This model was used to examine how construction material management practices influence project cost performance at Oromia Construction Corporation.

3.6. Data Validity and Reliability

3.6.1. Validity

Validity is the primary standard that reflects how effectively a tool measure what it is designed to measure; it is the degree to which differences detected by a measuring tool accurately represent differences among the subjects of the test is known as validity

(Kothari, 2004). The study implemented content validity by utilizing a validated questionnaire. Content validity was established through a thorough review of existing literature on the effect of construction material management on cost of construction project, from previously validated studies (e.g., Waries *et al*., 2022 & Khan *et al*., 2021).

3.6.2. Reliability

Reliability analysis was done for each study variable. We used Cronbach's Alpha to check if the questionnaire items are consistent. Joseph F. Hair Jr. Et al. (2019) Say that a Cronbach's Alpha of 0.70 or more is okay. We checked the consistency of the questionnaire items using this method. The Cronbach's Alpha helps us understand if the items in the questionnaire are reliable. A score of 0.70 or above, for Cronbach's Alpha is what we look for.

Table 3.3. Reliability Statistics for Key Constructs

Construct	Cronbach's Alpha (α)	Number of Items (N)
Material Planning	0.797	6
Material Procurement	0.961	6
Material Waste Reduction	0.810	6
Material Logistics	0.831	6
Cost Project Performance	0.894	3
All Items (Reliability)	0.956	27

Source; Own Survey Data, 2026

The results indicate that all study variables achieved Cronbach's Alpha values above 0.70, showing satisfactory internal consistency. This confirms that the questionnaire items for Material Planning, Material Procurement, Material Waste Reduction, Material Logistics, and Cost Project Performance were reliable and appropriate for further analysis using correlation and regression in IBM SPSS Statistics.

3.7. Ethical Consideration

This study made sure to do things the way and protect the people who were in it. People did not have to be in this study if they did not want to. They knew what it was about before they started. They could stop answering questions at any time. Nothing bad would happen to them. The study kept all the answers secret. Did not tell anyone who said what. The people who ran the study kept all the answers in a place and only people who were supposed to see them could look at them. The study only used the answers, for this project. The person who did the study also made sure to write down where all the information came from and gave credit to the people who originally said it.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Introduction

This chapter is about the results of looking at data for a study on how construction material management practices affect the cost of projects at Oromia Construction Corporation. The study wants to see how planning for materials buying materials moving materials around and reducing material waste affects the cost of projects. This chapter is set up to match these goals so that the analysis and the reason for the study are clear. It starts with how many people answered the questions and what kind of people they're. Then it looks at the numbers for the important variables. After that it looks deeper into the numbers, including how thingsre related to each other and what happens when one thing changes. Finally it tests some ideas. Explains what the findings mean for construction material management practices, at Oromia Construction Corporation and how they affect the cost of projects.

4.2. Response Rate

Table 4.2 Survey Response Rate:

Item	Number	Percentage (%)
Questionnaires Distributed	181	100%
Completed Responses Received	172	95.02%
Unreturned / Incomplete Responses	9	4.98%
Response Rate	**172 / 181**	**95.02%**

Source; Own Survey Data, 2026

The study distributed 181 questionnaires with 172 completed responses received. This results in the response rate of 95.02%. This rate is considered acceptable for statistical analysis, ensuring reliable conclusions.

4.3. Demographic Profile of Respondents

Table 4- 1 Respondent Demographics Summary

Variable	Response Options	Count	%
Gender	Male	114	66.3%
	Female	58	33.7%
Age Group	25 Years and Below	23	13.4%
	26-30 Years	73	42.4%
	31-35 Years	66	38.4%
	36-40 Years	10	5.8%
Education Level	Diploma and Below	21	12.2%
	BA Degree	120	69.8%
	Master's Degree and Above	31	18.0%
Role in Construction Project	Project Manager	14	8.1%
	Site Engineer	58	33.7%
	Procurement and Property Administration Team	47	27.3%
	Office Engineer/Cost Estimator	53	30.8%
Years of Experience	1-5 Years	15	8.7%
	6-10 Years	57	33.1%
	11-15 Years	64	37.2%
	16-20 Years	36	20.9%
Familiarity With Construction Material Management Practices	Expert	26	15.1%
	Advanced	71	41.3%
	Intermediate	43	25.0%
	Beginner	32	18.6%

Source; Own Survey Data, 2026

The main goal of this research is to look at how construction material management affects the cost of construction projects within the Oromia Construction Corporation (OCC). The demographic profile of the 172 respondents provides background information for understanding the study findings as it shows how suitable the respondents are to address the research objectives related to OCC. The gender composition shows males (114, 66.3%) than females (58, 33.7%). his makes sense because the construction sector is mostly made up of men. This is important to the study objective because construction material management and cost practices are mainly implemented in project environments where male professionals like those in OCC work. However the presence of respondents ensures that the findings include different perspectives from OCC, Age distribution shows that most respondents are young to mid-career professionals. 73 (42.4%) Are aged 26–30 and 66 (38.4%) are aged 31–35.
Only a few were above 35 years.
This is important because younger and mid-aged employees like those in OCC are usually involved in material handling, procurement coordination and cost-related project activities.
Their responses are very useful for checking how well material management works and how it affects project cost in OCC. Educational background shows that most people have a bachelor's degree, which's 120 people or 69.8% and 31 people or 18% have a master's degree from OCC. This education level is important for the study because understanding how material management affects costs needs knowledge of management. Most respondents have this knowledge, which's helpful for OCC. In terms of job roles site engineers make up 33.7%
office engineers or cost estimators make up 30.8%, Procurement staff make up 27.3%.
Project managers account for 8.1% in OCC. These roles are important because they deal with buying materials using them and controlling costs. Their input is very relevant for checking how material management affects project costs in OCC.

The experience levels of respondents are well spread out. Most respondents have 6 to 15 years of experience which's 70.3% in OCC. This shows they have been involved in construction projects. It makes their responses about OCC reliable. Most respondents rated their material management skills as intermediate to advanced which is 66.3%. This suggests they have a practical understanding of OCC.

The demographic profile confirms that the data comes from operationally engaged personnel from OCC.

This makes it very suitable, for examining how construction material management affects project cost in OCC.

4.4. Descriptive Analysis

Respondents were asked how much they agreed or disagreed with each statement about the study. They gave answers on a scale of one to five.CThe average scores and standard deviation were calculated for each statement.CThe average scores were grouped into five ranges. Scores from 1.00 to 1.80 meant they Strongly Disagree. Scores from 1.81 to 2.60 meant they Disagree. Scores between 2.61 and 3.40 were labeled as Moderate.

Scores from 3.41 to 4.20 meant they Agree. Scores between 4.21 to 5.00 meant they Strongly Agree. The standard deviation showed how much answers varied from person to person. A standard deviation above 2 meant people had different perceptions.

A value below 2 meant most respondents gave answers about the study. The study variables were analyzed using these scores. The answers to each statement, about the study were compared. The study looked at how people agreed or disagreed with each statement.

Table 4- 2 Descriptive Statistics for Key Constructs

Construct	Item	N	Mean	Std. Deviation
Material Planning	Material planning aligns effectively with the budget to control project expenses.	172	4.0058	1.32231
	Timely material availability, supported by good planning, helps reduce labor and overhead cost.	172	3.3372	1.16589
	Proper material planning helps prevent cost overrun.	172	3.2435	1.05892
	The project team effectively monitors material planning activities.	172	3.2442	1.33277
	Clear communication during the planning stage reduces material wastage and lowers cost.	172	3.2267	1.31157
	The project prepares a detailed material planning schedule before project execution.	172	2.9535	1.14358
Grand Mean	**3.3353**			
	Following proper procurement procedures reduces financial waste in the project.	172	3.6395	1.45025
	Procurement processes are aligned with project cost estimates.	172	3.5523	1.38608
	Planned and scheduled procurement helps avoid significant increases in material cost.	172	3.4942	1.44488
	Effective procurement planning	172	3.3779	1.29875

Material Procurement	make sure material availability and prevents shortage.			
	Stable pricing and proactive price management improve procurement efficiency.	172	3.3721	1.33812
	Timely procurement helps prevent project cost escalation by avoiding extended timelines and idle labor cost.	172	3.2791	1.29913
Grand Mean	**3.4525**			
Material Waste Reduction	Waste reduction strategies are actively implemented in projects.	172	3.5058	1.34424
	Avoiding rework through proper material handling and availability helps reduce project cost.	172	3.4477	1.25779
	Waste control measure contribute to significant cost savings.	172	3.4128	1.12310
	Regular supervision and monitoring reduce material wastage and related cost.	172	3.4012	1.08504
	Effective waste management strategies help in reducing project cost.	172	3.2674	1.18888
	Proper training for workers helps minimize material waste and lower project expenses.	172	3.0814	1.21121
Grand Mean	**3.3527**			
	People in this organization are encouraged to be really open and	172	3.6744	1.11808

	honest with each other.			
	The communication system of employees and organization are comfortable	172	3.4070	.88361
Material Logistics	Your receive information from the sources that you prefer (Example: from your superior, department meetings, co- workers, newsletters)	172	3.4012	.99507
	You are kept informed about how well organizational goals and objectives are being met	172	3.3605	1.17392
	I'm comfortable with the communication style of the Company	172	3.2907	1.26922
	People in this organization freely exchange information and perception.	172	3.2326	1.15140
Grand Mean	**3.3944**			
	Good quality control in material management helps prevent increases in construction cost.	172	3.5523	1.15097
Cost Project Performance	Proper inventory management and controlled material storage help avoid extra labor wage expenses due to overstocking.	172	3.5291	1.35261
	There is timely delivery of material by suppliers which reduce the rise of construction cost	172	3.4186	1.06475
Grand Mean	**3.500**			

Source; Own Survey Data, 2026

Range	Score
1.00 – 1.80	Strongly disagree
1.81 – 2.60	Disagree
2.61 – 3.40	Moderate
3.41- 4.20	Agree
4.21 – 5.00	Strongly Agree

Source: Rensis Likert in 1932.

To understand the results a five-point scale was used. This scale has one meaning Strongly Disagree two meaning Disagree three meaning Neutral, four meaning Agree and five meaning Agree. The average scores were looked at in the following ranges: people who Disagree scored between 1 and 2.60 people who're Moderate scored between 2.61 and 3.40 and people who Agree scored between 3.41 and 5.

The study looked at how construction material management affects the cost of projects, at Oromia Construction Corporation. This study used statistics and the five-point scale to understand the results. The results were compared to studies to see if they were similar or different. The study found that Oromia Construction Corporation is doing okay with managing construction materials. This means they have some practices but they are not yet perfect and can still improve to really control costs.

The study found that material planning is being implemented at a level with a grand mean of 3.3353.

Respondents agreed that material planning fits well with the budget with a mean of 4.0058, which shows that financial alignment is quite strong.

However the results for scheduling were not that good with a mean of 2.9535, which indicates some gaps in pre-construction planning. This matches with studies in Ethiopia by Alemu in 2020 and Bekele in (2019) which showed that poor material planning and weak scheduling cause cost overruns in construction projects.

Material planning is not fully effective. It leads to efficiency issues and higher project expenses as reported by Tadesse in (2021).

For material procurement the study found a positive view with a grand mean of 3.4525.

Respondents felt that procurement procedures help reduce waste with a mean of 3.6395 and match cost estimates with a mean of 3.5523.

However getting materials on time is still a challenge with a mean of 3.2791.

This result agrees with Workus (2018) study and Kassas (2022) study, which found that good procurement procedures help control costs in construction projects.

On the hand Fikadus (2023) study highlighted that delays in procurement lead to higher costs because of idle labor and longer project durations, which supports the moderate result on timeliness, in this study.

When we talk about reducing waste from materials the results show that it is somewhat effective. People think that companies are trying to reduce waste. They do not think that the training they get is very good. This is similar to what Dagnachew found in 2020. He said that companies in Ethiopia that build things do try to reduce waste but they do not do a good job of it. Hailu also found in (2019) that when people do not get training they waste a lot of materials. This is what we found too that the training for waste reduction in OCC is not very good.

For getting materials from one place to another the results show that it is moderately effective. People think that they can talk openly about things. They do not think that they share information or work together very well. This is what Mekonnen found in (2021). He said that when people do not communicate or work together well it can cause problems with construction projects in Ethiopia. Abebe also found in (2022) that when the system, for getting materials from one place to another is not very good it can cause delays and cost money. This is what we found too that people think the material logistics system is just okay.

The cost project performance indicators show that people generally think that managing materials helps control costs. This is especially true when it comes to quality control, managing inventory and delivering things on time. For example quality control has a mean of 3.5523 inventory management has a mean of 3.5291 and timely delivery has a mean of 3.4186.

Other researchers like Alemu, Worku and Bekele have found the thing in their studies. They found that when material management is done well it helps reduce construction costs. This is because good material control reduces waste makes things more efficient and stops costs from going up much.

When we look at what other people have found we see that our findings are similar. Both our study and other studies agree that managing materials is very important for controlling construction costs. However our study at OCC found that putting these ideas into practice is not as strong as it could be. This is particularly true when it comes to planning, coordinating logistics and training people to reduce waste. So while we know that managing materials is important, for controlling costs we need to do a job of actually doing it at OCC if we want to make construction projects more cost efficient. Material management is key to cost control. We need to focus on material management to achieve this.

4.6. Inferential Analysis

To analyze the relationships and effects between the variables, inferential statistics including correlation and regression analysis, were performed.

4.6.1. Correlation between Construction Material Management Practices and Cost of Construction Project

A correlation coefficient quantifies the relationship between two variables, ranging from -1 to +1 (Field, 2005). This study employed Pearson's correlation coefficient (r) to assess the associations between all independent and dependent variables and the interpretation followed Field's (2005) recommendations, the strength of these relationships was categorized as follows: coefficient of 0.1–0.29 indicates weak correlation, 0.3–0.49 indicates moderate correlation and values above 0.5 signify strong correlation. The assessment utilized two-tailed significance test at95% confidence level ($p < 0.05$) to determine the statistical relevance of the observed relationships.

Table 4- 3 Correlation Analysis between Key Constructs and Cost of Construction Project

		Material Planning	Material Procurement	Material Waste Reduction	Material Logistics	Cost Project Performance
Material Planning	Pearson Correlation	**1**				
	Sig. (2-tailed)					
	N	**172**				
Material Procurement	Pearson Correlation	**.750**	**1**			
	Sig. (2-tailed)	**.000**				
	N	**172**	**172**			
Material Waste Reduction	Pearson Correlation	**.751**	**.697**	**1**		
	Sig. (2-tailed)	**.000**	**.000**			
	N	**172**	**172**	**172**		
Material Logistics	Pearson Correlation	**.607**	**.602**	**.721**	**1**	
	Sig. (2-tailed)	**.000**	**.000**	**.000**		
	N	**172**	**172**	**172**	**172**	
Cost Project Performance	**Pearson Correlation**	***.699***	***.661***	***.705***	***.626***	***1***
	Sig. (2-tailed)	**.000**	**.000**	**.000**	**.000**	
	N	**172**	**172**	**172**	**172**	**172**

Source; Own Survey Data, 2026

Correlation Coefficient (r)	Interpretation
0.00 – 0.19	Very weak correlation
0.20- 0.39	Weak correlation
0.40 – 0.59	Moderate correlation
0.60 – 0.79	Strong correlation
0.80 – 1.00	Very strong correlation

Source: Cohen's (1988)

Following Cohen's (1988) guidelines, correlation coefficients were interpreted as follows: 0.10–0.29 = weak, 0.30–0.49 = moderate and ≥ 0.60 = strong

Each of the four material management practices showed a positive relationship with cost project performance. The correlation values were .699 for material planning, .661 for material procurement, .705 for material waste reduction and .626 for material logistics. All four numbers sit above 0.5. According to the scale, any value above 0.6 counts as strong correlation. Material waste reduction had the strongest relationship with cost performance at .705. Material planning came next at .699. Procurement followed at .661. Logistics showed the lowest of the four at .626, but, that number is still well about the strong range. None of the correlations fell below 0.5.

The significance values for all four relationships were .000l below the 0.05 cutoff used in the study. Therefore, the results are statistically meaningful. They did not happen by chance. The number of respondents was 172 for each pair of variables. Taken together, these numbers tell a clear story. Better material planning goes with better cost performance. The same holds for procurement, waste reduction and logistics. None of the relationships were weak or moderate. Every single one was strong.

4.6.2. Multiple Regression Results

The people at Oromia Construction Corporation (OCC) wanted to see how construction material management affects the cost of construction projects. They looked at construction project cost performance. How it is affected by material planning, material procurement, material waste reduction and material logistics. They used a formula to figure this out:

$$\mathbf{Y = \beta_0 + \beta_1 X_1 . B_2 x_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon,}$$

Where Y is construction project cost performance β_0 is a number X_1 is material planning X_2 is material procurement X_3 is material waste reduction and X_4 is material logistics and ε is the error.

They made this formula to see how all these material management practices together affect construction cost performance.

The goal of this formula is to find out how much each material management practice contributes to changes in construction project cost performance. It is based on the idea that construction project cost performance is affected by material management activities, not just one thing. Material planning should help reduce costs, by scheduling and budgeting properly procurement should help buy things at a good price waste reduction should minimize losing materials and having to redo work and logistics should improve efficiency by getting materials to the right place at the right time.

Overall this formula helps us understand how making construction material management practices better affects construction project cost performance at Oromia Construction Corporation (OCC).

4.6.2.1. Preliminary Tests (Assumption Checks)

A. Linearity (Scatterplot Inspection)

The scatterplot showed the relationship between each material management practice and project cost performance. The dots did not form a curve or a random cloud. They clustered along a straight line that ran from the bottom left to the top right. That pattern means the relationships were linear.

When material planning, procurement, waste reduction, or logistics improved, cost performance moved in the same direction at a steady rate. No bends or twists appeared in the plot. Therefore, the linearity assumption held.

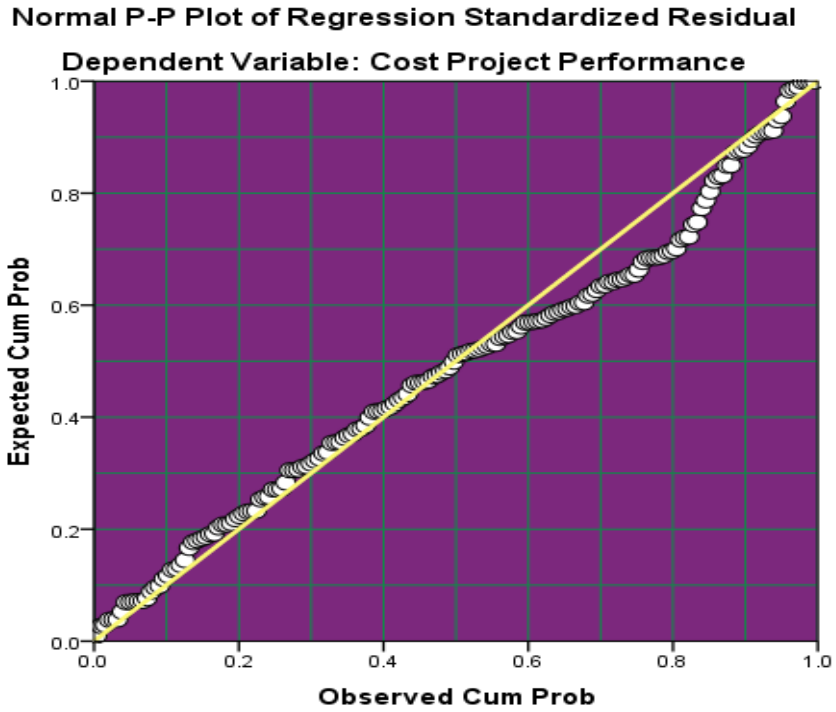


Figure 4- 1 Linearity Test Plot

Source; Own Survey Data, 2026

B. Homoscedasticity

The residual plot displayed dots scattered evenly above and below the zero line. The spread stayed about the same width from the left side of the plot to the right side. There was no widening band and no clumping on one end. Dots near the left were no more spread out than dots near the right, i.e., the variance of error was constant across all values. The homoscedasticity assumption was satisfied.

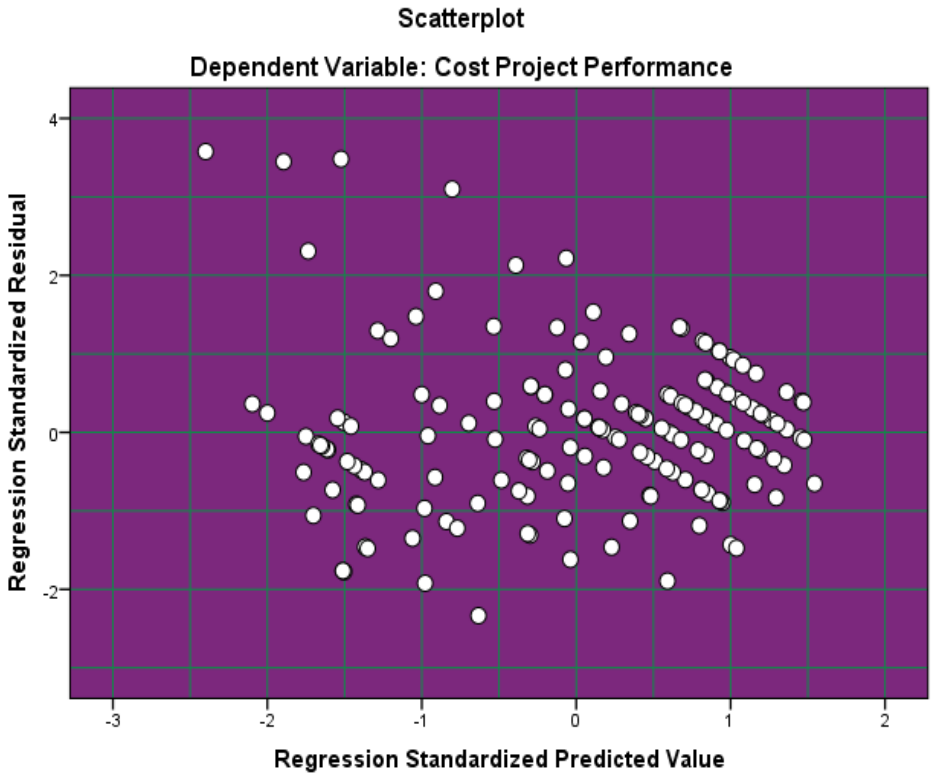


Figure 4- 2 Homoscedasticity Test Plot

Source; Own Survey Data, 2026

C. Normality Test (A bell-shaped histogram)

The histogram showed a bell-shaped curve. The tallest bars sat in the middle and the bars got shorter as they moved toward the left and right ends and the shape was symmetric. No long tail dragged out on one side more than the other. There were no flat tops, no sharp spikes and no gaps in the middle. The distribution of residuals followed a normal pattern confirming that the normality assumption was met.

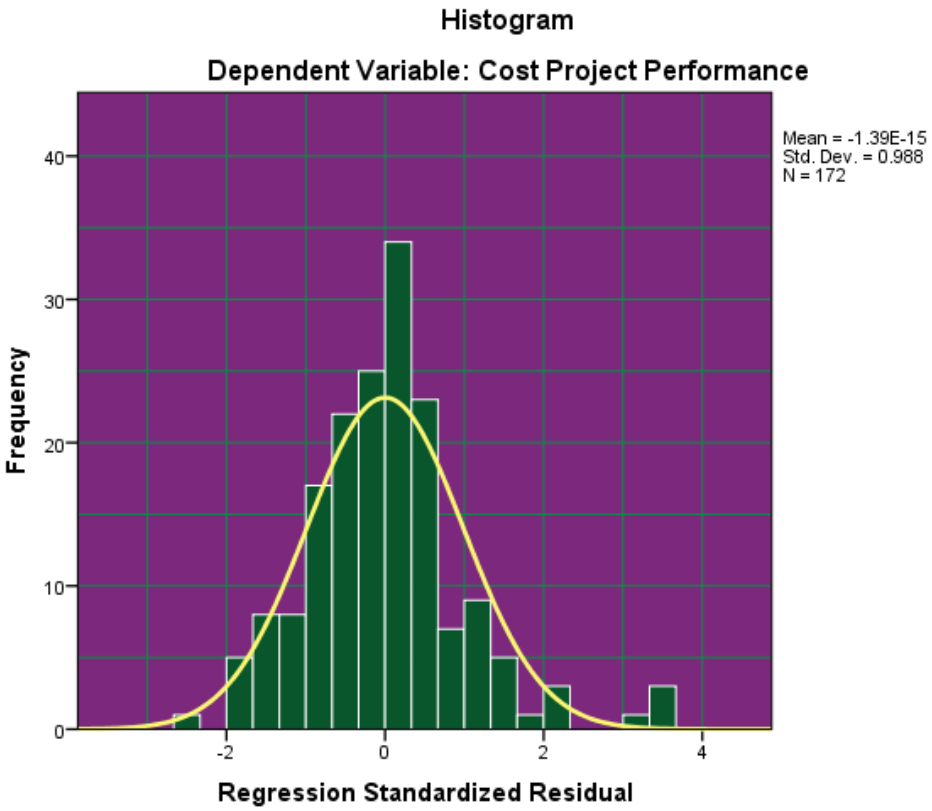


Figure 4- 3 Normality Test Plot

Source; Own Survey Data, 2026

D. Multicollinearity (Variance Inflation Factor - VIF)

All VIF values < 5 (Range: 2.176-3.209), indicating no multi-collinearity between predictors.

Table 4- 4 Multi-collinearity Test

Model		Collinearity Statistics	
		Tolerance	VIF
1	Material Planning	.335	2.983
	Material Procurement	.387	2.581
	Material Waste Reduction	.312	3.209
	Material Logistics	.460	2.176

Source; Own Survey Data, 2026

4.6.2.2. Regression Model Summary

The model produced an R value of 0.770 indicating the relationship between the four material management practices and project cost performance is strong. The R^2value 0.593 show that 59% of the changes seen in project cost and remaining 41%, comes from other things not measured in this study.

Table 4- 5 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	**.770[a]**	**.593**	**.583**	**.70097**	**1.829**
a. Predictors: (Constant), Material Logistics, Material Procurement, Material Planning, Material Waste Reduction					
b. Dependent Variable: Cost Project Performance					

Source; Own Survey Data, 2026

Table 4- 6 ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	**119.609**	**4**	**29.902**	**60.855**	**.000[b]**
	Residual	**82.058**	**167**	**.491**		
	Total	**201.667**	**171**			
a. Dependent Variable: Cost Project Performance						
b. Predictors: (Constant), Material Logistics, Material Procurement, Material Planning, Material Waste Reduction						

Source; Own Survey Data, 2026

The ANOVA table checks if the four material management practices together affect project cost. The regression sum of squares is 119.609. That is the part of the cost variation the model explains. The residual sum of squares is 82.058. That is the part the

model misses. Together they add up to 201.667. The regression has 4 degrees of freedom. The residuals have 167. The mean square for regression is 29.902. For residuals it is 0.491. The F value is 60.855. That number is big. A big F means the model works better than guessing. The significance value is 0.000. That is below 0.05. The four practices have a real effect on cost performance. The model holds up.

4.6.2.3. Regression Coefficients

Table 4- 7 Regression Coefficients Summary

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	**-.014**	**.253**		**-.057**	**.955**
	Material Planning	**.341**	**.107**	**.272**	**3.187**	**.002**
	Material Procurement	**.153**	**.069**	**.176**	**2.223**	**.028**
	Material Waste Reduction	**.321**	**.111**	**.255**	**2.886**	**.004**
	Material Logistics	**.228**	**.097**	**.171**	**2.343**	**.020**
a. Dependent Variable: Cost Project Performance						

Source; Own Survey Data, 2026

The regression coefficients table shows how each material management practice affects project cost performance on its own, though holding the other three constant. The constant term is -0.014 with a standard error of 0.253. The t value is -0.057 and the significance are 0.955. That number is well above 0.05. Therefore, the constant is not statistically different from zero. In plain terms, when all four material practices are at zero, the predicted cost performance is effectively zero. That makes sense because no project runs without material planning, procurement, waste reduction, or logistics. Material planning has an unstandardized coefficient B of 0.341 with a standard error of 0.107. The standardized Beta is 0.272. The t value is 3.187 and the significance is 0.002. That is below 0.05. Therefore, material planning has a real effect on cost performance.

For every one-point increase in material planning scores, cost performance goes up by 0.341 points. Among the four predictors, material planning has the largest Beta at 0.272, therefore, it is the strongest contributor.

Material procurement shows a B of 0.153 with a standard error of 0.069 (beta = 0.176, t = 2.223 p= 0.028). That is below 0.05. Therefore, procurement also makes a difference. A one-point increase in procurement raises cost performance by 0.153 points. Its Beta is the smallest of the four, therefore, it has the weakest individual effect. Material waste reduction has a B of 0.321 and a standard error of 0.111 (beta = 0.255, t= 2.886, p= 0.004). Waste reduction matters. A one point increase in waste reduction scores pushes cost performance up by 0.321 points. The Beta of 0.255 is the second largest, behind only material planning. Material logistics shows a B of 0.228 with a standard error of 0.097 (beta = 0.171, t= 2.343, p= 0.020). Logistics has a real effect too. A one-point increase in logistics raises cost performance by 0.228 points. The Beta of 0.171 is slightly smaller than procurement's 0.176. All four predictors have significance values below 0.05. None of them can be dropped from the model. Material planning packs the biggest punch, followed by waste reduction, then logistics, then procurement. but, even the smallest one, procurement, still contributes.

Regression Equation

Cost Project Performance = -0.014 + 0.341(Material Planning) + 0.153(Material Procurement) + 0.321(Material Waste Reduction) + 0.228(Material Logistics)

4.7. Hypothesis Testing Summary

Hypothesis H_1: Material planning has significant and positive effect on construction cost performance.

The regression results show a coefficient of 0.341 for material planning. The t value is 3.187 and the significance is 0.002. That number sits below the 0.05 cutoff. Therefore, the effect is statistically significant. The positive coefficient means the effect is positive. When material planning goes up, cost performance goes up. Therefore, H_1 is supported.

Hypothesis H_2: Material procurement has significant and positive effect on construction cost performance.

The coefficient for material procurement is 0.153. The t value is 2.223 and the significance is 0.028. That is below 0.05, therefore, the effect is statistically significant. The coefficient is positive. Better procurement practices lead to better cost performance. Therefore, H_2 is supported.

Hypothesis H_3: Material logistics has significant and positive effect on construction cost performance.

Material logistics shows a coefficient of 0.228. The t value is 2.343 and the significance is 0.020. That is below 0.05, therefore, the effect is statistically significant. The coefficient is positive. Improved logistics go hand in hand with improved cost performance. Therefore, H_3 is supported.

Hypothesis H_4: Material waste reduction has significant and positive effect on construction cost performance.

The coefficient for material waste reduction is 0.321. The t value is 2.886 and the significance is 0.004. That is well below 0.05, therefore, the effect is statistically significant. The coefficient is positive. More waste reduction leads to better cost performance. Therefore, H_4 is supported.

Table 4- 8 Summary of Hypothesis Testing

Hypothesis	Coefficient	Sig.	Result
H_1: Material Planning	0.341	0.002	Supported
H_2: Material Procurement	0.153	0.028	Supported
H_3: Material Logistics	0.228	0.020	Supported
H_4: Material Waste Reduction	0.321	0.004	Supported

Source; Own Survey Data, 2026

All four hypotheses are supported. Each material management practice has significant and positive effect on construction cost performance.

4.8. Discussion of results

The regression analysis revealed that all four material management practices planning, procurement, waste reduction and logistics have a statistically significant and positive effect on construction cost performance, with material planning emerging as the strongest predictor ($\beta = 0.272$, $p = 0.002$), followed by waste reduction ($\beta = 0.255$, $p = 0.004$), procurement ($\beta = 0.176$, $p = 0.028$) and logistics ($\beta = 0.171$, $p = 0.020$). These findings agree with previous studies that report the dominant effect of material planning such as Alemayehu (2022), who found that poor forecasting and lack of detailed scheduling drove budget inflation in Ethiopian public projects. The strong effect of waste reduction is also in line with the findings of Love et al. (2020) and Hosny et al. (2023), who documented cost savings of 8–11% and waste rates up to 16%, respectively, in projects with active waste control. Although procurement showed a significant effect, it has relatively smaller beta (0.176) and this result disagrees with the report of Salihu et al. (2022), who reported that emergency procurement inflated material costs by 27% in Nigerian projects.

This shows that Oromia Construction Corporation might already be doing some things to reduce problems with procurement. Logistics seems to have an impact ($\beta = 0.171$) which agrees with what Zhang et al. (2023) And Alemayehu (2022) found. They said that transportation coordination and storage infrastructure are cost drivers in similar situations. These findings have practical implications for Oromia Construction Corporation.

Material planning has the effect but it has a low mean score of 2.95 for detailed scheduling.

Oromia Construction Corporation should focus on creating material planning schedules before projects start.

Waste reduction is also important it ranked second in effect size. Worker training only scored 3.08. The corporation needs to implement accurate quantity estimation and just-in-time delivery protocols to reduce waste. This is especially crucial, in the context where foreign exchange is limited for Oromia Construction Corporation.

The corporation should prioritize material planning and waste reduction practices. Procurement showed the smallest beta (0.176), however, its statistical significance ($p = 0.028$)

warrants strengthening supplier coordination and aligning purchasing with project milestones can reduce reactive buying. As the site storage and timely delivery coordination scored lowest mean among cost performance items (M = 3.42), logistic improvements should focus on site storage and timely delivery coordination. The strong correlations among all four practices (r = 0.602 to 0.751) shows that OCC should adopt an integrated material management system rather than addressing each practice in isolation. This is because improvements in one area are likely to reinforce others.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter presents the summary of main findings from the descriptive analysis, correlation tests and regression results, and it also draws conclusions based on those findings and answers the research questions. Based on the findings the chapter also proposes practical recommendations for Oromia Construction Corporation.

5.2. Summary of Key Findings

The study collected data from 172 completed surveys from Oromia Construction Corporation employees with a response rate of 95%. Majority (two-thirds) of the respondents were men and one-third were women. The dominant age group of the respondents was 26-30 years, followed by those 31-35. A 70% of the respondents hold a BA degree. Site engineers were the biggest job category, then office engineers, then procurement staff and most of the respondents have a work experience between 6-15 years. About 41% rated themselves as advanced in material management practices. The reliability check showed that all five constructs measured consistently with Cronbach's alpha values were 0.797 for material planning, 0.961 for procurement, 0.810 for waste reduction, 0.831 for logistics and 0.894 for cost performance.

The descriptive analysis used five-point scale from Strongly Disagree to Strongly Agree. Material planning had a grand mean of 3.34 which falls in the Moderate range. One item scored higher at 4.01, showing agreement that planning aligns with the budget and the lowest planning item was about preparing a detailed schedule before execution (Mean = 2.95). Procurement had a grand mean of 3.45, showing agreement and the highest procurement item was about following proper procedures to reduce waste (mean = 3.64). Waste reduction scored a grand mean of 3.35, in the Moderate range and the highest waste reduction item was about actively implementing strategies (mean = 3.51). The lowest was about proper training for workers, at 3.08 and logistics had a grand mean of 3.39, very close to Agree, but, still Moderate.

The highest logistics item was about people being encouraged to be open and honest (mean = 3.67). Cost performance had a grand mean of 3.50, squarely in the Agree range; all standard deviation stayed under 2, therefore, responses did not vary too much from person to person.

The correlation analysis showed strong positive relationships between all four material practices and cost performance. Material planning (r= 0.699), procurement (r= 0.661), waste reduction (r= 0.705) and logistics (r= 0.626), all are positively correlated (p=0.000). Waste reduction had the strongest correlation, followed closely by planning, then procurement, then logistics; all relationship was strong. The regression model produced an R of 0.770 and an R^2 of 0.593 showing that the four practices together explained about 59% of the variation in project cost. The adjusted R square was 0.583, very small drop, therefore, the model did not over fit the data. The standard error was 0.70, acceptable for five-point scale. The ANOVA gave an F value of 60.855 with significance of 0.000, therefore, the model as whole worked well.

The regression coefficients showed that every single practice had significant effect on cost performance. Material planning had coefficient of 0.341 and significance of 0.002. That was the largest effect. Material waste reduction came second with coefficient of 0.321 and significance of 0.004. Material logistics had coefficient of 0.228 and significance of 0.020. Material procurement had coefficient of 0.153 and significance of 0.028, the smallest, but, still meaningful effect. The constant term was not significant which made sense because no project runs without these practices. All four hypotheses were supported. Material planning, procurement, waste reduction and logistics each had significant and positive effect on construction cost performance. Planning mattered the most, then waste reduction, then logistics, then procurement. None of the practices could be dropped from the model- very one of them contributed to keeping project cost under control.

5.3. Conclusion

This study examined the effect of construction material management practices material planning, material procurement, material waste reduction, and material logistics on construction project cost performance within Oromia Construction Corporation (OCC). This study looked at how construction material management practices affect project costs at Oromia Construction Corporation (OCC). The study checked material planning, material procurement, material waste reduction and material logistics. These practices were studied to see how they affect construction project cost performance. The study used statistics, correlation analysis and regression results to answer research questions. The findings showed that most material management practices are done at a level within OCC.

Material planning and waste reduction and logistics are done in an okay way but they can be a lot better. Procurement and cost performance are done a bit better than the things. The big issue is that there is no plan for materials before the projects start. Also the workers do not get the training they need on how to reduce material waste. These problems mean that the way materials are managed is not working well. The study found out that all four things. Material planning, procurement, waste reduction and logistics. Are connected to how the costs are managed. Improving material planning and procurement and waste reduction and logistics really helps to keep the project costs under control. Reducing waste and planning for materials are very important for keeping costs low. The study showed that the way materials are managed explains, about 59 percent of how costs turn out in construction projects at OCC.

Other factors, like market changes or financial management affect the rest. The study found that material planning has the effect on cost performance, followed by material waste reduction, logistics and procurement. In conclusion the study confirms that construction material management practices affect project cost performance at OCC. However some practices, like planning and waste reduction need attention. Improving these areas will help OCC save money on construction projects. OCC should focus on material planning and waste

reduction to improve cost efficiency. Material management practices are important, for OCCs construction projects. OCC needs to work on material management practices to save money.

5.4. Recommendations

The study looked at how construction material management practices like planning, buying, reducing waste and logistics affect the cost of construction projects at Oromia Construction Corporation. Based on what was found some recommendations were made to address the goals of the study and the problems that were identified.

Strengthen material planning before starting a project: the study showed that planning what materials are needed had the impact on cost. This means that planning is very important for controlling how much a construction project costs.. The study also found that there were some weaknesses in planning especially when it came to making detailed schedules for materials before starting a project. Oromia Construction Corporation should make sure that every project starts with an approved plan for materials. This plan should say what materials are needed how much of each material is required, when the materials should be delivered and how much money should be spent on each item. Project managers should not be allowed to start building until they have a plan that has been approved. The plan should not be set in stone it should be looked at regularly like every week. Changed as needed to fit the progress of the project and the conditions at the site. If things are planned out well at the beginning it can help avoid changes, delays and extra costs when the project is being built.

Provide training on reducing waste: the study found that reducing waste was the second most important thing that affects the cost of a project.. The study also found that workers were not being trained well enough on how to reduce waste. This means that workers may not have the skills they need to handle materials in a way that minimizes waste. So Oromia Construction Corporation should provide training for workers and staff on how to reduce waste. The training should focus on things like how to cut materials correctly how to store them properly how to handle them safely and how to identify where waste is happening. Workers should also be encouraged to report any waste or inefficiencies away. If workers are trained well it can help reduce the amount of materials that are wasted and make the project more cost efficient.

Improve the timing and efficiency of buying materials: the study found that the way materials are bought has an effect on the cost of a project but it is not as important as some other things. Even though people agreed that following the procedures when buying materials can help reduce waste the study found that there were some delays in the process of buying materials. So Oromia Construction Corporation should try to improve the timing of buying materials by making sure that orders are placed early and not waiting until materials are needed away. If materials are ordered early it can help avoid price increases workers not having anything to do. Delays in the project. At the time the procedures, for buying materials should be followed carefully to make sure that everything is fair and transparent. If the company can buy materials at the time and follow the right procedures it can help minimize extra costs and make the project run more smoothly.

To make the logistics management better the company should work on communication and coordination. The way things now the communication and coordination systems are not very good. Even though the employees are pretty open with each other the information does not flow well across the whole organization. This means that there are some problems with how the site teams, supervisors and logistics units talk to each other.

The OCC should make sure that the communication channels are strong so that everyone gets the information on time. This includes things like when materials will be moved when they will be delivered and what the project needs. They can do this by having meetings sending out daily reports or using simple digital tools like group messages.

If the communication is better there will be misunderstandings, fewer delays and the company will not waste money on unnecessary materials.

So these ideas are meant to help the company reach its goals by looking at the areas that affect the cost of construction projects. If the company can plan and train better buy things at the time and communicate better it will be able to save money on its projects. The OCC should focus on material management because it is very important, for the companys projects.

5.5. Future Research Direction

Future studies on construction projects should look at things that can affect how well construction projects do with costs. Construction projects should consider things like how money's managed and how complicated the construction project is. They should also look at how good the contractors what is happening with prices in the market.

It would be an idea to do a study over a long time to see how costs change at different stages of the construction project. This will help us understand what causes problems with costs in construction projects.

We should also compare how public and private construction companies, in Ethiopia work to get an idea of what's going on in the whole construction industry. To really understand why costs get out of control in construction projects and why material management does not work well in construction projects we should use a mix of ways to study the problem. This includes looking at numbers and talking to people involved in construction projects.

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Annex I: Questionnaire



Addis Ababa University School of Commerce

Project Management Master's Program

Dear Respondent,

This questionnaire is part of a research study titled "Effects of Construction Material Management Practices on the Cost of Construction Project: The Case of Oromia Construction Corporation." You have been selected to take part because of your role and experience in construction projects. The information you provide will be used only for academic purposes. Your answers will is anonymous and confidential. No names or personal details will be shared. Please answer each question honestly based on your experience at Oromia Construction Corporation. There is no right or wrong answers. The survey should take about 10 to 15 minutes to complete.

Thank you for your time and cooperation.

Sincerely,

Section A: Demographic Information

Please circle (○) the number that applies to you.

No.	Item	Response Options
I	Gender	1. Male 2. Female
II	Age Group	1. 25 Years and Below 2. 26–30 Years 3. 31–35 Years 4. 36–40 Years 5. 41 Years and Above
III	Education Level	1. Diploma or Below 2. BA Degree 3. Master's Degree or Above
IV	Role in Construction Project	1. Project Manager 2. Site Engineer 3. Procurement and Property Administration Team 4. Office Engineer / Cost Estimator 5. Other (specify: _____)
V	Years of Experience	1. 1–5 Years 2. 6–10 Years 3. 11–15 Years 4. 16–20 Years 5. 21 Years and Above

I. How would you rate your familiarity with construction material management practices?

1. Expert

2. Advanced

3. Intermediate

4. Beginner

Section B: Material Management Practices and Cost Performance

Please rate your agreement with each statement using the following scale:

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

Circle (○) the number that best reflects your perception.

I. Material Planning

Statement	***Strongly***	***Disagree***	***Neutral***	***Agree***	***Strongly***

	Disagree				***Agree***
Material planning aligns effectively with the budget to control project expenses.	***1***	***2***	***3***	***4***	***5***
Timely material availability, supported by good planning, helps reduce labor and overhead cost.	***1***	***2***	***3***	***4***	***5***
Proper material planning helps prevent cost overrun.	***1***	***2***	***3***	***4***	***5***
The project team effectively monitors material planning activities.	***1***	***2***	***3***	***4***	***5***
Clear communication during the planning stage reduces material wastage and lowers cost.	***1***	***2***	***3***	***4***	***5***
The project prepares a detailed material planning schedule before project execution.	***1***	***2***	***3***	***4***	***5***

II. Material Procurement

Statement	***Strongly Disagree***	***Disagree***	***Neutral***	***Agree***	***Strongly Agree***
Following proper procurement procedures reduces financial waste in the project.	***1***	***2***	***3***	***4***	***5***
Procurement processes are aligned with project cost estimates.	***1***	***2***	***3***	***4***	***5***
Planned and scheduled procurement	***1***	***2***	***3***	***4***	***5***

helps avoid significant increases in material cost.					
Effective procurement planning make sure material availability and prevents shortage.	***1***	***2***	***3***	***4***	***5***
Stable pricing and proactive price management improve procurement efficiency.	***1***	***2***	***3***	***4***	***5***
Timely procurement helps prevent project cost escalation by avoiding extended timelines and idle labor cost.	***1***	***2***	***3***	***4***	***5***

III. Material Waste Reduction

Statement	***Strongly Disagree***	***Disagree***	***Neutral***	***Agree***	***Strongly Agree***
Waste reduction strategies are actively implemented in projects.	***1***	***2***	***3***	***4***	***5***
Avoiding rework through proper material handling and availability helps reduce project cost.	***1***	***2***	***3***	***4***	***5***
Waste control measure contribute to significant cost savings.	***1***	***2***	***3***	***4***	***5***
Regular supervision and monitoring reduce material wastage and related cost.	***1***	***2***	***3***	***4***	***5***
Effective waste management strategies help in reducing project cost.	***1***	***2***	***3***	***4***	***5***

Proper training for workers helps minimize material waste and lower project expenses.	***1***	***2***	***3***	***4***	***5***

IV. Material Logistics

Statement	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
People in this organization are encouraged to be open and honest with each other.	***1***	***2***	***3***	***4***	***5***
The communication system of employees and organization is comfortable.	***1***	***2***	***3***	***4***	***5***
You receive information from the sources that you prefer (for example, from your superior, department meetings, co-workers, newsletters).	***1***	***2***	***3***	***4***	***5***
You are kept informed about how well organizational goals and objectives are being met.	***1***	***2***	***3***	***4***	***5***
I am comfortable with the communication style of the company.	***1***	***2***	***3***	***4***	***5***
People in this organization freely exchange information and perception.	***1***	***2***	***3***	***4***	***5***

V. Cost Project Performance

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Good quality control in material management helps prevent increases in construction cost.	***1***	***2***	***3***	***4***	***5***
Proper inventory management and controlled material storage help avoid extra labor wage expenses due to overstocking.	***1***	***2***	***3***	***4***	***5***
There is timely delivery of material by suppliers which reduces the rise of construction cost.	***1***	***2***	***3***	***4***	***5***

End of Questionnaire

Thank you for your time and honest responses.