Addis Ababa Institute of Technology

School of Civil and Environmental Engineering

Assessment on the Impacts of Material Management Practices in Addis Ababa Condominium Housing Projects Performance

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Civil Engineering (Construction Technology and Management)

By
Mahlet Abebe

Advisor

Abebe Dinku, Prof. (Dr.-Ing)

May 2023

Addis Ababa, Ethiopia

Addis Ababa Institute of Technology

School of Civil and Environmental Engineering

Assessment on the Impacts of Material Management Practices in Addis Ababa Condominium Housing Project Performance

By

Mahlet Abebe

APPROVED BY BOARD OF EXAMINERS

Abebe Dinku, Prof. (Dr.-Ing)
Advisor

Signature

Dr. Abraham Assefa
Internal Examiner

Signature

Dr. Girmay Kahesay
External Examiner

23/08/23

Signature

Chairman

Abrham Gebre (Dr.)
Dean, School of Civil & Environmental Engineering

Signature

Director of Postgraduate Program
Addis Ababa University
Addis Ababa Institute of Technology

STATEMENT OF CERTIFICATION

This is to certify that Mahlet Abebe has carried out this project work on the topic entitled - assessment on the impact of ineffective material management practice in Addis Ababa condominium housing project performance (A Case study on Addis Ababa Housing Development Corporation Selected Project) under my supervision. This work is original in nature and it is sufficient for submission for partial fulfillment of the Requirements for the Degree of Master of science in civil Engineering (Construction Technology and Management).

Abebe Dinku, Prof. (Dr.-Ing)

Signature_____

Date_____

DECLARATION

I, who have signed below, would like to state that the research project is unique and has not previously been submitted for a Degree at any other university. Every source of information used in the thesis has been properly recognized.

Name: Mahlet Abebe

Signature: _____

Place: Addis Ababa Institute of Technology

Date: _____

ACKNOWLEDGEMENTS

First of all, I would like to thank the Almighty God, Who gave me the strength, commitment, and tolerance to pass various obstacles and come up to the accomplishment of this thesis.

I would like to express my respect and deep appreciation to my advisor, Prof. (Dr.-Ing.) Abebe Dinku, for his valuable comments, suggestions, excellent advice, and also for spending his precious time improving the quality of this research. I am also deeply grateful to my Co-advisor, Ms. Selam Yohannes, for her supervision and advice.

I would like to express my appreciation to Addis Ababa Institute of Technology for allowing me to complete this educational program and Ethiopian Roads Authority for giving me the chance for this study.

I would like to forward especial thanks to all Addis Ababa condominium housing construction project contractors, consultants, and clients who sacrificed their time in filling out the questionnaires, time for interviews, and case studies.

Last but not least, my deepest appreciations go to my husband and my family, for their unconditional love and support throughout the preparation of this research work.

ABSTRACT

Numerous studies have revealed that the cost of building materials and equipment may account for more than 70% of the overall cost of a typical construction project. As a result, good management of these two factors enhances a project's quality, on-time completion, and cost effectiveness. The main problem with condominium housing in Addis Ababa is poor project performance. Analyzing the effects of material management procedures in Addis Ababa condominium housing complexes was the goal of this study.

A questionnaire survey, interview, site observation, and case study were carried out. In this research, a total of 74 questionnaires and 12 interview respondents participated. The data obtained from the questionnaire were analyzed using SPSS. The study indicated that there is poor material management practice in Addis Ababa condominium housing construction project sites.

The study identified major causes of ineffective material management practices. And identified measures for effective material management practices like using technologies to facilitate material management on the projects, preparing material takeoff from drawing, preparing the detailed and accurate bill of quantity, preparing drawings in detail.

The study also indicates that ineffective material management practice has a negative impact on the project performance of Addis Ababa condominium housing construction project sites. Some impacts identified are added costs over and above those initially agreed contract amount, fewer returns on investment, higher rental prices to the end user, loss of profits to the contractor, delay in the progress of the work, claims, and termination of project, failure and defects, loss of productivity of work and rework due to improper quality and mistakes.

Keywords: cause, cost overrun, delay, impact, ineffective material management, measure, poor material management practice, quality

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS/ ACRONYMS

GDP……Gross Domestic Product

UN-HABITAT……...United Nations Human Settlement Program

IHDP……..Integrated Housing Development Program

CBE……...Commercial Bank of Ethiopia

PMBOK…….Project Management Body of Knowledge

PMI……Project Management Institute

MoWUD……Ministry of Urban Development and Construction

SPSS……...Statistical Package for the Social Sciences

HCB……Hollow Concrete Block

AAHDC……..Addis Ababa Housing Development Corporation

FGD……Focus Group Discussion

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The development of a nation's overall GDP is greatly aided by the construction industry, which is a very large sector of the economy and plays a crucial part in the socioeconomic development of a nation. Many of the issues and difficulties that the building industry faces in other emerging nations are also present in Ethiopia.

According to Pataskar (2013), managing the materials used in construction projects is a crucial part of project management. Systematic planning and controlling of the construction works is necessary for the effective completion of construction projects within the constraints of cost, time, and quality as well as for the proper handling of building materials on the construction sites. Any construction project's primary cost component is the construction material. 50% or more of the total cost may be attributable to the installed materials.

According to research done in Ethiopia by Addise (2005), 57% of the entire budget set aside for construction projects is made up of construction materials. Therefore, effective material handling and procurement are essential to the task's successful completion. Material management seeks to make sure that. Therefore this study will analyze the impact of material management practices on condominium housing construction project performance on some selected housing project undertaken by Addis Ababa City Administration.

1.2 Statement of the problem

The construction of housing suffers problems in project delivery like delays in project completion time, poor quality, cost and time overrun.

Due to supply shortages, waste, and displacement on the job sites as well as inadequate accounting and security systems, the project ran over budget, took longer than projected, and produced less profit than anticipated. Lack of materials not only contributes to delays but also lowers production, which raises costs.

According to Addise (2005) construction materials account for 57% of the overall budget allotted for construction projects in Ethiopia.

Additionally, research by Tibebu (2016), Asmara (2015), and Selam (2021) inefficient handling of building materials has an impact on the success of construction projects as a whole. These studies don't discuss how material management techniques affect the success of projects undertaken by the Addis Ababa condominium housing construction project sites. Therefore this research needs to be conducted.

The practical gap in this research is that inefficient management of building materials has a negative impact on how well construction projects perform overall in terms of cost, time, quality, and productivity in the majority of Ethiopia's construction industry, particularly in Addis Ababa.

Addis Ababa condominium housing projects are one of the building projects impacted by this poor handling of materials, and more research is required to determine how material management practices affect project outcomes. In order to better understand how poor materials management procedures can affect the construction performance of Addis Ababa condominium housing a more in-depth investigation was done in this study.

1.3 Research Questions

The following are the research questions related to this study.

1. What are the current material management practices in Addis Ababa Condominium Housing construction project sites?
2. Is there ineffective material management in Addis Ababa Condominium Housing construction projects sites?
3. What are the impacts of materials management on construction project performance in Addis Ababa Condominium Housing construction projects sites?
4. What are the measures to be put in place to ensure effective materials management in Addis Ababa Condominium Housing construction projects sites?

1.4 Objective of the Study

1.4.1General objectives of the Study

The general objective of the research is to assess the impact of ineffective material management practices in Addis Ababa condominium housing project performance.

1.4.2 Specific Objectives of the Study

The specific objectives of this research are

1. To study the current material management practices in Addis Ababa condominium housing construction projects sites.
2. To identify the existence of ineffective material management in Addis Ababa condominium housing construction project sites.
3. To identify the impact of materials management on project performance of Addis Ababa condominium housing construction project sites.
4. To identify the measures to be put in place to ensure effective materials management in Addis Ababa condominium housing construction projects sites.

1.5 Significance of the study

The significance of this research is to fill the research gap on the impact of material management systems on Addis Ababa condominium housing construction project performance. The study identifies the current material management practices, the major causes of material management practices, and the measures to be taken. The beneficiaries of this research are mainly the City Government of Addis Ababa and Addis Ababa Condomini-

um housing help to see the gap for improved material management of condominium housing projects, also consultants and contractors to review their material management plan and future researchers.

1.6 Scope of the study

The focus of this study is on identification of the current material management practices, the causes of material management, the impacts of material management on project cost, time, and quality performance, and the measures to be taken which are carried out in Addis Ababa condominium housing construction projects which are in active construction progress.

1.7 Limitations of the study

This research will be limited and focuses on selected Addis Ababa Condominium Housing construction projects sites that are under construction. While conducting this study the researcher faced problems like the unavailability of documents, and the unwillingness of some organizations to provide information. And the major problem was the client was under transformation and the questionnaire participants were transferred to other project sites which makes it difficult to collect the questionnaires.

1.8 Organization of the study

The research study is divided into five chapters, each of which is briefly summarized below.

Chapter one: introduces the back ground of the study, a statement of the problem, followed by research questions and objectives of the research, the scope of the study, the significance of the study, limitations, and the organization of the study are included.

Chapter two: - Discusses the literature review.

Chapter three: - Discusses the research methodology and design in detail.

Chapter four: - Discusses in detail the analysis and discussion of the results.

Chapter five: - Conclusions and recommendations of the findings are forwarded.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The objective of this chapter is to identify the applicability of past studies on the impact of material management practice on project performance which includes mostly time, cost, and quality, and to undertake a research review of various kinds of literature related to practices, causes, measures of material management in the construction industry and its impact on project performance.

This chapter includes a history of condominiums, a definition of keywords in the topic, an empirical review, and a conclusion. The definition of key words discusses the key words defined by different authors to the topic of this study. The empirical review presents a summary of studies conducted to analyze the evaluation of material management strategies on project performance. A summary of research gaps identified in the empirical review is also presented. The conclusions present the general findings of the literature.

2.2. Theoretical Review

2.2.1 The History of Condominiums

According to Ducharme (2019), the first condominium was constructed in New York City in 1881. It was created to meet the housing demands of city people who couldn't afford a single-family house but didn't want to remain renters and had eight units. The structure was regarded as the first multifamily structure that we would identify as a condominium, despite the fact that it was later demolished.

According to Ducharme (2019) Graystone Manor, completed in 1960, is considered as the first contemporary condominium in the United States. It was constructed soon after Utah passed a state condominium act. The floodgates opened soon after the Federal Housing Administration started enabling federal assistance for condos. There are currently more than 30 million condominiums in North America, and that number will only in-

crease. Germany, for instance, widely used condominiums, nothing they were the use of the horizontal division of buildings into separate legal interests, with community ownership of the underlying and surrounding land. (The Germans apparently had not yet thought of or invented non-horizontal, or vertical, division of buildings, today commonly seen in condominium associations as attached town houses.)

2.2.2 History of Housing Condominiums in Ethiopia

Condominium housing is described by UN-HABITAT (2011) as a type of housing tenure in which each resident household owns their own apartment but equally shares ownership and responsibility for the building's common areas and amenities, such as the hallways, heating systems, and elevators. Plots of land are not owned by any one person. Each homeowner on a condominium site is the sole owner of the land.

UN-HABITAT (2011) states that Addis Ababa was the first city in Ethiopia to implement a significant housing development program since 2003. The IHDP (Integrated Housing Development Program) was then ramped up in 2005. The Commercial Bank of Ethiopia (CBE) began offering building financing to local governments in 2006. In 2016, the federal program went into effect. The IHDP has been implemented with a number of goals in the major urban centers.

2.2.3 Material management in construction projects

General

Kanimozhi and Latha (2014), and Donyavi et al. (2009), stated that inadequate material management procedures, which can result in low-quality materials, material damage, inadequate planning, late delivery, and exorbitant expenses, are to blame for a project's failure. A construction project's success depends on efficient construction materials management. As a result, effective material management is essential to preventing project failure. It can also increase a project's productivity, cost effectiveness, and timeliness. According to research, the cost of construction materials accounts for at least 60% of the total cost of a construction project.

According to Kanimozhi G. et al. (2014) and Donyavi S. et al. (2009), Materials manage-

ment is essential to project management since materials make up a significant portion of the project's overall cost. It also has a big influence because having the right resources is crucial to the success of a building project. The project's performance suffers as a result. Effective material management is essential for managing a building site profitably and efficiently. The materials management system for every project makes certain that the right sort and quantity of supplies are wisely selected, effectively purchased, dutifully delivered, and securely handled on-site in a timely manner and at an appropriate affordable cost.

Khyomesh and Chetna (2011) investigated the management of construction materials on Indian project sites. The common problem with material management is that there needs to be a centralized team to coordinate between the site and the organization, that the system needs to be properly controlled, tracked, and monitored, that awareness and accountability need to be established within the organization, that there needs to be an effective MIS that integrates all aspects of material management, and that businesses that use proper material management systems are seen to have increased their overall earnings by 35%.

2.2.4 Material Management Definition

Table 2.1 shows a summary of the definition of material management by different authors.

Table 2.1 Material management definition

No	Authors	Material management definition
1	Stukhart (1995)	Activities involved planning, controlling, purchasing, expediting, transporting, storing, and issuing in order to achieve an efficient flow of materials
2	Dobler and Burt (1996)	system for planning and monitoring to make sure the proper kind and amount of resources used
3	Khyomesh (2011)	A process that coordinates planning, determining the need, sourcing, buying, delivering, storing, and controlling of resources; eliminating waste; and maximizing profitability by lowering the cost of the material.
4	Kanimozhi G. et al. (2014) and Donyavi S. et al.(2009)	Insure that the right quality of material and quantity of materials are appropriately selected, effectively purchased, properly delivered, and safely handled on-site in a timely manner and at a proper reasonable cost.
5	Josephine N.Sila (2015)	Scientific techniques involve planning, acquiring, selecting, purchasing, transporting, storing, and moving materials.
6	Okeke and Mbabuikeu (2020)	The department in charge of organizing the planning, sourcing, buying, moving, storing, and controlling of materials in the best possible way to deliver a predetermined service to the client at the lowest possible cost.

2.3 Material Management Processes

According to Kasim, et al. (2005), the coordination of planning, requirement assessment, sourcing, purchasing, transportation, storage, and control of materials, as well as the reduction of waste and material costs, is known as materials management. The main goal of this coordination is cost optimization, having good quality, and having the needed quantities of material sufficient for the project. Kasim et al. (2005) stated that successful construction project which its material management is good and effective ends to maintain the following five processes.

1. **Material planning: -** Planning is the initial process that needs to be carried out accurately in order to provide a guide to all the subsequent activities. Adopting a good material management plan can increase productivity and profit. Hence, it can help to increase the success of project delivery.
2. **Procurement: -** procurement involves the contractor's appointment and contract documents preparation. Procurement is not only about appointing contractors and preparing a contract but is also very much a starting point in the process of delivery. Activities included in the procurement process range from purchasing equipment, materials, labor, and services required for the construction and implementation of a project.

   Purchasing management involves procuring raw materials, supplies, and services required for production. It consists of the selection of suppliers, negotiation of prices, preparation of purchase orders, and management of supplier relationships.

   The objective of purchasing management is to buy the required materials at the best possible price and quality while ensuring timely delivery**.**
3. **Logistics: -** logistics as a concept that includes movement and it may encompass planning implementing, and controlling the flow and storage of all goods from raw materials to the finished product to meet customer requirements.
4. **Handling:-** effective material handling involves handling, storing, and controlling

construction material. Proper protection during storage is often ignored, and this can result in poor material quality or material deterioration. Handling of materials is the flow of elements that provides for their movement and placement.

5. **Stock and Waste Control: -** According to Prabu and Baker (2006), Stock control is a technique to ensure all items such as raw materials, processed materials components for assembly, consumables stores, general stores, maintenance materials and spare work in progress and finished products are available when required**.**

2.4 Construction Projects Performance and Material Management

According to Cha and Kim (2011) the degree to which a construction project's objectives in terms of cost, time, quality, safety, environment, and other factors are met can be used to assess how well it performed.

According to the PMBOK guide of the project management institute (PMI, 2013), the main factors determining the performance of a project are project integration management, project scope management, project time management, project cost management, project quality management, project human resources management, project communications management, project risk management, project procurement management, and project stakeholder management.

According to Sila and Gakobo (2021) Poor material management leads to project bottlenecks that hinder success, which is mostly to blame for project failure. Poor material management practices are to blame for project failure since they can lead to low-quality materials, material damage, inadequate planning, late deliveries, and expensive expenses. Therefore, effective material management is essential to avoid project failure.

Poor material management can lead to project delays, cost overruns, poor quality, lost productivity, and excessive waste production, among other problems. Only the effects of material management on time, cost, and quality are discussed in this study.

a) Time

According to Chan et al. (2002) Time is defined as the extent to which overall circumstances encouraged project completions within allotted timeframes. Also Brian and Peter (2009) noted that time is a crucial component of a construction contract; as a result, the majority of contracts contain a similar language about completion time that is explicit.

The timely completion of construction projects is crucial.

According to Abdul et al. (2005) Workers attempt not to deplete the stockpile of materials, which results in idle time, which is made worse by work interruptions. Materials must be reordered due to the scarcity, which increases idle time. As a result, the job will move more slowly. Therefore, the time performance is influenced by the availability and quantity of the resources. Also Construction time is impacted by material procurement and inventory. This involves putting mechanisms in place to prevent delays in the supply of supplies and making sure the suitable materials are available to satisfy production needs at the appropriate time and in the appropriate quantity.

b) Cost

Patil and Pataskar (2013) noted that acceptable time needs to be taken into account because ordering supplies too early may have an impact on the company's capital, interest costs, and storage costs. Also Gulghane and Khandve (2015), the entire amount of materials needed on the construction site must also be taken into account, as excess materials on the site are the primary cause of cost variations in construction projects. Organizations must pay additional costs for labor wages and transportation to remove overstocked materials from the job site. Additionally, a lack of standards or poor quality control in material management raises the cost of building. Cost savings can be attained by efficient planning, purchasing, and storage procedures as well as by putting into practice cost-cutting strategies like cutting waste, shortening lead times, and improving the effectiveness of delivery procedures.

c) Quality

According to Wayne (2013), In addition to the execution or installation of a task on a building project in accordance with the conditions of the contract document, quality is defined as a certain attribute, feature, or nature of a product. The materials themselves must also be of the proper quality in accordance with the specification.

Adnan Enshassi et.al, (2007), said that using materials of the right grade can produce work of a satisfactory standard, which will then be approved by the expert. Additionally, the resources must be functioning, adequate in number, and in compliance with the requirements. This entails ensuring that the products and materials used in production adhere to the required quality standards and putting mechanisms in place to stop errors.

2.5 Empirical Review

2.5.1 Material Management Practices

Planning, requirement assessment, sourcing, purchasing, conveying, material storage and regulating, waste minimization, and cost reduction are all steps in the materials management process that are coordinated for the purpose of maximizing profit. Material management has been a big difficulty for the majority of organizations in the construction industry because of a tendency for material misuse.

With the aim of examining the way that building projects are now managed in terms of materials, identifying the reasons why some material management practices are ineffective, and evaluating the impact of the material management process on the completion of construction projects, Mohamed et al. (2021) conducted a study on the effect of material management on the completion of construction projects in Somalia. A questionnaire survey was used to obtain data. The findings highlighted the most common reasons for ineffective material management as well as how it is currently done in building projects.

And the current method of managing materials in a construction project in Somalia is planning, which entails identifying the materials required, budgeting accurately for the construction material management system, organizing appropriate material management in the sector, and generating a preliminary material order. Procurement of material management, which includes material delivery, should be done in accordance with requirements, by having a site representative request the material directly, buying it from the previous supplier, and placing bulk orders of estimated material. Ordering estimated quantities based on the scope of the project, confirming that the material supplied matches the estimate, and choosing the winning supplier based on price are all part of the logistics of material management.

Handling of material management considers the accessibility of materials close to the site, timely delivery of materials, and the prevention of material waste on the construction site when supplying materials. Storage of materials management requires that goods be kept out of the elements, that parties involved in the storage of materials communicate clearly, and materials should be handled properly on the job site. Controlling stock and

waste in material management entails reporting issues, getting bids from a variety of vendors to find the best deal, and tracking material fluctuations through a market survey.

Also, Bamidele and Festus (2016) conducted an assessment of materials management on building projects in Ondo State, Nigeria. The research aimed to assess the current practices of managing materials on building projects in Ondo state. Data were collected through a questionnaire to professionals in both consulting and contracting firms. The study reveals that purchasing materials, material planning methods, and transportation of materials are the most common practices of materials management.

Asegid, Srinivas, and Krishna (2020) also investigated how construction materials were managed on project sites in Ethiopia. A questionnaire was used to gather the information. According to the research, handling and managing materials improperly on the job site has a negative impact on project costs. A properly implemented material management program can ensure that materials and equipment arrive at the job site on time, which will help with planning, improve labor productivity, create better schedules, and reduce project costs. The author has undergone /chosen/ to find out the typical material management practices and Construction material management strategies are adopted by 80% of big enterprises, with the remaining 15% improperly utilizing the procedures. The author also concluded that there should be centralized main team coordination between the site and the organization, proper control, tracking, and monitoring of the system required, and awareness and accountability should be created within the organization. Additionally, effective material management is crucial to the success of any major undertaking project.

2.5.2 Causes of Ineffective Material Management in the construction industry

Okeke and Mbabuike (2020), conducted research on an overview of materials management control for effective project delivery. Findings showed that the lack of specified quantities of materials before orders are placed is one of the main causes of bad material management. lack of consideration in detail of the period over which deliveries can be spread without affecting the contract, delay in receiving materials on sites, poor control of materials wastage on site, lack of consideration of making deliveries of materials at schedule dates and time, lack of keeping adequate buffer stock in case of delay in receiv-

ing materials, non-consideration of stocking materials at various points where work is going. Also, the author added other factors responsible for poor material management as inadequate protection of materials which can cause problems with the workman shop and general finish, lack of planning of sites to indicate the main storage area and stockpiles, lack of procedures for checking, inspecting and documentation of materials, lack of coordination for movement of plant handling materials, lack of a coordinate system of withdrawing materials from the stores and lack of proper design.

Bamidele and Festus (2016) conducted an assessment of materials management on building projects in Ondo State, Nigeria. The aim of the research was to assess the current practices of managing materials in building projects, the problems associated with materials management, and measures for managing materials in building projects in Ondo state. Data were collected through a questionnaire to professionals in both consulting and contracting firms.

Insufficient storage space, delayed delivery of ordered materials, inexperienced material suppliers chosen for the projects, access issues to the site, difficulty managing materials among subcontractors due to the limited storage space on site, damage to materials during transportation to the site, a lack of security personnel, lack of implementation of health and safety procedures on site, and a hindrance to work are all issues with material management, according to the study.

A study on the effects of material management on the performance of particular building projects in Rwanda was carried out by Kayiranga, Nyamweya, and Shukla (2020). Additionally, Mohamed et al.(2021) study on the effect of material management on the completion of building projects in Somalia revealed the root causes of poor material management practices in construction projects phase by phase.

Undefined scope, a lack of communication, insufficient drawings, non-standard specifications, and a lack of knowledge of what and when the material is needed are all examples of material identification causes of poor material management.

Organizing the administration of materials having no list of the materials to be purchased, insufficient knowledge of material supply, and improper scheduling of material on site are some of the factors that contribute to inefficient material management.

Lack of calculating the amount of material required, poor material verification based on

amounts ordered, inappropriate tracking of material supply on-site, and lack of benchmark for gauging quality material are all procurement of material management causes of ineffective material management.

Poor communication between partners in the material supply chain, an excessive number of difficult-to-select suppliers, and inadequate or late detail drawings are some of the logistical causes of unsuccessful material management. Poor material supervision, material exposure to harsh weather, material wastage on the site, and an abundance of material on the site are all factors that contribute to improper storage of material management.

Poor on-site material storage systems, adequate material stocking, storage of material that should be free from harsh weather or climate, insufficient storage facilities, and storage facilities that are exposed to harsh weather are all causes of stock and waste control material management.

Lack of necessary knowledge about the supplier, inadequate storage facilities, and wrong material arrangement are some of the factors that contribute to ineffective material management Stock and waste control.

In addition, Vikram, Rohit, and Mohit (2017) investigated how major, medium, and small construction contractors view the issues influencing materials management in the sector. A questionnaire was used to gather the information. The results demonstrate that the three types of factors vary depending on the contractor's competence; for example, delays caused by supplies being rejected by the quality control team, transportation issues, and seasonal issues are factors impacting materials management in major enterprises. The variables that affect small and medium-sized businesses are: delays brought on by the quality control team rejecting supplies; transportation issues; seasonal issues; labor strikes; communication issues; increases in material pricing; poor material management; and incorrect material handling.

Additionally, from the perspective of contractors, Anwar et al. (2015) conducted research on the elements influencing material supply, management, and procurement in construction projects in Pakistan. Data were gathered through a questionnaire in this study, and the top five most important factors identified were: difficulty managing materials among sub-contractors due to the limited storage space on-site; difficulty storing materials on-site due to the lack of space available; conflict between sub-contractors due to the acute

space available for material, incorrect material stocking and a challenge coordinating the material of subcontractors on-site are obstacles to the progress of the work.

According to Khyomesh and Chetna (2011) and Zaha (2017), the problems with material management vary depending on the stage of construction. The material identification phase is characterized by an unclear scope, a lack of communication, incomplete drawings, a failure to adhere to requirements, nonstandard specifications, incomplete meetings, a discrepancy between plans and specifications, and a failure to identify the type of materials that are required. A controlled bid list, incomplete offers, and time spent researching unqualified providers are all part of the vendor selection phase. Problems with materials availability, quantity, matching price to competitors' price, late deliveries, incorrect submittals, poor communication, lack of conformance to requirements, arbitrary delivery dates, ambiguous stated requirements, re-handling of materials, storage of materials, theft, and damage are all included in the procurement phase. The delivery of the wrong kind of material, the wrong sizes, the wrong quantities, the tracking of the material, the handling and storage of the material again after loss or damage, the lack of supplier quality assurance, poor communication, and the receipt, handling, and storage of unused materials are all aspects of the construction phase.

Research on the elements affecting the material management methods of building works in Ekiti state, Nigeria, was done by Olanrewaju, Olatuny, and Okedare (2021). The objective was to rank the variables influencing the material management approaches used in construction projects in Nigeria's Ekiti state. To collect information, a questionnaire was issued to experts. And analysis of the questionnaire responses revealed that material delivery, accessibility to the material in the local market, material changes in type and specification during construction, material damage in storage, delay in the special manufacturing of building materials, erratic supply from material suppliers, inadequate planning and coordination, poor communication between sites, transportation for large quantities, and inadequacy of the waste management plan.

In Ethiopia, research on the management of materials has been done. Using appropriate, safe, and secure storage, congested sites, attention to weather conditions, adequate supervision and proper control during storage, reporting the situation of materials in the project's store, frequency of returning purchased materials, identifying material schedule,

and employment of store keeper were the factors that Sori et al. (2021) identified in their research as relating to the management of building construction materials in building construction projects.

Additionally, Tibebu (2016) did study on the methods used in defense construction companies to handle materials. The findings demonstrate that inappropriate material issuance, improper material sourcing, and improper material use all have a greater impact on the material on the enterprise's building site.

2.5.3 Impact of Material Management Practice on Project Performance

In Abuja, Nigeria, Albert, Shakantu, and Ibrahim (2021) studied the effects of subpar material management in the construction sector. This study looks at how materials waste, labor quality, and project profitability are affected by inadequate materials management in Nigerian construction projects. The effect of bad materials management on profitability is revealed to be Poor material management results in suboptimal material accounting, which reduces profitability. Poor material management also increases waste. Low profitability results from improper material storage on the job site, which encourages material theft. Poor materials management raises sub-optimal material quality, which causes rework and decreases profitability. Poor site storage of materials results in damage/destruction, which lowers profitability. Profitability is impacted by claims/expenses and health and safety issues that are increased by inadequate materials management.

A study on the effects of efficient material management on the productivity of small and medium-sized construction firms was also carried out by Sohrab and Roger (2009). The study sought to explain how SMEs might enhance project delivery, save costs, and enhance performance in materials management. Interviews and case studies have both been used.

The authors claim that as materials movement is taken into account throughout the supply chain and up until installation on site, a project with a successful supply chain will be successful and productive. Regardless of the project size, planning is essential to establishing effective management systems to regulate resources. It has also been argued that construction projects involve a lot of diverse parties, abilities, and specialists, each of whom contributes to the project's success.

The impact of material management on project performance, according to Zairra and Narimah (2017), had been identified as the availability and sufficient materials and equipment having an impact on time, quality, productivity, and performance, appropriate quality material having an impact on time, cost, and quality performance, on time and reasonable time of material procurement having an impact on time and cost performance, and efficient inventory system and documentation having an impact on time, and minimizing procurement costs has an impact on cost performance, appropriate site storage has an impact on productivity and waste performance, efficient site layout has an impact on productivity performance, easy site access has an impact on productivity performance, unconfined working space has an impact on productivity, performance efficient material controlling has effect on waste performance.

Since materials account for a sizable amount of the project's overall expenditures, material management is a crucial component of project management. Additionally, it's important since having the right resources is essential to the success of every construction project. As a result, it has ramifications for the success of the project.

Other study on the material management and project performance of construction enterprises in Nairobi city was undertaken by Josephine (2020). The project's productivity, cost effectiveness, and on-time completion were all goals that were to be improved. The information was acquired via distributing a questionnaire to responses. According to the study, using effective allocation and management of the materials used in construction helped the projects get done. Ineffective material management techniques can lead to low-quality materials, damage to the materials, poor planning, delayed deliveries, and expensive. Effective material management, the capacity to reduce costs, and construction companies' planning for the materials to be used are crucial to the project's timely completion. Successful project completion within budget is largely dependent on these factors. The mean was computed based on the data gathered from the many responders from the field, as good planning helps to reduce delays in project delivery.

A negative influence on the project will ultimately result from changes in storage costs and the targeted value of the project, which are also considered. Additionally, transportation strategies for moving materials have an impact on how successfully the project is managed. And having lower transport standards on project success affects project per-

formance. The proper transportation of materials is necessary to prevent material damage during the process, which could affect project quality and the completion of projects within the designated timeframes and budget. The fourth need is that materials must be stored in secure locations where they may be protected from external threats and kept in good quality. The structural integrity of the material is preserved during project implementation thanks to proper storage, which is crucial. To prevent material theft, which could result in extra losses to the project and increase the cost of implementation while delaying it, the storage rooms should be well strengthened.

The impact of poor material management, according to Okeke and Mbabuike (2020), includes systematic operation, a decrease in the cost of material handling, a decrease in the project's overall cost, an increase in labor productivity, time management, quality control, a better relationship with suppliers, and a better relationship with customers. As a result, material management has existed for as long as the building business. It is a practice that primarily affects time, quality, and expense.

In addition, a study on the effects of material management on the performance of particular building projects in Rwanda was carried out by Kayiranga, Nyamweya, and Shukla (2020). The purpose of the study was to investigate how material management techniques affected and how well the building project performed. In particular, the effects of procurement on the performance of construction projects, the effects of material estimating prices on project performance, and the effects of inventory control on the performance of construction projects were all addressed. In this research questionnaire, an interview guide, and documentary analysis were used. The study showed how different categories of material cost estimation effects affect how well construction projects perform in terms of reducing delays, enhancing service quality, ensuring a steady supply of goods and services to users and customers, and ensuring price control for materials as well as helping to control product prices and stock levels.

The other is how inventory control affects how well building projects perform. fewer wastes, lower production costs, better products, on-time deliveries, higher profits, lower stock levels, quicker production cycles, and more adaptable systems. Additionally, the effects of procurement on the performance of construction projects enhance the quality of materials purchased, ensure that sufficient quantities of materials are available, identify

material needs, choose potential sources of supplies, settle favorable tendering prices, and ensure that the right materials are purchased at reasonable prices.

A study on the effects of material management on the completion of building projects in Somalia was done by Mohamed Yusuf et al. (2021). The study also showed how material management practices affected how projects were completed on the building site. The first is the occurrence of cost overrun, which denotes additional costs above the amount originally agreed upon in the contract. This results in lower returns on investment, higher rental prices for the end user, and could cause the contractor to lose money. It can also lead to project abandonment, a decline in construction activities, and the impediment of a planned increase in the production of goods and services.

The second is the time which can result in a delay in the progress of the work, third-party complaints and contract cancellation or abandonment, and late completion of the project. The third one is quality which results in loss of productivity of work, rework because of the flawed design and low-quality building materials.

Idowu, Winston, and Kabir (2018) conducted study on the impact of materials management practices on Nigeria's building construction sector. This study assessed how materials management affects construction projects. Questionnaires given to building site professionals were used to collect data. Environmental impact, economic impact, and performance impact are the three categories the author uses to characterize the effects of materials management. The study demonstrates how materials management techniques have a positive impact on how materials are handled generally, leading to greater effectiveness and efficiency on the construction site.

The paper also shows that inefficient handling of building materials has an impact on how well construction projects perform overall in terms of cost, time, quality, and productivity. Practices in materials management increase the efficiency of project planning and execution, resulting in lower project costs. Additionally, minimizing material waste during the construction phases is crucial to prevent revenue loss. To ensure timely project execution and standard work delivery within reasonable cost, time, and quality constraints, proper planning of material management practices should be implemented from the beginning of project execution. This should be done on all sites and by all categories of the construction industry, whether large, medium, or small.

2.5.4 Measures for Effective Material Management in Construction Industry

Questionnaires were utilized to gather information for Nann and Aye (2014) study on the factors influencing material management in building construction projects. The study found that effective material management involves defining precise material specifications, locating sources for procurement, obtaining approval for sample materials, forecasting future field conditions, weather, and events, forecasting material price in the market, preparing for material storage, taking into account necessary communication techniques for material management, identifying material schedule, and daily recording of material usage reporting the state of the materials in the project's store, highlighting issues like waste and loss during storage and delivery, monitoring market prices and noting price changes, using appropriate, safe, and secure storage, taking into account efficient mechanical systems and machinery for moving materials, planning and monitoring construction activities, taking into account off-site construction, and making efficient use of packaging, Educating people on waste reduction techniques, using recycling and reuse techniques for excess and waste materials, limiting over ordering and purchase, paying attention to the weather, hiring storekeepers and security staff.

The measures to have effective material management, according to Bamidele and Festus (2016), include improving supervision on site, ensuring that materials are handled properly when delivered, taking inventory of materials on site, increasing awareness of the importance of knowledge of materials management on building projects, especially on construction sites, and paying attention to the weather.

2.6 Gap Identification

Despite the fact that numerous investigations were carried out locally and internationally to find the impact of material management practice in project delivery in the construction industry. The following are the gaps identified. Addis Ababa condominium housing due to the unique nature of this housing construction project there is no research conducted on this title and it needs to be conducted. Most of the studies conducted in Ethiopia did not include the impact of material management practice on project performance. This study intention was to fill the literature and practical gap on the impact of ineffective material

management practice on Addis Ababa condominium housing construction project sites performance in terms of time, cost and quality. Table 2.1 below shows the summary of gap identification.

Table 2.1 Summary of gap identification

No.	Source	Gap
1	Zaha,(2017)	The researcher focused on project delivery time and cost. however, project delivery in terms of quality was not mentioned..
2	Tibebu Kebede, (2016)	The research only asses on material management practice not its impact on project delivery/performance.
3	Josephine N. Sila, (2015)	The study did not examine the effects of poor material management techniques on project delivery or performance; rather, it examined the relationship between construction companies' material management and project performance.
4	Asmara Seyoum, (2015)	The most important causes of construction waste on building construction projects were determined by the researcher. But excludes all methods of material management, such as preparation, acquisition, shipping, handling, and storage.
5	Idowu, Winston, and Kabir, (2018)	This paper breaks down the effects of materials management into three categories: performance, economic, and environmental. But not taking into account its connection to project delivery as well as the reasons behind inefficient material management methods and the necessary remedial actions.
6	Okeke and Mbabuike, (2020)	The study talked about the difficulties. However, they are not incorporated into the strategies for efficient material management in the building sector.

2.7 Summary of Literature Review

The techniques used to control construction materials have been the subject of extensive research for many years. Although there are many definitions of "material management," most scholars concur that it refers to a process that coordinates planning, requirement assessment, sourcing, purchasing, transportation, storing, and controlling materials, minimizing waste, and optimizing profitability by lowering the cost of the material. In order to improve the entire handling of materials for greater effectiveness and efficiency on the building site, the systematic literature study found that materials management practices need to be transformed. This is because the way in which construction projects are often managed can have an effect on how well they perform in terms of cost, time, quality, and productivity.

According to the literature analysis, inadequate material management practices, which can lead to subpar materials, damage to the materials, inadequate planning, late deliveries, and high prices, are to blame for a project's failure. A construction project's success depends on efficient construction materials management. As a result, effective material management is essential to preventing project failure. It can also increase a project's productivity, cost effectiveness, and timeliness. According to research, the cost of construction materials accounts for at least 60% of the total cost of a project.

Effective material management is crucial for running a profitable and economical construction site. The materials management system for any project makes sure that the required materials, in the right quantity and quality, are effectively selected, successfully acquired, appropriately supplied, and appropriately managed on-site in a timely manner and at a reasonable cost. It has been highlighted that substantial research has been conducted to evaluate different construction waste management strategies at a certain stage of a construction project.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter provides an overview of the various methods for gathering and analyzing data. It explains the methodology utilized to conduct this research as well as the type of research approach employed to gather data. The research design, sample size, sampling method, data source and collection method, data collection procedure, data analysis method, questionnaire design, questionnaire content, and assessments of the reliability of the questionnaire are all included in this. The technique used to analyze the data comes last.

3.2 Research Design

According to Leedy (1997) defines research design as a plan for a study, providing the overall framework for collecting data. The study started with secondary data collection through an extensive literature review from various sources comprising reference books, journals, and websites. The literature review was followed by a second stage of data collection, which is a questionnaire survey and interview. A questionnaire that covered the respondent's Profile, the current practice of material management, causes of ineffective material management practices, impacts of material management practice on project performance, and measures to be taken for effective material management.

3.3 Research Approach, and Data source

Research Approach

To achieve the research objectives, this research method is a combination of both qualitative and quantitative methodology means this research used a mixed method.

Data source

Two types of data sources are used in this research both primary and secondary. The secondary data was collected through an extensive literature review from various sources comprising reference books, journals, and websites. The primary data source is collected through a questionnaire survey, interview, and direct observation.

3.4 Population and Sampling Techniques

3.4.1Target population

The population for this study was taken from the stakeholders involved in selected construction projects which include contracting companies, consultants, and client. Because the population from which a sample was drawn did not constitute a homogeneous group, the target population was classified into the stratum of contractors, consultants, and government offices or clients. The contractors and consultant companies had valid registration according to the Ministry of Urban Development and Construction (MoWUD) which participated in Addis Ababa housing development corporation (condominium) projects.

3.4.2 Sampling method

In this study, the researcher used both probability sampling techniques and non-probability sampling techniques. Since the researcher needed a limited number of people can serve as primary data sources for the questionnaires stratified sampling technique was used. Which involves the population is divided into three subpopulations or strata client, consultant, and contractor. This allows ensuring every construction party in the projects is represented in the sample.

For the interview, the purposive/ judgment/ sampling technique was used which is the researcher believes that the samples are most useful and can get detailed knowledge about the specific objectives of the research. The criteria for this were the experience of participants in Addis Ababa condominium housing construction projects in the construction department. Inclusive populations are who have experience more than five years in Addis Ababa condominium housing construction projects in the construction department.

3.4.3 Sample size

There are total of 10 of housing project sites in Addis Ababa condominium housing. In the case of the research population, it does not mean that all members of stakeholders are possible respondents for the questionnaire, and not all Addis Ababa condominium housing construction projects sites are included. From ten projects four are selected that is projects 01, 02, 03, and 08. These four projects are selected because they are still active projects and the other six project sites have more than 90% working progresses which are

not convenient for this study.

a) Branch one project site

The location of this project site is Bole Bulbula. In this project, 89 building blocks were constructed by 28 contractors in grades one through three and three class one consultants. Out of the entire number of building blocks, 8 are B+G+7 typologies, 8 are B+G+9 typologies, 13 are 2B+G+12 typologies, 34 are 2B+G+13 typologies, 15 are 2B+G+15 typologies, and 11 are 2B+G+18 typologies. There are a total of 11,985.00 housing units in the project.

b) Branch two project site

The Bole Ayat Area is where this project's site is situated. 50 contractors in grades one through three and three consultants in class one worked together to construct 206 building blocks for this project. 90 building blocks out of the total number are B+G+8 typology, 35 are B+G+10 typology, 47 are 2B+G+13 typology, and 34 are 2B+G+15 type. Three different types of bed rooms, including one-bed, two-bed, and three-bed rooms, are included in the project. There are 1,780 houses with a single bedroom, 6,762 houses with two bedrooms, 4,272 houses with three bedrooms, and 4983 shops.

c) Branch three project site

The Bole beshale Area is where this project's site is situated. The construction of 58 building blocks involved 27 contractors from grades one through three and one class one consultant. Out of the total number of building blocks, 21 are B+G+9 typologies, 15 are 2B+G+13 typologies, and the remaining 22 are 2B+G+15 typologies. 6,581 homes total. There are 902 one-bedroom apartments, 2,874 two-bedroom apartments, 1,406 three-bedroom apartments, 1,414 shops, 4,272 three-bedroom apartments, and 4983 shops.

d) Branch eight project site

The Leghar Area is where this project's site is situated. The construction of 12 building blocks used one public consultant and 12 grade one contractors. The entire structure is based on the 3B+G+21 typology with 1920 houses. There are 1,414 shops, 480 one-bedroom apartments, 480 two-bedroom apartments, 960 three-bedroom apartments, and 480 two-bedroom apartments.

From these four project sites 117 contractors, 8 consultants, and four client project branch offices with a total population of 135 individuals are participated in the questionnaire.

Construction industry professionals who work for these construction companies were the survey's target respondents. Project managers, local engineers, site engineers, foreman, and office engineers are included in this study.

The following Taro Yamane sampling formula Yamane (1967) is used to calculate the sample size for the questionnaire.

Yamane's Formula

$$n = \frac{N}{1 + N(e)^2}$$ …….. [Eq. 3.1]

Where: e = precision level (in this case 0.95)

N= population size

n = sample size

n =135/ (1+135*0.0025)

n =100.9~101

Consequently, depending on the proportionate population size of the parties on the project, 101 questionnaires were issued to the parties.

3.5 Method of Data collection

In this research, methods of data collection include a literature review, questionnaire, case study (through the interview), and site visits. This means data was obtained using two different methods. Namely interviews, site visits, and questionnaires which are referred to as primary sources of data, and literature review as secondary data. Site visits involved observations where the researcher sought to find out how materials management works how they are planed, stored, stocked, and how waste is controlled.

3.5.1 Collection of data through Interview and Focus Group Discussion

In this study unstructured interview and semi structured focus group questions were conducted. The FGD started with a round of introduction of participants and Introduce the main topic and the overall research question then proceeds to ask specific questions listed in the discussion guide in this study only one specific objective was included that is identification of the impacts of material management practice on project performance with a total of four question. A total of 12 participants were involved from four project sites with three participants each. Which have similar work experience in Addis Ababa condominium housing construction project sites. It promotes conversations with other participants, unlike other research approaches.

An unstructured interview was conducted in the form of a dialogue between the interviewer and an interviewee to select detailed and important data for the analysis. The interviews were conducted in person. First, the researcher checked if the participants are voluntary. The interviewees' convenience was taken into consideration when choosing the time and day. The interview was scheduled to take place between mid-October and mid-November 2022. The sessions lasted 20- 40 minutes, but the participants were given opportunity to talk as much as they wish without time restriction.

According to Derbisa (2018), interviews allow researchers to capture the perspectives of the participants. The use of interviews for data collection is based on the assumption that the participants' perspectives are meaningful, clear, and accurate. In this research, the participants in the interview were individuals from all parties (client, consultant, and contractor) with five years and more working experience as project managers, project coor-

dinators, resident engineers, site and office engineers in Addis Ababa housing development construction projects. Three participants from each project site were selected with a total of 12 interviews were conducted. The interview was needed to gather additional information about the objectives of the research study.

3.5.2 Collection of data through Questionnaires

To design a questionnaire first it needs to identify various material management practices, their impact, causes, and the measure to be taken should be extracted from a literature review.

The survey asks on a variety of things, including issues like material management practices in different stages, causes of material management, the impact of material management practice on project performance, and measures to be taken for effective material management on Addis Ababa condominium housing construction sites. All items in the questionnaire are arranged in a form of Likert items on a scale ranging from 1 to 5.

A survey is used to gather demographic data or opinions about people. In this research, a questionnaire was taken to the persons concerned with a request to answer the questions in person and returned. The respondents have to answer the questions on their own. In this research, the questionnaire contains five different sections.

3.4.2.1 Questionnaires survey section A

In this section, the background of the participants is identified like gender, current work position, work experience in the construction industry, education qualification, and organization they are working included.

3.4.2.2 Questionnaires survey section B

The first objective of the study was to identify the current material management practices of Addis Ababa condominium housing construction projects. The material management practices identified by other researchers are discussed in the literature review. This information helped to formulate the questions for section B.

3.4.2.3 Questionnaires survey section C

The second objective of the study was to identify the causes of ineffective material management practices of Addis Ababa condominium housing construction projects. The causes of ineffective material management practices identified by researchers are also

discussed in the literature review. This information helped to formulate the questions for section C.

3.4.2.4 Questionnaires survey section D

The third objective of the study was to identify the impact of ineffective material management practices on the project performance of Addis Ababa condominium housing construction projects. The impacts of ineffective material management practices on project performance identified by other researchers are discussed in the literature review. This information helped to formulate the questions for section D.

3.4.2.4 Questionnaires survey section E

The fourth objective of the study was to identify the measures to be taken for effective material management practices of Addis Ababa condominium housing construction projects. The measures to be taken for effective material management practices identified by other researchers are also discussed in the literature review. This information helped to formulate the questions for section E.

3.5.3 Collection of data through Direct Observation

Derbisa (2018) asserts that by investigating and comprehending the background of the operations, researchers can build a comprehensive grasp of a topic by observing operations and activities. There are two types of observations these are direct observation and participant observation. In this research direct observation was used in which the observer watches rather than takes part in the activities focused. The observations can be so valuable that one may even consider taking photographs at the site. Unfortunately, the resources did not permit multiple observers in the three project sites but in the project 8 site, the researcher get formal observations in the other three project sites casual observations were applied for this research, and during these site visits an interview was conducted.

3.6 Data analysis and presentation method

3.6.1 Data analysis

The data collected using the questionnaire sections A, B, and section D (background information, current material management practice, the impact of material management

practice on project performance of Addis Ababa condominium housing construction project) to display the gathered data in frequency, percentage, tables, and charts, the obtained data was analyzed using descriptive statistical analyses of the SPSS software.

According to Derbisa (2018), descriptive statistics denotes the analysis of data that helps to explain, show or summarize numerical information in a meaningful pattern. It is simply a way of describing the information as it appears. For measures to be taken for effective material management mean was used and analyzed using SPSS software to describe the group's typical behavior. Tables and bar graphs were used to display the mean scores. The Relative Importance Index was used to find out the most significant causes of ineffective material management practices in Addis Ababa condominium housing construction project sites.

3.6.2 Research Reliability

The Cronbach's alpha coefficient is used to determine the consistency or reliability of data collected through surveys. This is done using SPSS.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

In this chapter of the research the data gathered from the questionnaire survey and In this chapter of the research, the data collected from the questionnaire survey and unstructured interview were presented, interpreted, analyzed, and discussed in detail to justify the material management practices, the impact of material management practices on project performance, identify causes of material management and the measures for effective material management, and the practices of material management on the projects were discussed from perspectives of professionals.

4.2 Reliability test

Before doing an analysis based on the questionnaire's answers, a reliability study using Cronbach's Alpha was done to make sure the questions were internally consistent. There is no internal consistency between the items, as shown by the result with Cronbach Alpha 0.582 in table 4.1 below section b. This indicates that some of your items are not typical of the behavior domain. This is due to the fact that the Cronbach's alpha coefficient's minimum level of reliability is 0.7, and any result below this level denotes that the variables are inconsistent and unreliable (Fellows & Liu, 2007).).

Table 4.1 Reliability Statistics

No.	Section	Cronbach's Alpha	N of Items
1	B	0.582	19
2	C	0.843	30
3	D	0.806	9
4	E	0.785	20
Overall		0.754	78

To improve the reliability is to remove some odd items in the internal consistency. And the new Cronbach's Alpha value for section B with 16 items is 0.702 which is acceptable.

4.3 Questionnaire survey response rate and Background of respondents

4.3.1 Questionnaire survey response rate

For this project, a total of 101 questionnaires were circulated out of these 54 questionnaires were distributed for contractors, 25 questionnaires were circulated for consultants, and 22 questionnaires were circulated for clients. Since 74 questionnaires were sent, the response rate was 73.27 percent, which is considered appropriate for study. The response rates to the questionnaires are displayed in Table 4.2 below:

Table 4.2 Response rate

Name of projects	**Total population**	**Number of questionnaires distributed**	**Number of questionnaires responded**	**Response rate**
Project 1	33	25	16	**64%**
Project 2	39	29	22	**75.86%**
Project 3	36	27	19	**70.37%**
Project 8	27	20	17	**85%**
Total	**135**	**101**	**74**	**73.27%**

4.3.2 Background of Respondents

The demographic data of the participants is included in the questionnaire's first section. These elements include: gender, level of education, work experience, job profession, and organization respondents represent. This is described in tables.

4.3.2.1 Respondents Gender

Table 4.3 below shows the respondent's gender that took part in the survey. From the Table most of the respondents 67.6% are Male and 32.4% of the respondents are Female.

Table 4.3 Respondent's gender

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Male	50	67.6	67.6	67.6
	Female	24	32.4	32.4	100.0
	Total	74	100.0	100.0	

4.3.2.2 Respondent's job position

Table 4.4 below shows the Respondent's job positions that took part in the survey. About 14.9% of the respondents are project managers, 25.7% are office engineers 47.3% are site engineers, 10.8% are resident engineers and 1.4% are other professionals.

Table 4.4 Respondent's job position

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Project manager	11	14.9	14.9	14.9
	Office engineer	19	25.7	25.7	40.5
	Site engineer	35	47.3	47.3	87.8
	Resident engineer	8	10.8	10.8	98.6
	Other	1	1.4	1.4	100.0
	Total	74	100.0	100.0	

4.3.2.3 Respondent's Educational Qualification

Table 4.5 below shows the respondent's educational qualifications that took part in the survey. About 70.3% of the respondents are first Degree holders, Master's degree holders make up 29.7% of responses. In conclusion, every respondent has a first degree or higher.

Table 4.5 Respondent's educational qualification

		Frequency	Percent	Valid percent	Cumulative percent
Valid	BSC	52	70.3	70.3	70.3
	MSC	22	29.7	29.7	100.0
	Total	74	100.0	100.0	

4.3.2.4 Respondent's Work Experience

The respondent's job history is displayed in Table 4.6 below for those who participated in

the survey. A little more than 29.7% of respondents have less than five years' experience, compared to 43.2% who have worked for construction companies for at least five years but fewer than ten, 23% who have more than ten years' experience but fewer than fifteen, and 4.1% who have more than fifteen years' experience.

Table 4.6 Respondent's work experience

		Frequency	Percent	Valid percent	Cumulative percent
Valid	0-5	22	29.7	29.7	29.7
	6-10	32	43.2	43.2	73.0
	11-15	17	23.0	23.0	95.9
	16-20	3	4.1	4.1	100.0
	Total	74	100.0	100.0	

4.3.2.5 Respondents Representing Organization

The respondents from the organization that participated in the survey are listed in Table 4.7 below. Clients make up around 24.3% of respondents, consultants make up about 23%, and contractors make up the remaining 52.7%.

Table 4.7 Respondents representing the organization

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Client	18	24.3	24.3	24.3
	Consultant	17	23.0	23.0	47.3
	Contractor	39	52.7	52.7	100.0
	Total	74	100.0	100.0	

4.4 Response to the current practice of material management in Addis Ababa condominium housing construction projects

The first objective of the research was to identify the current practice of material management at the Addis Ababa condominium housing construction project.

Table 4.8 below summarizes the response about the planning practice of material management.

For the practice, there is a plan for materials needed the respondents who disagree are 77%, 21.6% strongly disagree and 1.4% strongly agree. This means that most of the respondents disagree on the practice of planning for materials needed. The researcher can say that they think the practice of planning for materials needed is poor.

For the practice of preparing the material schedule, the respondents who strongly disagree are 25.7% and 74.3% disagree on the practice of preparing material schedule which means most of the respondents disagree on the practice of the organization prepare a material schedule. The researcher can say that they think the organization doesn't have practice in preparing the material schedules. For the practice of the organization preparing preliminary material order the respondents who strongly disagree are 6.8 %, 90.5 % disagree, 1.4% neither agree nor disagree and 1.4% agree. This means there is poor practice in preparing preliminary material orders.

Table 4.8 Response to the planning of material management practice

The organization Plan for the materials needed					
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly Disagree	16	21.6	21.6	21.6
	Disagree	57	77.0	77.0	98.6
	Strongly Agree	1	1.4	1.4	100.0
	Total	74	100.0	100.0	
The organization Prepares a material schedule					
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly Disagree	19	25.7	25.7	25.7
	Disagree	55	74.3	74.3	100.0
	Total	74	100.0	100.0	
The organization Prepare preliminary material order					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6.8	6.8	6.8
	Disagree	67	90.5	90.5	97.3
	Neutral	1	1.4	1.4	98.6
	Agree	1	1.4	1.4	100.0
	Total	74	100.0	100.0	

From the above survey result, the researcher comes to an understanding that on the selected Addis Ababa condominium housing projects the majority of respondents believe that there is poor material management planning.

Table 4.9 below summarizes the response about the practice of procurement of material management.

For the practice of the organization identifying the conformity of materials with specification 77% of the respondents disagree, and 23% of the respondents strongly disagree. This means that they believe there is poor practice on Identify the conformity of materials with the specification. For the practice of the organization Purchasing material in bulk 9.5% of respondents strongly disagree, 77% disagree, 12.2% neither agree nor disagree, and 1.4% agrees. This shows that they believe there is poor practice in purchasing material in bulk. For the practice of selecting a lower-price supplier as the winner 56.8% of respondents strongly disagree, and 43.2% disagree. This shows that they believe there is poor practice in selecting lower-price suppliers as the winner.

Table 4.9 Response to the procurement of material management practice

The organization Identifies the conformity of materials with the specification					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	17	23.0	23.0	23.0
	Disagree	57	77.0	77.0	100.0
	Total	74	100.0	100.0	
The organization Purchase material in bulk					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	9.5	9.5	9.5
	Disagree	57	77.0	77.0	86.5
	Neutral	9	12.2	12.2	98.6
	Agree	1	1.4	1.4	100.0
	Total	74	100.0	100.0	
The organization Select lower price supplier as the winner					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	42	56.8	56.8	56.8
	Disagree	32	43.2	43.2	100.0
	Total	74	100.0	100.0	

From the above survey result, the researcher comes to an understanding that the majority of respondents believe that there is poor practice in the procurement of material management in the selected project sites.

Table 4.10 below summarizes the response for practice on logistics of material management.

For the practice of checking the supplied material in accordance with estimation, 60.8% of the respondents strongly disagree, and 39.2% of the respondents disagree. This shows that they think there is poor practice in checking the supplied material in accordance with estimation. For the practice of developing site layout and material location, 44.6 % of respondents strongly disagree, and 55.4% disagree. This result shows that they think there is poor practice in developing site layouts and material locations. For the practice of ordering the material needed based on the amount of work 23% of respondents strongly disagree, 68.9% disagree, and 8.1% neither agree nor disagree. This shows that they think there is poor practice in ordering the material needed based on the amount of work. Therefore the practice of logistics in Addis Ababa condominium housing construction projects is very poor.

Table 4.10 Response to logistics of material management practice

The organization Check the supplied material in accordance with the estimation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	45	60.8	60.8	60.8
	Disagree	29	39.2	39.2	100.0
	Total	74	100.0	100.0	
The organization Develop the site layout and material location					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	33	44.6	44.6	44.6
	Disagree	41	55.4	55.4	100.0
	Total	74	100.0	100.0	
The organization Order the material needed based on the amount of work					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	17	23.0	23.0	23.0
	Disagree	51	68.9	68.9	91.9
	Neutral	6	8.1	8.1	100.0
	Total	74	100.0	100.0	

Table 4.11 below summarizes the practice of handling and storage of material management.

For the practice of preparing a sufficient place for material storage, 60.8 % of the respondents strongly disagree, 39.2 % of the respondents disagree, 0% neutral, 0% agrees and 0% strongly agrees. This means that most of the respondents think there is poor practice in preparing a sufficient place for material storage. For the practice of care in the transportation of materials 43.2 % of respondents strongly disagree, 55.4 % disagree, and 1.4 % neither agrees nor disagrees. This means that most of the respondents think there is poor practice on care in the transportation of materials in selected Addis Ababa condominium housing construction sites. For the practice of proper storage and handling of material, 44.6 % of respondents strongly disagree, 54.1 % disagree, and 1.4% agrees. This means most of the respondents think there is poor practice on proper storage and handling of material in selected Addis Ababa condominium housing construction sites. For the practice of efficient communication about the storage of materials between parties, 54.1% of respondents strongly disagree, 45.9% disagree. This means that most of the participants think there is poor practice inefficient communication about the storage of materials between parties.

Table 4.11 Response to handling and storage of material management practice

The organization Prepares a sufficient place for material storage					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	45	60.8	60.8	60.8
	Disagree	29	39.2	39.2	100.0
	Total	74	100.0	100.0	
The organization cares about the transportation of materials					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	32	43.2	43.2	43.2
	Disagree	41	55.4	55.4	98.6
	Neutral	1	1.4	1.4	100.0
	Total	74	100.0	100.0	

There is Proper storage and handling of material					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	33	44.6	44.6	44.6
	Disagree	40	54.1	54.1	98.6
	Agree	1	1.4	1.4	100.0
	Total	74	100.0	100.0	
There is efficient communication about the storage of materials between parties					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	40	54.1	54.1	54.1
	Disagree	34	45.9	45.9	100.0
	Total	74	100.0	100.0	

From the above survey result, the researcher comes to an understanding that the majority of respondents believe that there is poor practice in handling and storage of material management.

Table 4.12 below summarizes the response about the practice of stock and waste control of material management.

For the practice of reuse of materials, 56.8 % of the respondents strongly disagree, 43.2 % of the respondents disagree. This means that most of the respondents believe that there is poor practice on the reuse of materials on the selected Addis Ababa housing development project sites. For the practice of reporting a shortage of material on time, 18.9 % of respondents strongly disagree, 48.6 % disagree, 20.3% neither agree nor disagree, 12.2 % agree. This shows that more than half of the respondents believe that there is poor practice in reporting a shortage of material on time. For the practice of daily recording of material usage in the project sites, 70.3 % of respondents strongly disagree, 29.7 % disagree. This means that all of the respondents disagree on the practice of daily recording of material usage in the Addis Ababa housing development project sites. For the practice there is control material wastage on site 63.5 % of respondents strongly disagree, 36.5 % disagree. This means that all of the respondents disagree on the practice of there is control material wastage on site.

Table 4.12 Response to stock and waste control of material management practice

There is the reuse of materials					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	42	56.8	56.8	56.8
	Disagree	32	43.2	43.2	100.0
	Total	74	100.0	100.0	
There is reporting a shortage of material on time					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	18.9	18.9	18.9
	Disagree	36	48.6	48.6	67.6
	Neutral	15	20.3	20.3	87.8
	Agree	9	12.2	12.2	100.0
	Total	74	100.0	100.0	
There is a daily recording of material usage in the project sites					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	52	70.3	70.3	70.3
	Disagree	22	29.7	29.7	100.0
	Total	74	100.0	100.0	
The organization controls material wastage on site					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	47	63.5	63.5	63.5
	Disagree	27	36.5	36.5	100.0
	Total	74	100.0	100.0	

From the above survey result, the researcher comes to an understanding that the majority of respondents believe that there is poor practice on stock and waste control of material management.

4.4 Discussion on the current practice of material management in Addis Ababa condominium housing construction project

From the results found from questionnaires and interviews, there is no well-defined planning of material management which includes preparing a material management plan, quantifying of material needed, scheduling the identified materials, and preparing initial material order.

The majority of the respondents disagreed that planning of material management is not conducted adequately, and the results about the existing practice of material management at the construction project in Addis Ababa condominium housing were negative. This finding does not support previous research by Mohamed et al. (2021) which the current practice of material management on the planning of material management was positive in Somalia construction respondents.

The second one is the Procurement of material management practice the findings show that the practice is not satisfactory in Addis Ababa condominium housing construction project site. The client provides materials like cement, rebar, electric and sanitary fittings, precast, hollow blocks, etc. which the procurement process is not well known and is not clear to answer the process. But the site contractors use a common procurement process which is based on the requisition of materials by site persons for the branch project sites and it is the best practice in all Addis Ababa condominium housing project sites. The specification compliance of materials are not checked when they are purchased rather they are checked on-site after they are dumped and stocked, since they are purchased in bulk it is difficult to reject all materials away if they are not compliant with the specification on the contract and causes more claims and dispute in the construction site between the contractor, consultant, and client.

This means the practices in the project sites are rather than planning and ordering materials based on the degree of work the client purchase materials in large or small quantities without complying with the needs of the construction site and without preparing the place to put the purchased materials. And also there is no coordination and communication during both the design and construction phases about material management between the client, consultant, and contractors.

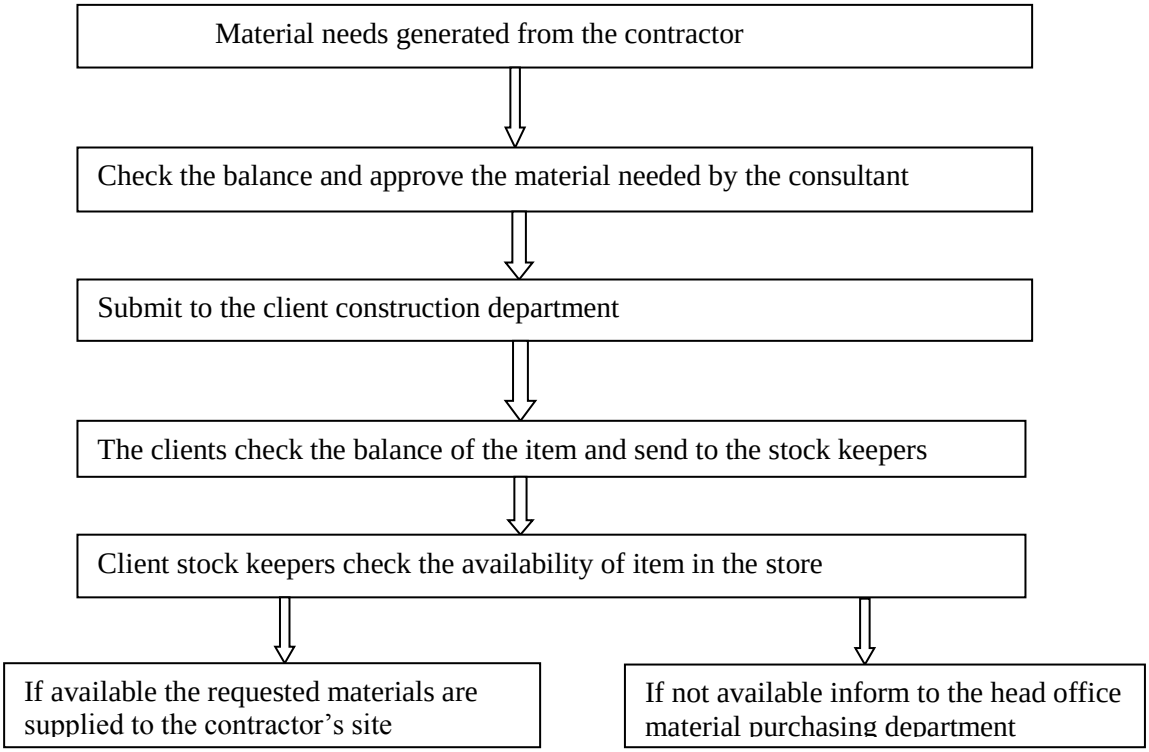
Also in handling and storage of material management, there is poor storage and handling

practice in Addis Ababa condominium housing construction project site. For example, the space for storage and the way materials are stored on-site also at the storehouse is not well organized and protection is not done for the materials, the communication between parties on how to store materials is low but in some of the sites the client is giving training about kaizen philosophy and they are pushing the contractors to apply this kaizen philosophy by taking actions like by not paying payment without having proper storage of materials.

In stock and waste control of material management practice, there is no efficient waste control system in all of Addis Ababa condominium housing construction project sites. Also, the reuse of waste materials both in the design and construction phases is not practiced more in all construction sites. Waste materials are dispersed here and there on the project sites. From the site visit and observation, the materials require proper stock control. Since the client provides most of the construction materials for housing projects like cement, rebar, conduit, HCB, precast, ceramic, wire, cable, sanitary fixtures, etc. materials should be available on-site when required but the reverse is practiced when the materials are required they are out of stock the project stops for a while until they are purchased or bring from other stock which leads to other /additional /cost and delay for the project and transport cost for the contractor.

Figure 4.1 below illustrates the different material requisition process that was identified in different project sites of Addis Ababa condominium housing construction.

Figure 4.1 Material requisition process in Addis Ababa condominium housing



The finding of this research shows that there is poor material management practice in Addis Ababa condominium housing construction project sites. The researcher believes that Addis Ababa condominium housing should give more attention to the material management practices of the construction sites and share experiences with other companies and countries.

4.5 Response to major causes of ineffective material management practice in Addis Ababa condominium housing construction projects

In this section of the study, relative relevance index analysis was chosen to order the causes of ineffective material management techniques according to their relative importance. Equation 4.1 is used to determine the relative importance index

$$RII = \sum W / A \times N \quad \text{[Eq. 4.1]}$$

Where

W= the weighting that each responder assigned on a scale of one to five, with one denoting the least weight and five the most weight,

A= the highest weight and 5 in this case,

N= the total number of the respondents

RII= relative importance index

According to Akadiri (2011), RI values are translated into five significant levels.:

High (H) ($0.8 \leq RI \leq 1$),

High medium (H–M) ($0.6 \leq RI \leq 0.8$),

Medium (M) ($0.4 \leq RI \leq 0.6$),

Medium Low (M-L) ($0.2 \leq RI \leq 0.4$) and

Low (L) ($0 \leq RI \leq 0.2$)

The research's second goal was to pinpoint the main reasons why the Addis Ababa condominium housing construction project's material management practices were inadequate. According to the analysis in below table 4.12 the major causes of ineffective material management practices at Addis Ababa condominium housing construction project range between medium to a high level of causes. The highest ranking for causes of ineffective material management practice is an incorrect material takeoff from drawing with RII = 0.91 followed by materials incompliance with the specification with RII = 0.889 and receiving materials before they are needed with RII = 0.886. However, the lowest rank for this analysis is undefined scope with RII = 0.618 and incorrect material arrangement with RII = 0.600. The remaining causes range in a high medium which shows that most of the respondents agree on the causes of ineffective material management practices.

Table 4.13 Importance of causes of ineffective material management practice in AAHDC

No.	**Causes of ineffective material management**	RII	Rank
1	Incorrect material takeoff from drawing	0.910	1st
2	Materials in incompliance with specification	0.889	2nd
3	Receiving materials before they are needed	0.886	3rd
4	Lack of detailed and accurate bill of quantity	0.883	4th
5	Incomplete delivery of material	0.878	5th
6	Not receiving materials when needed	0.870	6th
7	Poor and insufficient communication on the supply of material between parties	0.867	7th
8	Material storage in harsh weather	0.864	8th

9	Not determining the quantity of material (Wrong material quantity)	0.856	9th
10	Incomplete drawing and Consecutive Design change	0.848	10th
11	Inconsistency between specification and drawings	0.837	11th
12	Material wastage	0.835	12th
13	Poor material storage system and Lack of storage space and facilities	0.816	13th
14	Poor material supervision	0.805	14th
15	poor material management planning	0.800	15th
16	Not knowing what and when the material is required	0.792	16th
17	Lack of material schedule	0.789	17th
18	Excessive paperwork	0.770	18th
19	Not-standard specification	0.759	19th
20	Excess supply of material	0.735	20th
21	Not sufficient material stock	0.729	21st
22	Incomplete report on material supply	0.681	22nd
23	Lack of care in transporting materials	0.654	23rd
24	Undefined scope	0.618	24th
25	Incorrect material arrangement	0.600	25th

4.6 Discussion on the major causes of ineffective material management practices in the Addis Ababa condominium housing construction project

The primary cause was found to be an incorrect material takeoff from a drawing which has a relatively important index of 0.91 per the responders which shows that preparing of takeoff incorrectly leads to incorrect material quantity, this means the material ordered may be more or less of the material needed for the work. In all Addis Ababa condominium housing construction projects there is no master takeoff for all typology types of buildings and all the contractors and consultants prepare different takeoff which leads to different material quantities with different material requisitions one contractor may have much quantity of some item material stock on site and the other to have less quantity of

the same item. The second major cause of ineffective material management practice is materials' incompliance with the specification which has a relatively important index of 0.889 which means the material ordered and deployed on site is not the same as the specification on the contract agreement. The interviews show that this non-compliance of materials to specification happened all the time for example some of the color ceramic specified on the specification is white and the material deployed on site was light pink. In addition metal handrail (CHS) specification was 80mm by 2mm thick and the material available on market and deployed on site was 76mm by 2mm and so on.

The third and sixth major cause is not receiving materials when they are needed and receiving materials before they are needed with relative important index 0.886 and 0.87 respectively this means for example the client purchase some materials before they are required and force the contractors to receive and stock which leads for damage of materials and theft.

The fourth major cause is the lack of a detailed and accurate bill of quantity with a relative important index of 0.883 means the contract document does not show the detailed bill of quantity which is directly related to the takeoff preparation because the takeoff is not done correctly by an experienced person the bill of quantities are also wrongly described in the contract document which leads always to frequent contract amendment. The fifth major cause is incomplete delivery of material with relative important index of 0.878 means that the quantity of materials provided to the site does not match that which was ordered, which causes materials delivery to the construction site to be delayed.

The seventh major cause is poor communication on the supply of material between parties with a relative significant index of 0.867; the three parties (client, consultant, and contractor) were in communication over the supply of materials, like what material is needed, according to the project progress which material is required, the quantity of material ordered and needed, when the materials are delivered and so on is very weak. The eighth major cause is material storage in harsh weather with a relative important index of 0.864. From site visits and observation, this cause of ineffective material management is the most common in all Addis Ababa condominium housing project sites. This means there is a poor storage system on the project sites. The ninth major cause is not determining the quantity of material (Wrong material quantity) with a relative importance index of

0.856.

The tenth cause of ineffective material management practice is incomplete drawings and subsequent design change with relative importance index of 0.848 which leads to wrong material quantity. Because design changes frequently the material ordered (purchased) or material deployed on-site may be over or under needed quantity.

In addition, inconsistency between specifications and drawings, material wastage, poor material storage system and lack of storage space and facilities, improper material supervision, and poor material management planning are major causes of ineffective material management practice ranking from 11^{th} to 15^{th}. Not knowing what and when the material is required, lack of material schedule, excessive paperwork, not-standard specification, excess supply of material, not sufficient material stock, incomplete report on material supply, lack of care in transporting materials, undefined scope and incorrect material arrangement are major causes of ineffective material management practice ranking from 16^{th} to 25^{th}.

Figure 4.2 a and b shows rebar soked in water and stored on mud in leghar site.Which shows that there is Poor material storage system and lack of storage space and facilities.

(a) Poor material storage system in leghar site

(b) Lack of storage space and facilities in leghar site

Figure 4.2 (a) and (b) Poor material storage system and lack of storage space and facilities respectively at Leghar site

In figure 4.3 a and b below shows the oversupply of ceramic and rebar material in bole bulbula and bole beshale project sites. This means material deployed on site is over needed quantity.

a) Excess supply of ceramic on bole bulbula site b) Excess supply of rebar on bole beshale site

Figure 4.3 (a) and (b) excess supply of material ceramic and rebar on bole bulbula and bole beshale site respectively

Figure 4.4 a and b below shows sand and rebar material stored in harsh weather in bole hayat and leghar site. This storage system leads the materials to damage and have poor quality for the required construction. Improper storage of materials has impact to the construction performance of projects. As we see in the figure there are derbies grown on sand which decrease its quality and there is rust on rebar which cause decrease in strength and diameter of the bar.

a) Sand stored in harsh weather in bole hayat site b) rebar stored in harsh weather in leghar

Figure 4.4 (a) and (b) sand and rebar stored in harsh weather on hayat and leghar site

These findings addressing the reasons for inadequate material management at the condominium housing construction project in Addis Ababa were favorable, and the majority of respondents "agreed" with the reasons for inadequate material management. The finding is consistent with Okeke and Mbabuike (2020), Mohamed et al. (2021), and Bamidele and Festus (2016) which linked the causes of ineffective material management at construction projects, which are lack of determining quantities of materials prior to orders, lack of consideration in detail the period over which deliveries can be spread without affecting the contract, delay in receiving materials on sites, poor control of materials, unclear scope, incomplete drawings, insufficient information on material supply and poor scheduling of material onsite.

4.7 Response to impacts of material management practice in Addis Ababa condominium housing project performance

The third objective is to identify the impacts of ineffective material management practices on project performance at Addis Ababa condominium housing construction project.

4.7.1 Cost-related impacts of material management practice in Addis Ababa condominium housing project performance

Table 4.14 and Figure 4.5 below summarize the response about cost impact for added cost over and above the initially agreed contract amount.

For the cost impact, added cost over and above the initially agreed contract amount 62.2 % of the respondents strongly agree, 28.4 % of the respondents agree, 6.8 % are neutral, 2.7% strongly disagree. This means that most of the respondents believe that ineffective material management has an impact on added costs over and above the initially agreed contract amount on the selected Addis Ababa condominium housing project sites.

Table 4.14 Response to added cost over and above the initially agreed contract amount

There is Added cost over and above the initially agreed contract amount					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.7	2.7	2.7
	Neutral	5	6.8	6.8	9.5
	Agree	21	28.4	28.4	37.8
	Strongly Agree	46	62.2	62.2	100.0
	Total	74	100.0	100.0	

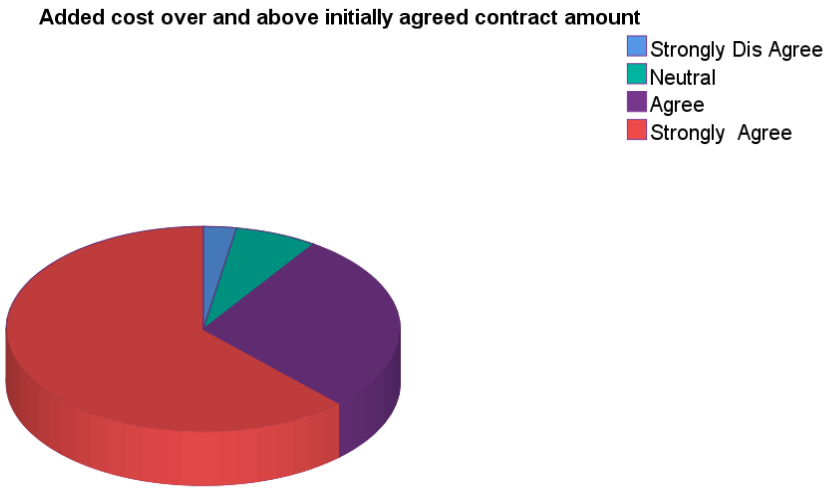


Figure 4.5 There is added cost over and above the initially agreed contract amount

Table 4.15 and figure 4.6 below summarize the response about cost impact for there is less return on investment.

For the cost impact, less return on investment 8.1 % of the respondents strongly agree, 35.1 % of the respondents agree, 37.8 % are neutral, 5.4 % disagree and 13.5% strongly disagree. This means that some of the respondents believe that ineffective material management has an impact on fewer returns on investment and some of the respondents neither agree nor disagree on the impact on less return on investment of the selected Addis Ababa condominium housing construction project sites.

Table 4.15 There is less return on investment

There is Fewer return on investment					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	13.5	13.5	13.5
	Disagree	4	5.4	5.4	18.9
	Neutral	28	37.8	37.8	56.8
	Agree	26	35.1	35.1	91.9
	Strongly Agree	6	8.1	8.1	100.0
	Total	74	100.0	100.0	

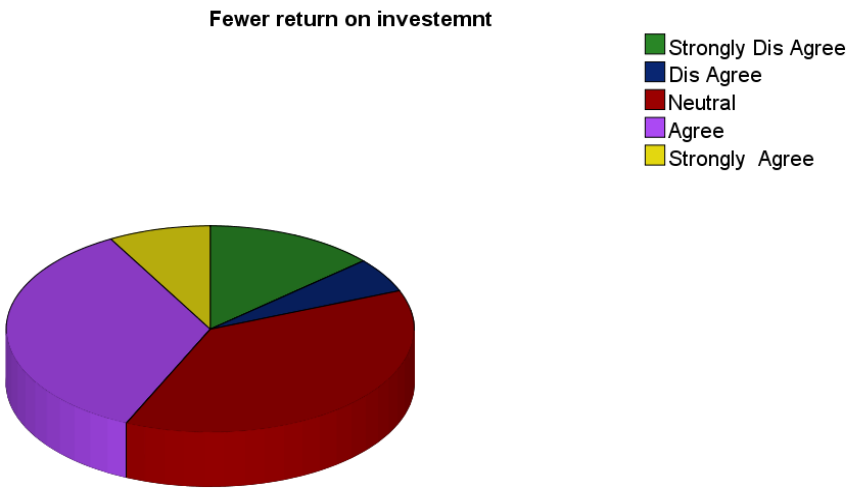


Figure 4.6 There is fewer return on investment

Table 4.16 below and figure 4.7 summarizes the response about the cost impact of there is higher rental prices to end users.

For the cost impact, higher rental prices to end users 44.6 % of the respondents strongly agree, 44.6 % of the respondents agree, 6.8 % neutral, 2.7% disagree and 1.4 % strongly disagree. This means that most of the respondents believe that ineffective material management has an impact on higher rental prices to end users on the selected Addis Ababa condominium housing construction project sites.

Table 4.16 Response to there is higher rental prices to end user

There are Higher rental prices to end user					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.4	1.4	1.4
	Disagree	2	2.7	2.7	4.1
	Neutral	5	6.8	6.8	10.8
	Agree	33	44.6	44.6	55.4
	Strongly Agree	33	44.6	44.6	100.0
	Total	74	100.0	100.0	

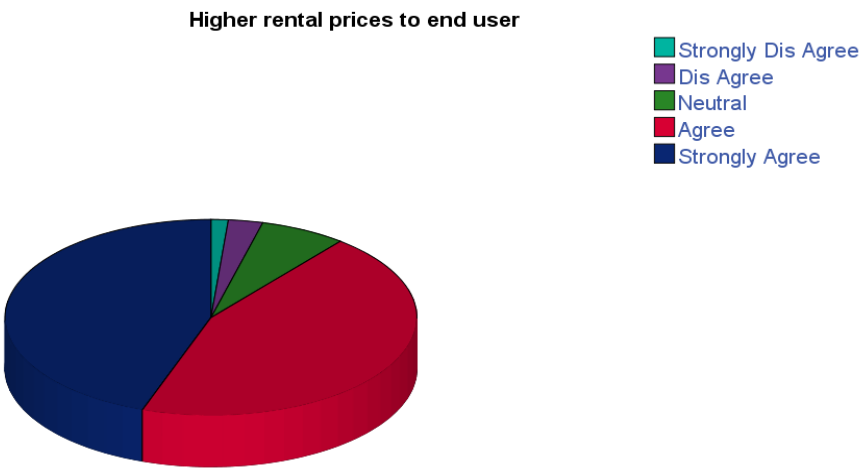


Figure 4.7 There is higher rental prices to end user

Table 4.17 and figure 4.8 below summarize the response about the cost impact for there is a loss of profits to the contractor.

For the cost impact of there is loss of profits to the contractor 31.1 % of the respondents strongly agree, 41.9 % of the respondents agree, 23 % are neutral, 1.4 % disagree and 2.7 % strongly disagree. This means that most of the respondents believe that ineffective material management has an impact on the loss of profits to the contractor on the selected Addis Ababa condominium housing construction project sites.

Table 4.17 Response to there is loss of profit to the contractor

There is a loss of profits to the contractor					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.7	2.7	2.7
	Disagree	1	1.4	1.4	4.1
	Neutral	17	23.0	23.0	27.0
	Agree	31	41.9	41.9	68.9
	Strongly Agree	23	31.1	31.1	100.0
	Total	74	100.0	100.0	

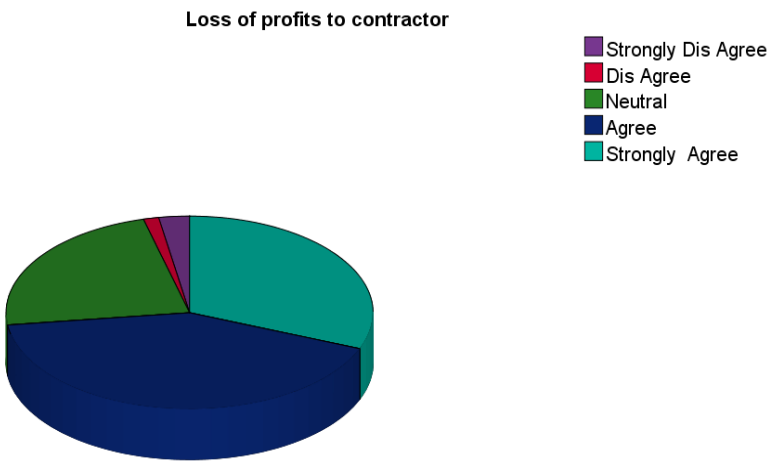


Figure 4.8 There is a loss of profits to the contractor

4.7.2 Discussion on Cost related impacts of material management practice in Addis Ababa condominium housing project performance

The third objective of this research was achieved through the questionnaire, interview, and case study/reviewing different site contract documents/ that have been asked on the impacts of ineffective material management practice on project performance, which most respondents strongly agree on the cost impact of ineffective material management practice on project performance of Addis Ababa condominium housing construction project and the majority of respondents think that ineffective material management has a significant impact on project cost. project cost increases above the agreed contract amount to different poor material management practices in Addis Ababa condominium housing construction projects from these inappropriate material waste control strategies, rework, specifications incompliance of materials, delay in material supply, high wastage of material, improper planning of materials, improper material handling, bad material storage, poor material quality. The result from FGD shows that all of 12 participants agreed on there is an increase in projects cost because of improper/poor/ material management practice. From this five participants agreed on from the total increase in cost or cost overrun of Addis Ababa condominium housing projects 50%-60% cost overrun is caused because

of improper material management, one participant said that from the total increase in cost or cost overrun of Addis Ababa condominium housing projects 75% increase on cost is caused because of improper material management ,three participants agreed on from the total increase in cost or cost overrun of Addis Ababa condominium housing projects 40%-45% increase on cost is caused because of improper material management and the other three participants agreed on from the total increase in cost or cost overrun of Addis Ababa condominium housing projects 55%-65% of the increase on cost is because of improper material management. Therefore from total increase on cost or cost overrun of Addis Ababa condominium housing projects average of 54.8% increase on costs is caused by improper materials management on site.

This result from questionnaires and interview is reinforced by a case study by reviewing different site documents and from FGD result the cost increased by improper material management is calculated on the last column of the table which is discussed as follow.

Table 4.18 below shows the unit rates of some selected construction materials listed on the contract document and on the amended contract document for all typologies of project 1, project 2, and project 3 which started on May 2015. From the data gathered from the contract documents listed, there is an increase in the unit rate of materials which shows there are an increase in the cost of materials.

Table 4.18 Unit rate of materials on initial contract document and amended contract document for projects 1, 2 and 3

Description of construction material	unit	Contract unit rate (birr) (a)	2013, 3rd quarter unit rate (birr) (b)	Increase in cost of improper material management(birr) c=(b-a)54.8%
Reinforced concrete quality(C-25) 360kg cement/m^3	m^3	1033.89	3150.58	1159.95
Reinforced concrete quality(C-30) 400kg cement/m^3	m^3	1033.89	3371.24	1280.87
Mild steel reinforcement G-60 (Imported) Dia 8mm	kg	5.08	74.83	38.22
Mild steel reinforcement G-60 (Imported) Dia 10mm	kg	5.08	73.41	37.44
Mild steel reinforcement G-60 (Imported) Dia 12mm	kg	4.24	71.79	37.02

Mild steel reinforcement G-60 (Imported) Dia 14mm	kg	4.24	69.89	35.98
Mild steel reinforcement G-60 (Imported) Dia 16mm	kg	4.24	71.58	36.90
Mild steel reinforcement G-60 (Imported) Dia 20mm	kg	4.24	61.5	31.38
Mild steel reinforcement G-60 (Imported) Dia 24mm	kg	4.24	68.43	35.18

Table 4.19 below shows the unit rates of some selected construction materials listed on the contract document and the amended contract document for all typologies of Project 8 started in July 2020.

From the data gathered from the contract documents listed, there is an increase in the unit rate of materials. From FGD result shows there is 54.8% increase in the cost because of improper materials.

Table 4.19 Unit rate of materials on initial contract document and amended contract document of project 8

Description of some selected construction material	unit	Contract unit rate (birr) (a)	2015, 1st quarter unit rate (birr) (b)	2015, 2nd quarter unit rate (birr) (c)	Percent increase in unit rate (d)	Percent increase in unit rate(improper material management) (e) d*54.8%
Reinforced concrete quality(C-50) 520kg cement/m^3	m^3	3732.67	9,102.99	11,195.24	300%	164.40%
Reinforced concrete quality(C-40) 504kg cement/m^3	m^3	3,538.10	8,502.48	10,171.15	287%	157.28%
Reinforced concrete quality(C-30) 420kg cement/m^3	m^3	2847.21	7,382.90	9,387.09	330%	180.84%
Mild steel reinforcement G-60 (Imported) Dia 8mm	kg	52.28	157.18	165.58	317%	173.72%

Mild steel rein-forcement G-60 (Imported) Dia 10mm	kg	53.70	156.04	165.58	308%	168.78%
Mild steel rein-forcement G-60 (Imported) Dia 12mm	kg	45.31	150.65	160.90	355%	194.54%
Mild steel rein-forcement G-60 (Imported) Dia 14mm	kg	45.00	152.11	160.76	357%	195.64%
Mild steel rein-forcement G-60 (Imported) Dia 16mm	kg	50.73	150.30	160.76	316.89%	173.66%
Mild steel rein-forcement G-60 (Imported) Dia 20mm	kg	49.42	150.19	160.76	325.29%	178.26%
Mild steel rein-forcement G-60 (Imported) Dia 24mm	kg	56.34	159.52	160.76	285.33%	156.36%
uPVC PN-6 Dia. 50 mm, Outer di-ameter	ml	116.88	277.00	285.27	244.07%	133.75%
uPVC PN-6 Dia. 80 mm, Outer di-ameter	ml	214.70	515.72	590.92	275.23%	150.83%
uPVC PN-6 Dia. 110 mm, Outer diameter	ml	252.95	762.70	838.80	331.60%	181.72%
uPVC PN-6 125 mm, Outer di-ameter	ml	480.64	873.87	950.48	197.75%	108.37%
Dia uPVC PN-6 160 mm, Outer diameter	ml	493.27	1,506.30	1,573.61	319.01%	174.82%
uPVC PN-6 Dia. 200 mm, Outer diameter	ml	1,101.67	1,716.31	1,796.59	163.07%	89.36%
uPVC PN-6 Dia. 250 mm, Outer diameter var.	ml	1,165.91	2,147.56	2,178.96	186.88%	102.41%
The Average increase in the unit rate					288.19%	157.93%

Table 4.20 below shows the Summary of the initial contract amount and amended contract amount of selected Addis Ababa condominium housing construction project sites. (Project 1, project 2, project 3, and project 8)

Table 4.20 Summary of initial and amended contract amount of selected Addis Ababa condominium housing construction project sites

Project name	Typology	Initially agreed contract amount (birr)	Amended contract amount 2013 3rd quarter (birr)	Amended Contract amount 2015 1st quarter(birr)	Increase in contract amount (improper material management) %
Project 1	B+G+7	14,693,366.59	33,759,858.29	_	72.34
	B+G+9	23,800,989.86	31,383,119.79		76.72
	2B+G+13	32,897,663.73	46,038,311.04		76.66
	2B+G+15	106,680,369.8	Not amended		-
Project 2	2B+G+15	62,166,388.69	88,398,747.53	_	77.82
	2B+G+13	39,514,915.98	49,381,476.8		68.5
Project 3	B+G+9	19,146,333.62	24,042,985.17	_	69.05
	2B+G+13	45,996,676.41	54,569,529.47		65.21
	2B+G+15	62,166,388.69	88,398,747.53		77.82
Project 8	3B+G+21	315,738,399.6	_	1,026,534,724.79	178.16

From the data gathered from contract documents listed in table 4.20 above the increase in the cost of materials increase the unit rate which causes an increase in the contract amount of the projects. In project 08 of Addis Ababa condominium housing, there is a 325.1% increase in the contract amount of the project from this 178.16% increase is because of improper material management practice. In project 1 for B+G+7 building types, there is a 230% increase in the contract amount of the project from this 72.34% increase is because of improper material management practice. For B+G+9 building types, there is a 132% increase in the contract amount of the project from this 76.72% increase is because of improper material management practice. For 2B+G+13 building types, there is a 140%

increase in the contract amount of the project from this 76.66% increase is because of improper material management practice. In project 2 for 2B+G+13 building types, there is a 125% increase in the contract amount of the project from this 77.82% increase is because of improper material management practice. For 2B+G+15 building types, there is a 142% increase in the contract amount of the project from this 68.5% increase is because of improper material management practice. In project 3 For B+G+9 building types, there is a 126% increase in the contract amount of the project from this 69.05% increase is because of improper material management practice. For 2B+G+13 building types there is a 119% increase in the contract amount of the project from this 65.21% increase is because of improper material management practice. And For 2B+G+15 building types there is a 142% increase in the contract amount of the project from this 77.82% increase is because of improper material management practice.

The other impact is higher rental prices to end users which mean when there is a cost overrun of the housing projects that directly affect the end users of the projects.

For example, when we see 40/60 condominium prices as per Addis Ababa Saving Houses Development Enterprise (ASHDE) 2017 price was 4,918 birr per square meter in the first round lottery. And in the third round lottery the price changes to 11,162.97 birr per square meter. This means the price of houses per square meter increased by 227%.

Table 4.21 below shows the price per square meter of 11th and 12th round 20/80 condominium winners.

Table 4.21 11th and 12th 20/80 condominium price per square meter

No.	Condominium Type	Price per Square meter (SQM)
1	Studio	2,483 Birr
2	One-bedroom	3,438 Birr
3	Two -bedroom	4,394 Birr

4	Three- bedroom	4,776 Birr

But in the 14th round condominium winners' price changes for all types to 7,997.17 birr per square meter this shows clearly the increase in the cost of the project directly affects the price of end users. This means the price of houses per square meter increased by 226%. All this cost overrun caused due to the increase in the unit rate of construction materials.

This outcome supports the research of Mohamed Yusuf Wayrah et al. (2021), who found that inefficient material management has a detrimental impact on the delivery of construction projects in the form of cost overruns and delays in the work's progress. Reiterate the findings of the study by Albert, Shakantu, and Ibrahim (2021) that poor material management has a high impact on material waste, a medium impact on building project quality, a high and a low impact on the profitability of the construction industry, and generates claims and expenses.

In order to guarantee timely project execution and standard work delivery within reasonable cost, time, and quality, Tibebu Kebede (2016) also revealed proper material management practices, such as proper planning of material management right from the start of project execution and strict compliance with the project bill of quantities, schedule of materials, construction program, specification, proper stock accounting, and security systems.

4.7.3 Time-related impacts of material management practice in Addis Ababa condominium housing project performance

For this research paper, two time-related impacts were selected which are delays in the progress of the work and claims and termination of projects.

Table 4.22 and figure 4.9 below for there is a delay in the progress of the work can be summarized as follow:

For the time impact of delay in the progress of the work 50 % of the respondents strongly agree, 50 % of the respondents agree, 0 % neutral, 0 % disagree and 0 % strongly disagree. This means that all of the respondents believe that ineffective material management

has an impact on the delay in the progress of the work on the selected Addis Ababa housing development project sites.

Table 4.22 Response to there is delay in the progress of the work

There is a Delay in the progress of the work					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	37	50.0	50.0	50.0
	Strongly Agree	37	50.0	50.0	100.0
	Total	74	100.0	100.0	

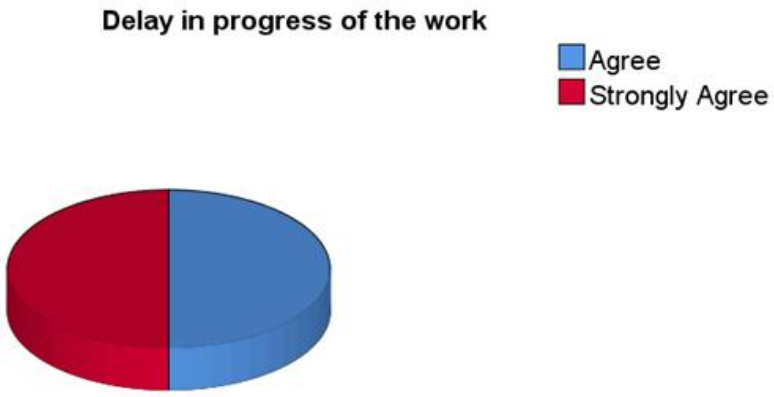


Figure 4.9 There is delay in the progress of the work

Table 4.23 below and figure 4.10 for there are claims and termination of the project can be summarized as follow:

For the time impact of there are claims and termination of the project 58.1 % of the respondents strongly agree, 32.4 % of the respondents agree, 8.1 % are neutral, 0 % disagree and 1.4 % strongly disagree. This means that above 90% of the respondents believe that ineffective material management has an impact on claims and termination of the project on the selected Addis Ababa housing development corporation project sites.

Table 4.23 Response to there are claims and termination of projects

There are claims and termination of the project					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.4	1.4	1.4
	Neutral	6	8.1	8.1	9.5
	Agree	24	32.4	32.4	41.9
	Strongly Agree	43	58.1	58.1	100.0
	Total	74	100.0	100.0	

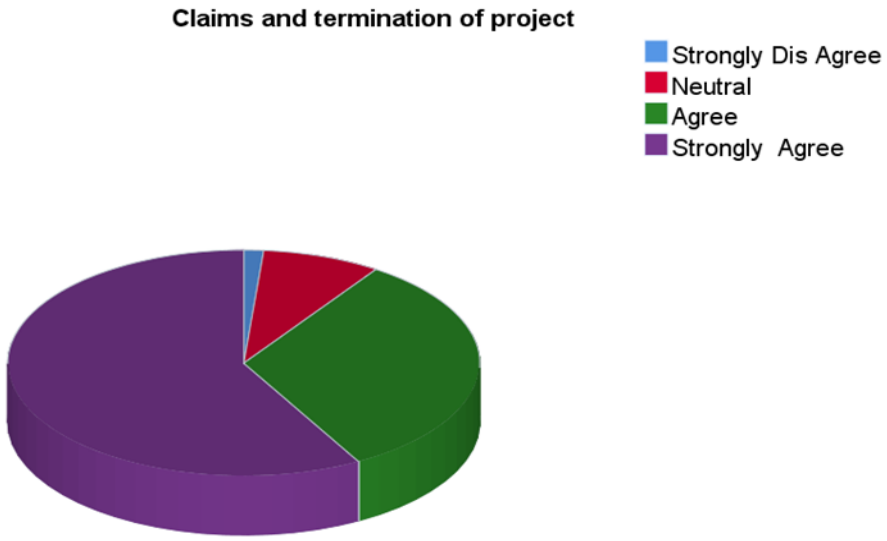


Figure 4.10 There are claims and termination of the project

4.7.4 Discussion on Time-related impacts of material management Practice in Addis Ababa condominium housing project performance

From questionnaires and interviews results show that poor material management like inappropriate material waste control strategies, rework, specifications incompliance of materials, delays in material supply, high wastage of material, improper planning of materials, improper material handling, bad material storage, poor material quality has a high effect on delay in the progress of the work which leads to claims/expenses and termination

of projects.

From FGD findings lack of construction materials in the market, improper material procurement that results in disapproval, modifications to material types and specifications during construction, a delay in material delivery, loss of materials on site that causes a delay, damage to sorted materials when they are urgently needed, late material procurement and late selection of finishing materials because there are numerous types of materials available in the market are all factors that can cause delays constitute 45% of total delay in Addis Ababa condominium housing construction projects.

To reinforce the Time-related impacts of material management practice results achieved through the questionnaire and interview, a case study/reviewing different site contract documents/ was needed which is discussed as follows.

Because of this, the project is not finished within the time frame stated on the contract amount; this is identified on the contract documents of different project sites and summarized in the following table 4.23.

Table 4.24 Time frame of different Addis Ababa condominium housing project sites

Project name	Typology	Project started date	Maximum Project completion date	Initially agreed contract (calendar days)	Time the project takes up to December,30,2022 (calendar days)
Project 1	B+G+7	21 February 2016	1 September 2016	193	2,311 days
	B+G+9	13 July 2015	1 April 2016	263	2,464 days
	2B+G+13	15 October 2015	18 March 2017	520	2,113 days
	2B+G+15	11 July 2015	30 June 2017	720	2,009 days
Project 2	2B+G+13	15 May 2015	15 March 2017	670	2,116 days
	2B+G+15		15 May 2017	730	2,055 days
Project 3	B+G+9	15 May 2015	15 October 2016	520	2,267 days
	2B+G+13		15 March 2017	670	2,116 days
	2B+G+15		15 May 2017	730	2,055 days
Project 8	3B+G+21	03 July 2020	20 December 2022	900	10 days

As we can understand from the above table there is a delay on the selected projects of Addis Ababa housing development corporation construction. For project 2 and project 3, 2B+G+13 building typology types the initially agreed contract was 670 calendar days until this research desk study was done 2,116 days elapsed from the project completion date. For 2B+G+15 building, typology types, the initially agreed contract was 730 calendar days until this research desk study was done 2,055 days elapsed from the project completion date. For B+G+9 building typology types, the initially agreed contract was 520 calendar days until this research desk study was done 2,267 days elapsed from the project completion date. For project 1, B+G+7 building typology types the initially agreed contract was 193 calendar days, until this research desk study was done 2,311 days elapsed from the project completion date. For B+G+9 building typology types, the initially agreed contract was 293 calendar days until this research desk study was done 2,464 days elapsed from the project completion date. For 2B+G+13 building, typology types, the initially agreed contract was 520 calendar days until this research desk study was done 2,113 days elapsed from the project completion date. For 2B+G+15 building, typology types, the initially agreed contract was 720 calendar days until this research desk study was done 2,009 days elapsed from the project completion date. One and the major cause for this delay in the construction projects are material management practices in the construction sites. Some of the material management practice which causes delay on the project sites is improper material planning, delay in procurement of materials, not receiving materials when needed, and wrong material quantity leading to delay in projects. When we see not receiving materials when needed some of the materials that are needed to be used at that time will be absent and the project work does not proceed because of missing materials. In Addis Ababa condominium housing construction projects, for example, cement and rebar are provided by the client and these materials may not be deployed on time so the whole project stops for some time. Which shows from the above elapsed construction completion period there are different causes but the most (45%) of the causes was because of poor material management practice.

There are also claims and terminations of projects because of poor material management practices on the project sites. This can be seen because delay in material supply, specification incompliance of materials, and wrong material quantity leads to claims in the sites.

And also poor quality of material, and delay in the progress of the projects because of ineffective material management lead to many contractors termination.

This supports the research of Mohamed Yusuf Wayrah et al. (2021), who found that the principal effects of ineffective material management that have a detrimental influence on the delivery of construction projects are the incidence of cost overrun and delays in the progress of the job. Also reinforce the findings of the study by Albert, Shakantu, and Ibrahim (2021) that poor material management has a high impact on material waste, a medium impact on building project quality, a high and a low impact on the profitability of the construction industry, and generates claims and expenses. Also, the finding revealed by Molaye Takele (2020), poor material management practices like late deliveries of material by the client, project delays are caused by the labor-intensive procurement procedure and imprecise quantity estimation in the material acquisition. In order to guarantee timely project execution and delivery of standard work within a reasonable amount of money, time, and quality, Tibebu Kebede (2016) contends that proper material management procedures, such as proper planning of material management from the beginning of project execution and strict adherence to the project's bill of quantities, schedule of materials, construction program, specification, proper stock accounting, and security systems, are required.

4.7.5 Quality-related impacts of material management practice in Addis Ababa condominium housing project performance

Table 4.25 and figure 4.11 below for there is a loss in productivity of work can be summarized as follow:

44.6% of respondents highly agree, 44.6% of respondents agree, 9.5% neutral, 0% disagree, and 2.7% strongly disagree with the quality impact of the loss in productivity of work. This indicates that the majority of respondents think poor material management contributes to a decrease in labor productivity at the chosen building sites for the Addis Ababa condominium housing projects.

Table 4.25 Response to there is a loss in productivity of work

There is a loss in productivity of work					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.4	1.4	1.4
	Neutral	7	9.5	9.5	10.8
	Agree	33	44.6	44.6	55.4
	Strongly Agree	33	44.6	44.6	100.0
	Total	74	100.0	100.0	

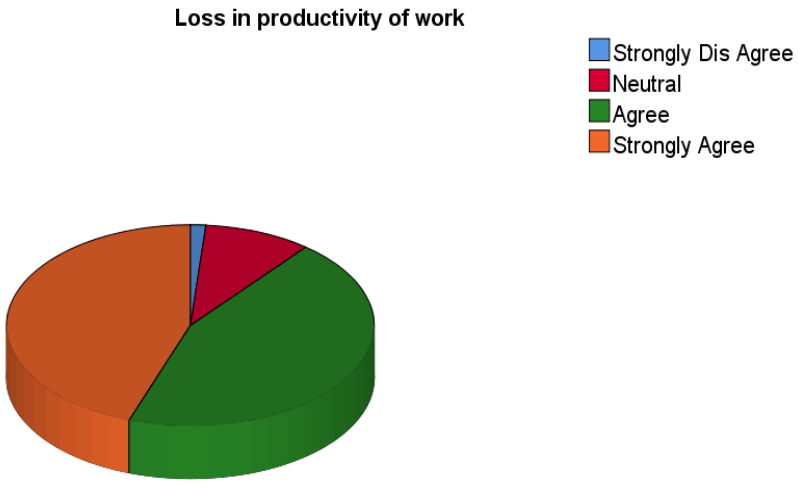


Figure 4.11 There is a loss in productivity of work

Table 4.26 and figure 4.12 below for there is rework due to poor quality material and mistakes can be summarized as follow:

Rework is necessary because of errors and low-quality materials, which has an impact on quality. 62.2% of respondents strongly agree, 37.8% agree, 0% are neutral, 0% strongly disagree, and 0% neutral. This indicates that on the chosen Addis Ababa condominium housing construction project locations, every respondent thinks inefficient material management has an impact on rework owing to subpar materials and errors.

Table 4.26 Response to there is rework due to poor quality material and mistakes

There is rework due to poor quality material and mistakes					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	28	37.8	37.8	37.8
	Strongly Agree	46	62.2	62.2	100.0
	Total	74	100.0	100.0	

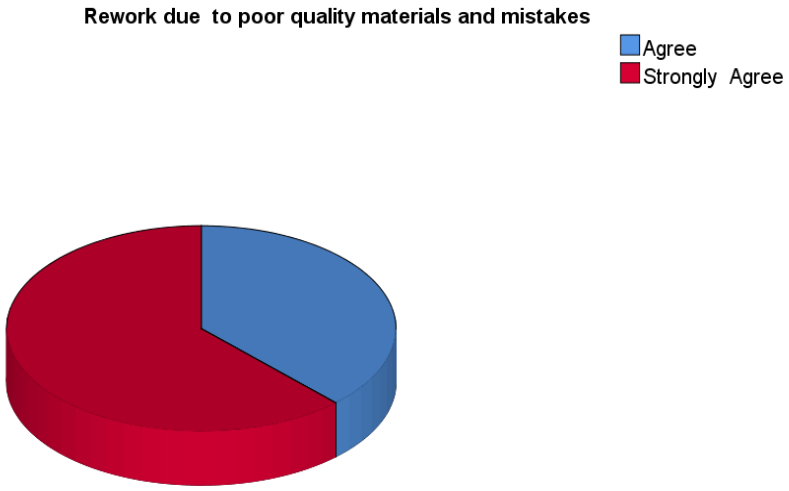


Figure 4.12 There is rework due to poor quality materials and mistakes

Table 4.27 and figure 4.13 below for there is a failure and defects can be summarized as follow:

For the quality impact of there is failure and defects 54.1 % of the respondents strongly agree, 45.9 % of the respondents agree, 0 % neutral, 0 % disagrees and 0 % strongly disagree. This means that all of the respondents believe that ineffective material management has an impact on Failure and defects on the selected Addis Ababa housing development corporation construction project sites.

Table 4.27 Response to there is failure and defects

There is Failure and defects					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	34	45.9	45.9	45.9
	Strongly Agree	40	54.1	54.1	100.0
	Total	74	100.0	100.0	

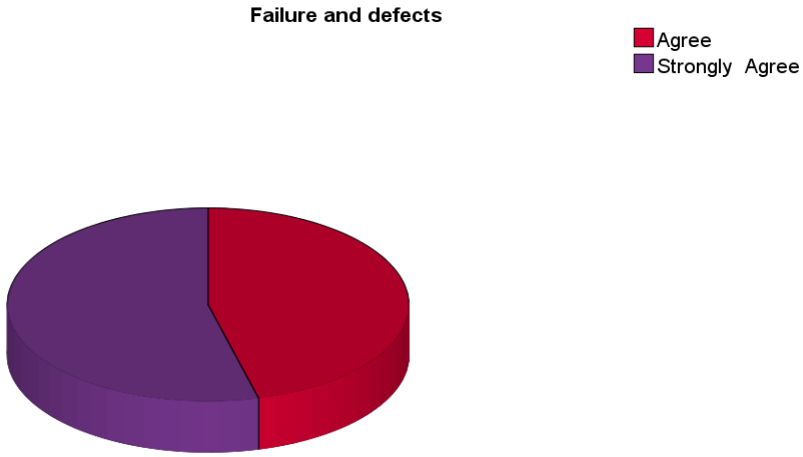


Figure 4.13 There is failure and defects

4.7.6 Discussion on Quality related impacts of material management practice in Addis Ababa condominium housing project performance

Rework due to improper quality and mistakes result from many causes from this one of the most significant cause is poor material quality and mistakes due to poor workmanship, incompliance of material with the specification and drawings which means that If building materials do not meet technical and structural requirements, and if there is consequent mistakes (errors) are done at work site construction rework may be needed to correct work that had not been done right the first time. Problems can also arise from ineffective identification, planning, procurement, handling, storage, stock control, and waste control

of materials.

On project sites, poor quality, and improper material management cause failure and defects mean that building constructions or parts of buildings lack properties that have been agreed on contract document. Because wrong methods of construction and poor quality material used on construction sites lead to the occurrence of failure of structure and defects in buildings. These failures and defects affect the project's budget, timetable, and waste of materials. Some of the sources of defects are low-quality materials, lack of proper material supervision, design changes, and lack of quality system. Low-quality materials cause problems such as leakages, concrete cracks, sudden dropping of ceilings, and inadequately functioning structures. Having no quality system governing on-site is also another major source of defects on housing project sites therefore there should be a system to counter-check the qualities of delivered materials.

Figure 4.14 below shows the rework of HCB slab by additional rebar is used because of the poor quality of HCB used. This increases in construction cost and also additional time is required to construct the rework. And also this may cause shortage of rebar for other construction works and additional quantity of rebar is required.

Figure 4.14 Rework due to poor quality of HCB at bole hayat project site

Figure 4.15 a below shows defect on beams on bole beshale site because of poor quality of sand. This poor quality of sand leads to rework and plastering and filing of the area in additional cement and sand also leads to over quantity of sand and cement also delay in progress of work.

a) Defects on beams at bole beshale project site

Figure 4.15 b below shows defect on lift shaft at bole bulbula site because of wrong design of lift. This leads to rework and cheasleaing of the lift which needs additional materials to correct the area also leads to over quantity of materials also delay in progress of work.

b) Defects on the lift shaft at bole bulbula project site

Figure 4.15 (a) and (b) Defects on beams and lift shaft respectively

Generally, most of Addis Ababa condominium housing construction projects failed to complete according to the initially agreed contract cost /amount/, on the agreed time frame, and specified quality. One cause is ineffective material management. All participants believe and agreed on efficient material management in housing construction projects lowers the total material costs which directly affects overall project costs, and helps to finish the projects on schedule and with the required quality and productivity. Construction projects finished with the initially agreed contract cost, on time, and quality is very important and said to be successful. Minimal performance of construction is measured mostly by cost, time, and quality. The finding of this section respondent agreed that improper/ineffective/ material management could result in the project falling behind schedule and late completion, an increase in project cost, and defects and damage to buildings.

This outcome supports the research of Mohamed et al. (2021), who found that inefficient material management has a detrimental impact on the delivery of construction projects in the form of cost overruns and delays in the work's progress. Reiterating the research's

findings from Albert, Shakantu, and Ibrahim (2021), poor material management has a high impact on material waste, a medium impact on building project quality, a high and a low impact on the construction industry's profitability, and it causes claims and expenses. According to Tibebu Kebede's (2016) research, inefficient handling of building materials has an impact on how well construction projects perform overall in terms of cost, time, quality, and productivity. To prevent losing money, it's crucial to reduce material waste during the construction phases. When there are significant discrepancies between the date the material was requested or the date the purchase order was made and the time the material will be delivered to construction sites, it is possible that the project will be delayed. Other factors that could contribute to this include a poor transportation system and strict public procurement procedures.

4.8 Response to Measures to be taken for effective material management practice in Addis Ababa condominium housing construction project

Finding the necessary actions is the fourth goal for effective material practice in Addis Ababa condominium housing construction project sites.

Table 4.28 Response about measures to be taken for effective material management practice

No.	Measures	Mean	Rank
1	Using technologies to facilitate material management on the projects	4.77	1st
2	Prepare material takeoff from drawing and design	4.23	2nd
3	Prepare detailed and accurate bill of quantity	4.19	3rd
4	Prepare drawings in detail	4.15	4th
5	Following up and forecasting material prices and recording the variation of price in the market	4.08	5th
6	Testing materials by certified technicians	4.07	6th
7	Adequate site management, supervision, and proper administration	4.04	7th
8	Proper workmanship	4.04	7th
9	Preparing construction material management plan	4.04	7th
10	Preparing detailed materials specifications	4.01	10th

11	Predicting field conditions and weather	4.01	10th
12	Controlling over-ordering and purchasing	4.00	12th
13	Preparing material schedule	4.00	12th
14	Performing recycling and reuse methods for surplus and waste materials	3.99	14th
15	Considering required communication methods for material management	3.97	15th
16	Preparing safe and suitable material storage and employment of store-keeper or security personnel	3.96	16th
17	Prepare material quality, waste management training, and meeting	3.95	17th
18	Considering off-site construction	3.92	18th
19	Recording daily usage of material and taking inventory of material	3.89	19th
20	Moving materials using machinery	3.38	20th

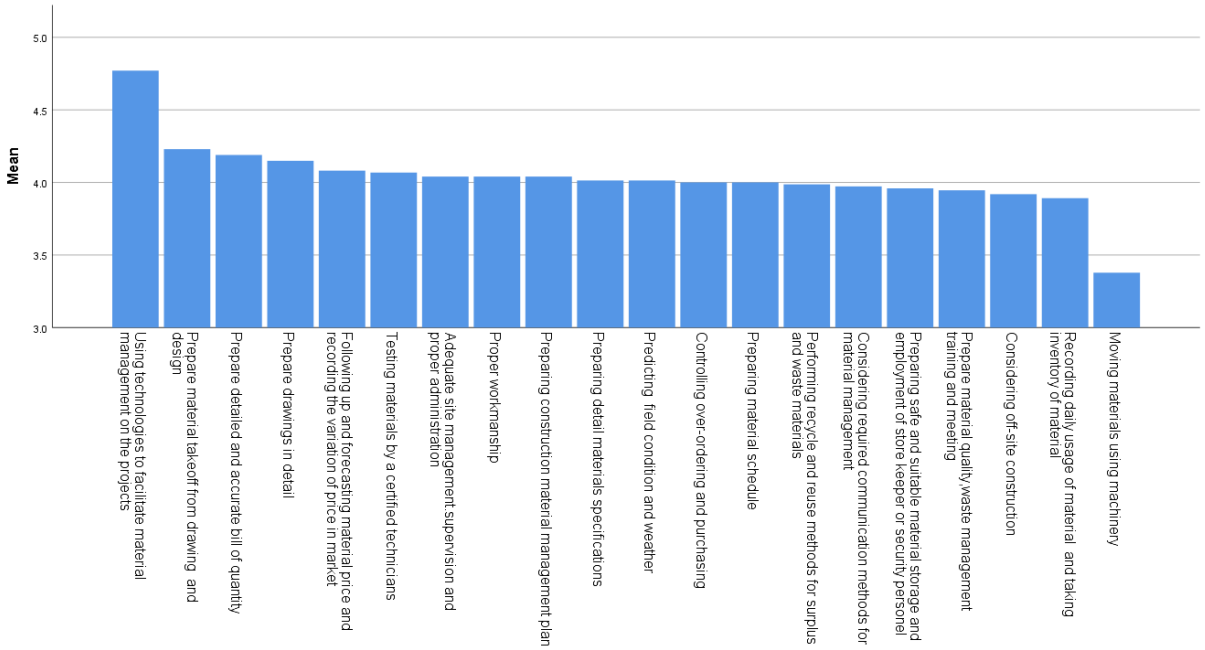


Figure 4.16 Measures to be taken for effective material management

Finding the necessary actions is the fourth goal for measures to be taken for effective material management at Addis Ababa condominium housing construction project. From the findings of this section the major measure to be taken for effective material management ,

as per the result on table the highest ranking is 'using technologies to facilitate material management on the projects' with mean = 4.77 which lies under 'strongly agree', the second measure to be taken for effective material management in Addis Ababa condominium housing construction project is prepare material takeoff from drawing and design with mean =4.23 ,the third measure is prepare detailed and accurate bill of quantity with mean= 4.19, the fourth measure is prepare drawings in detail with mean = 4.15, the fifth rank for measure to be taken is following up and forecasting material price and recording the variation of price in market with mean = 4.08 ,the sixth measure is testing materials by a certified technicians with mean=4.07, three measures are identified with seventh place adequate site management, supervision and proper administration , proper workmanship and preparing construction material management plan with mean= 4.04 , also two measures are identified in the tenth place preparing detail materials specifications and predicting field condition and weather with mean =4.01,the twelveth measure are controlling over-ordering and purchasing and preparing material schedule with mean=4.00 finally the rest measure to be taken for effective material management in Addis Ababa condominium housing Construction project mean score value lies between 3.89 and 3.99 which is under 'agree' category except moving materials using machinery with mean =3.38 which lies in 'neutral' category and the average mean 4.03 which most respondents agree on the measures to be taken for effective material management at Addis Ababa condominium housing construction project.

4.9 Discussion on Measures to be taken for effective material management in the Addis Ababa condominium housing construction project

The fourth objective was achieved through the questionnaire and interview questions asked. The findings show that different measures have to be taken for effective material management in all Addis Ababa condominium housing construction projects. According to the finding from this section measures for effective material management includes using technologies to facilitate material management on the projects, preparing material takeoff from drawing and design, preparing the detailed and accurate bill of quantity, preparing drawings in detail, following up and forecasting material price and recording the variation of price in the market, testing materials by certified technicians, adequate

site management, supervision, and proper administration, proper workmanship, preparing construction material management plan, preparing detail materials specifications, predicting field condition and weather, controlling over-ordering and purchasing and Preparing material schedule.

The findings of Nann Lwin Phu and Aye Mya Cho (2014) are supported by the results of this study. The measures for effective material management include defining accurate material specifications, locating sources of materials for procurement, obtaining approval for sample materials, forecasting weather conditions and market prices, preparing for material storage, taking into account necessary communication methods for material management, identifying material schedules, and daily recordkeeping..

Additionally, support the findings of Bamidele T. A. and Festus O. A. (2016), who found that management needs to improve their material supervision on site, materials need to be handled appropriately when delivered, care needs to be taken during the materials handling process, and more attention needs to be paid to the knowledge of materials management on building projects, particularly on construction sites.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The general objective of the research is to assess the impact of material management practices on public condominium housing development construction project performance in Addis Ababa. A questionnaire survey, interview, and site observation were conducted to identify the practices, causes, impacts, and measures of ineffective material management. The following conclusions are taken from the findings..

1. The finding shows that all Addis Ababa condominium housing construction sites have poor material management practices. This means they have undefined planning, procurement, logistics, storage, handling, stock, and waste control of material management.
2. The identified major causes for ineffective material management practice in Addis Ababa condominium housing construction sites are incorrect material takeoff from drawing, materials incompliance with specification, receiving materials before they are required and not receiving materials at the time of requirement, Lack of detailed and accurate bill of quantity, incomplete delivery of material, poor communication on supply of material between parties, material storage in harsh weather, not determining the quantity of material (wrong material quantity), subsequent design change, inconsistency between specification and drawings, material wastage, incomplete and late detail drawings, poor material storage system and poor material supervision.
3. Ineffective material management practice has a negative impact on the performance of Addis Ababa condominium housing construction projects in terms of time, cost, and quality. Based on the findings there is 54.8% increase in project cost, 45% delay in project completion period because of improper material management practice and also rework, damage, and failure of the project. Therefore it is important to manage all materials from the design stage to the construction stage. Poor handling of construction materials affects the overall performance of construction projects in terms of time, cost, and quality.

4. To minimize the impact of ineffective material management practices in Addis Ababa condominium housing construction projects using technologies to facilitate material management on the projects, preparing material takeoff from drawing and design, preparing the detailed and accurate bill of quantity, preparing drawings in detail, following up and forecasting material price and recording the variation of price in the market, testing materials by certified technicians, adequate site management, supervision, and proper administration, proper workmanship and preparing construction material management plan, preparing detail materials specifications and predicting field and weather condition, controlling over-ordering and purchasing and preparing material schedules are the major measures to be taken.

5.2 Recommendations

From the findings of the study, the following recommendations were given considering all Addis Ababa condominium housing construction sites

- To minimize the costs, time, and quality associated with poor material management, a systematic and integrated approach is required. Adequate awareness about material management should be created within the organization by preparing material quality, waste management training, and meetings.
- There should be a department for material management, a designated person for it, centralized team coordination between the site and the organization for it, and good implementation of all the functions and procedures related to it.
- Top management needs to pay closer attention to how the company handles its materials.
- Using software or technology to handle materials should be done to prevent human error
- Contractors should store goods like steel, cement, etc. to prevent delays and cost overruns caused by rejected items due to quality, unavailability of supplies, price inflation, or seasonal difficulties.
- Other businesses are not included in this analysis; it solely applies to Addis Ababa condominium housing construction sites. Therefore, more research on different construction firms is needed. Because it would be possible to generalize the

knowledge covered in the research using a large sector sample. In addition to time, cost, and quality, other researchers can examine how material management strategies affect additional project performance indicators.

References

1. Abdul Kadir M.R., Lee W.P., Jaafar M.S., Sapuan S.M. and Ali A.A.A., 2005 , Factors affecting construction labour productivity for Malaysian residential projects, University Putra Malaysia, Selangor, Malaysia, Vol. 23 No. 1, pp. 42-54
2. Addise, D., 2005, Handling of Concrete Making materials in Ethiopia construction industry, MSc.thesis, Addis Ababa Institute of Technology, Addis Ababa University
3. Adnan Enshassi , Sherif Mohamed , Ziad Abu Mustafa and Peter Eduard Mayer,2007, Factors Affecting Labour Productivity in Building Projects in the Gaza strip, Journal of Civil Engineering and Management, Vol XIII, No 4, 245–254
4. Albert, I., Shakantu, W. & Ibrahim, S. 2021, The effect of poor materials management in the construction industry: A case study of Abuja, Nigeria, Acta Structilia,28(1), pp. 142-167
5. Anwar, Z., Sohail, M., Shazia, N., Hashim H. & Muhammad O.S. A., 2015, Factors Affecting Material Procurement, Supply, and Management in Building Projects of Pakistan: A Contractor's Perspective, International Conference on Innovations in Civil and Structural Engineering Istanbul, Turkey, pp. 170-175
6. Asegid, T., dr srinivas K., Krishna, 2020, review on construction materials management practice on project sites, International Journal of Engineering Innovations in advanced technology, Volume-2, issue-2
7. Ashwini R. Patil, and Smita V. Pataskar ,2013, Analyzing Material Management Techniques on Construction Project, International Journal of Engineering and Innovative Technology (IJEIT) Volume 3, Issue 4
8. Asmara, S., 2015, Managing and Minimizing Wastage of Construction Materials on selected public building projects in Addis Ababa, MSc. thesis, Addis Ababa Institute of Technology, Addis Ababa University
9. Bamidele, T., A., and Festus, O., A., 2016, Assessment of materials management on building projects in Ondo State, Nigeria, Quantity Surveying Department, Federal University of Technology, Akure, Nigeria

10. Brain Cooke, and Peter Williams, 2009, Construction Planning, Programming and Control, Wiley-Blackwell; 3rd edition
11. Chan, A. P. C., Scott, D., & Lam, E. W. M. (2002). Framework of Success Criteria for Design/Build Projects. Journal of Management in Engineering, 18, 120-128
12. Chitkara, K., K., 2004, Construction Project Management, Planning, Scheduling and Controlling, Tata McGraw-Hill Publishing Company Limited, New Delhi
13. Deribsa, A., 2018, research methodology handbook for research students and practitioners, first edition, pp. 22-
14. G. Kanimozhi, P. Latha, 2014, Material Management in Construction Industry, Indian Journal of Applied Research, 4(4), pp. 1-3.
15. Gulghane A. A., and Khandve P. V.,2015, Management for Construction Materials and Control of Construction Waste in Construction Industry: A Review, Int. Journal of Engineering Research and Applications, Vol. 5, Issue 4, (Part -1), pp.59-64
16. Hee sung cha and chan kyu Kim , 2011, Quantitative approach for project performance measurement on building construction in South Korea, KSCE Journal of Civil Engineering volume 15, pages1319–1328
17. Josephine, N., S., 2015, Material Management and Project Performance of Construction Companies in Nairobi City, Msc. Thesis, Kenyatta University, Kenya
18. Kasim, N., B., Anumba, C., J., and Dainty, A., R., J., 2005, Improving materials management practices on fast-track construction projects In Khosrowshahi, F (Ed.), 21st Annual ARCOM Conference,7-9 September 2005, SOAS, University of London, Association of Researchers in Construction Management, Vol. 2, pp.793-802
19. Kayiranga, R., Nyamweya, M., N., Shukla J., 2020, Effects of Materials Management on Performance of Selected Construction Projects in Rwanda, International Journal of Scientific and Research Publications, Volume10, Issue9
20. Mohamed Y., W., Norliana, B., S., Sulzakimin, M., and Asrul, N., M., 2021, The Impact of Material Management on Construction Project Delivery in Somalia, journal of technology management and business, vol. 8, no. 1
21. Molaye Takele, 2020, Study on Investigating Causes and Effects of Delay in Addis Ababa 40/60 Housing Construction: A Case Study on Some Selected Project Sites, MSc. thesis, Addis Ababa institute of technology, Addis Ababa university

22. MoWUD, C., 2014, Ministry of Urban Development and Construction, List of Registrar Contractors from Meskem2 /2006 E.C. to Sene30 /2006 E.C
23. Nann, L., P., and Aye, M., C., 2014, Factors Affecting Material Management in Building Construction Projects, international journal, Vol.03, Issue.10.
24. Okeke, F., N., and Mbabuike, U., C., 2020, An Overview of Materials Management Control for Effective Project Delivery, International Digital Organization for Scientific Research journal of applied sciences, volume 5, no.1, pp.46-54.
25. Olanrewaju, S., B., O., Olatunyadeji, A., and Okedare, D., K., O., 2021, Appraisal of the Factors that Affect the Material Management Strategies of Construction Works in Ekiti State Nigeria, IOSR Journal of Humanities and Social Science(IOSR-JHSS), Volume26, Issue9, pp. 21-29.
26. Pataskar, A., R., 2013, Analyzing Material Management Techniques on Construction Project, International Journal of Engineering and Innovative Technology (IJEIT), Volume 3, pp.96-100.
27. Patel, K., V., and Vyas, C., M., 2011, Construction Material Management on Project Sites, National Conference on Recent Trends in Engineering and Technology, New Vallabh Vidhyanagar ,Gujarat, India
28. Prabu, V., and Baker, M., 2006, "Materials Management", UK: McGraw-Hill.
29. PMBOK guide (2013) A Guide to the Project Management Body of Knowledge, Project Management Institute, Inc. Fifth edition.
30. Saunders, M., Lewis, P., and Thornhill, A., 2012, Research Methods for Business Students, Pearson Education Limited, 6th edition
31. Selam, H., 2021, Assessment of Construction Material Waste in Addis Ababa, the case of selected building construction projects, MSc.thesis, School of Graduate Studies, St. Mary's University
32. Sila, J. N., and Gakobo, J. (2021). Material management and project performance of construction companies in Nairobi city county, Kenya. International Academic Journal of Information Sciences and Project Management, 3(6), 368-391.
33. Sori, T., Woyesa, A., Jifara C., and Emer, T., Q., 2021, Material Cost Optimization and Quality Control Improvement of Building Construction, Construction Technology, and Management, Ambo University Hachalu Hundessa, Institute of Technology

Ambo University Journal of Xidian University, Volume15, Issue8

34. Stukhart, G., 1995, Construction Materials Management, Marcel Dekker Inc, New York
35. Tibebu, K., 2016, Assessment of Materials Management Practices on Construction Sites, MBA Thesis, School of Graduate Studies ,St. Mary's University
36. UN-HABITAT, 2011, Condominium Housing in Ethiopia, the Integrated Housing Development Program, United Nations Human Settlements Program
37. Vikram, K., Rohit, S., and Mohit, H., 2017, Factors Affecting Material Management on Construction Site, International Research Journal of Engineering and Technology Volume: 04 Issue:01
38. Wayne J. Del Pico,2013, Project Control-Integrating Cost and Schedule in Construction , John Wiley & Sons, Inc., Hoboken, New Jersey
39. Yamane, Taro, 1967, Statistics: An Introductory Analysis, 2nd Edition, New York: Harper and Row.
40. Zaha, A., 2017, The Impact of Material Management on Construction Project Delivery in Maldives, MSc. Thesis , Faculty of Engineering and Science, University Tunku Abdul Rahman
41. Zairra, M., J., and Narimah K., 2017, A Review on Implication of Material Management to Project Performance, Faculty of Technology Management and Business, University Tun Hussein , 86400 Batu Pahat, Johor, Malaysia
42. Zikmund, et.al, 2010, Zikmund, W., G., Babin, B., & Carr, J., C., 2010, Business research methods Canada, South-Western, Cengage Learning, 8th edition

APPENDIX

APPENDIX A

ADDIS ABABA UNIVERSITY

INSTITUTE OF TECHNOLOGY

SCHOOL OF GRADUATE STUDIES

SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

Questionnaire

Dear respondents,

I'm conducting research on how material management techniques affect the completion of condominium housing projects in Addis Ababa. I would appreciate it if you answered the questions on the survey. Your information will be kept private and used solely to carry out this research project. No specific responder or organization will be named in the supplied data, which will be aggregated.

I appreciate your cooperation and time in advance. I may be reached at the number listed below if you have any additional queries.

Sincerely,

Mahlet Abebe

Email: mahieya12@gmail.com

Mobile. +251-9-13-84-99-68

SECTION A: - Background information about the respondents please use (√) in the relevant box for your response

1. Gender

Female ☐ Male ☐

2. Which of the following best describes your current position?

Project manager ☐ Office engineer ☐ Site engineer ☐ Resident engineer ☐

Project Coordinator ☐ Other ☐

3. What is your year of work experience in the construction industry?

0 – 5 years ☐ 6 – 10 years ☐ 11 – 15 years ☐ 16 – 20 years ☐

4. What is your highest educational qualification?

Diploma ☐ Adv. Diploma ☐ BSC ☐ MSC ☐ PHD ☐

5. Which Organization do you represent?

Client ☐ Consultant ☐ Contractor ☐

SECTION B: Current practice of material management in condominium housing construction projects

The following are selected practices of material management in construction projects. Please indicate your level of agreement on the current practice of material management in Addis Ababa housing development corporation construction projects. Please note that: 1= Strongly Disagree; 2= Disagree; 3 = Neutral; 4 = Agree and 5 = Strongly Agree

1. To what extent do you evaluate the following practices for the planning of material management?

Questions related to Planning of Material Management	Responses				
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
The organization Plan for the materials needed					
The organization Prepares a material schedule					
The organization Prepare preliminary material order					

2. To what extent do you evaluate the following practices for Procurement of material management?

Questions related to Procurement of Material Management	Responses				
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
The organization Identifies the conformity of materials with the specification					

The organization purchase Material from the same supplier					
The organization Purchas-ing material in bulk					
Selecting lower price sup-plier as the winner					

3. To what extent do you evaluate the following practices for logistics of material manage-ment?

Questions related to the Logistics of Material Management	Responses				
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agr ee (4)**	**Strong-ly Agree (5)**
The organization checks the supplied material in accordance with the esti-mation					
The organization develops site layout and material location					
The organization orders the material needed based on the amount of work					

4. To what extent do you evaluate the following practices for Handling and Storage of material management?

Questions related to Handling and Storage of Material Management	Responses				
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
The organization prepares a sufficient place for material storage					
The organization cares about the transportation of materials					
There is proper storage and handling of material in the organization					
There is efficient communication about the storage of materials between parties					

5. To what extent do you evaluate the following practices for Stock and Waste control of material management?

Questions related to Stock and Waste control of Material Management	Responses				
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
The organization reuse materials					
There is reporting a shortage of material on time					

There is a daily recording of material usage in the project sites					
The organization control material wastage on site					

SECTION C: Major causes of ineffective material management practices condominium housing construction projects

Please indicate your level of agreement on the Causes of ineffective material management practices in Addis Ababa housing development corporation construction projects. Please note that: 1= Strongly Disagree; 2= Disagree; 3 = Neutral; 4 = Agree and 5 = Strongly Agree

To what extent do you evaluate the following Causes of ineffective material management practice material management?

Causes	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Undefined scope					
Insufficient communication between parties					
Incomplete drawing and consecutive design change					
Not-standard specification					
Not knowing what and when the material is required					
Lack of material schedule					
Incomplete report on material supply					
poor material management planning					
Inconsistency between specification and drawings					

Not determining the quantity of material (Wrong material quantity)					
Not receiving materials when needed					
Receiving materials before they are needed					
Lack of detailed and accurate bill of quantity					
Incorrect material takeoff from drawing					
Materials incompliance with specification					
Incomplete delivery of material					
Poor communication on the supply of material between parties					
Excessive paper work					
Poor material supervision					
Material storage in harsh weather					
Poor material storage system and lack of storage space and facilities					
Lack of care in transporting materials					
Material wastage					
Excess supply of material					
Not sufficient material stock					
Incorrect material arrangement					

SECTION D: Major impacts of material management practice to project performance in condominium housing construction projects.

Please rate how much you believe that poor material management practices affect the success of construction projects undertaken by the Addis Ababa condominium housing. 1 indicates "Strongly Disagree," 2 "Disagree," 3 "Neutral," 4 "Agree," and 5 "Strongly Agree."

To what extent do you evaluate the following **cost related** impact of ineffective material management practice to project performance?

Cost related questions	Responses					
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**	
There is added costs over and above those initially agreed contract amount						
There is fewer returns on investment						
There is higher rental prices to the end user						
There is loss of profits to the contractor						

To what extent do you evaluate the following **time related** impact of ineffective material management practice to project performance?

Time related questions	Responses				
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
There is a delay in the progress of the work					
There are claims and termination of the project					

To what extent do you evaluate the following **quality related** impact of ineffective material management practice to project performance?

Quality related questions	Responses				
	Strongly Disagree (1)	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly Agree (5)**
There is loss of productivity of work					
There is rework due to improper quality and mistakes					
There is failure and defects					

SECTION E: Major measures to be taken for effective material management in condominium housing construction projects

Please rate how much you agree with the proposed procedures for efficient material management on the Addis Ababa condominium home development projects. Please be aware that 1 indicates "Strongly Disagree," 2 "Disagree," 3 "Neutral," 4 "Agree," and 5 "Strongly Agree."

To what extent do you evaluate the following measures to be taken for effective material management practice material management?

Measures	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Preparing detailed materials specifications					
Prepare material quality, waste management training, and meeting					
Testing materials by certified technicians					
Predicting field conditions and weather					
Following up and forecasting material prices and recording the variation of price in the market					
Preparing safe and suitable material storage and employment of storekeeper or security personnel					
Considering required communication methods for material management					
Preparing material schedule					
Recording daily usage of material and taking inventory of material					
Moving materials using machinery					

Preparing construction material management plan					
Considering off-site construction					
Prepare drawings in detail					
Performing recycling and reuse methods for surplus and waste materials					
Controlling over-ordering and purchasing					
Prepare detailed and accurate bill of quantity					
Prepare material takeoff from drawing and design					
Adequate site management, supervision, and proper administration					
Proper workmanship					
Using technologies to facilitate material management on the projects					

APPENDIX B

Interview

Greetings, sir/madam

I want to start by saying how much I appreciate you taking part in this study. This interview's objective is to learn more the current material management practices in Addis Ababa condominium housing construction projects, To identify the impact of materials management on project delivery of Addis Ababa condominium housing projects construction sites, To identify the Causes of ineffective material management in Addis Ababa condominium housing projects construction sites And To identify on the measures to be put in place to ensure effective Materials management in Addis Ababa condominium housing construction projects sites. The data collected will only be used for academic purposes, and it will be kept private. I anticipate your kind reply in advance.

INTRODUCTION AND ORIENTATION

1. I want to appreciate you for your cooperation first and foremost.

2. Your answers to this interview will be utilized anonymously and in confidence.

3. The interview will last about 35 minutes and will consist of 6 questions.

4. If you have any questions or comments about this interview, you can contact

Your name and contact information

_____ is my job title.

Contact information (Optional): Email: Phone: ()

5. For whom do you now work?

Three parties: the client, the consultant, and the contractor.

Contractual details

Project's contract length is.....

Cost of the project under contract……..

The project's commencement date is.....

Project's contractual completion date is.....

Interview Questions

Question 1

Does your organization have a formal material management system? If yes which process of material management is practiced more in Addis Ababa housing development corporation construction project you are engaged in? Explain in detail

- Planning of material management
- Procurement of material management
- Logistics of material management
- Handling of material management
- Storage of material management
- Stock and waste control of material management

Question 2

Is there a specific division or designated individual for material management?

Question 3

Do you have any comments regarding the causes of ineffective material management practices in Addis Ababa Housing development corporation construction project? If yes please describe

Question 4

What do you think about the existing performance of Addis Ababa Housing development corporation construction project ensures the achievement targeted by 2017?

Question 5

Do you think ineffective material management practice and project performance are related? If yes, what are the impacts? Please explain with an example

Question 6

What measures do you suggest for effective material management on Addis Ababa housing development cooperation construction project you are engaged in?

APPENDIX C

Focus group discussion

Good morning and welcome.

Thanks for taking the time to join us to talk about the impact of material management practice on Addis Ababa condominium housing project performance.

My name is Mahlet Abebe and I am doing research paper on the impacts of material management practice on Addis Ababa condominium housing project performance in Addis Ababa university institute of technology. You were invited because you have more experience in Addis Ababa condominium housing project sites, so you're familiar with the impacts of material management practice on project performance.

There are no wrong answers but rather differing points of view. Please feel free to share your point of view even if it differs from what others have said. I won't use any names in my reports. You may be assured of complete confidentiality.

Well, let's begin.

Tell us your name and your job position in your company.

Question 1

Do you think there is delay in projects because of improper/poor/ material management practice? [Yes/no]

Question 2

If yes, how much percent is the delay in projects?

Question 3

Do you think there is increase in cost or cost overrun of projects because of improper/poor/ material management practice? [Yes/no]

Question 4

If yes, how much percent is the cost overrun in projects?