HARAMBEE UNIVERSITY

FACULTY OF BUSINESS AND ECONOMICS

DEPARTMENT OF PROJECT MANAGEMENT

THE EFFECT OF MATERIAL MANAGEMENT PRACTICES ON PROJECT PERFORMANCE OF SELECTED BUILDING CONSTRUCTION COMPANIES IN ADAMA

BY

FETENE YIGREM

JUNE 2022

ADAMA

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ADVISOR: EJARRA BATU (Ph.D.)

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APPROVAL SHEET

THE EFFECT OF MATERIAL MANAGEMENT PRACTICES ON PROJECT PERFORMANCE OF SELECTED REAL ESTATE COMPANIES IN ADAMA

BY

FETENE YIGREM

APPROVED BY BOARD OF EXAMINERS

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CERTIFICATION

This is to certify that Mr. Fetene Yigrem has completed his thesis work entitled “THE EFFECT OF MATERIAL MANAGEMENT PRACTICES ON PROJECT PERFORMANCE OF SELECTED BUILDING CONSRUCTION COMPANIES IN ADAMA”. As I have evaluated, his research is original work and appropriate to be submitted as a partial fulfillment requirement for the Award of Degree in Masters of Business Administration.

_____ _____

Thesis Advisor Signature June 2022

DECLARATION

I, Fetene Yigrem, hereby declare that the thesis entitled "THE EFFECT OF MATERIAL MANAGEMENT PRACTICES ON PROJECT PERFORMANCE OF SELECTED BOUILDING CONSTRUCTION COMPANIES IN ADAMA" is my original work and submitted by me for the award of the Degree of Master of Business Administration of Harambee University at Adama Campus and it hasn't been presented for the award of any other Degree, Diploma, Fellowship or other similar titles of any other university or institution and that all sources of material used for the study have been appropriately acknowledged.

Fetene Yigrem

_____ _____

Student Signature, June 2022

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ABBREVIATIONS AND ACRONYMS

BSC	- Balanced Score Card
EOQ	- Economic Order Quantity
ICT	- Information and Communication Technology
MRP	- Materials Requirements Planning
RFID	- Radio Frequency Identification
SWOT	- Strengths, Weaknesses, Opportunities, and Threats
SPSS	- Statistical Package for the Social Sciences

ABSTRACT

The main objective of the study was to investigate the effect of material management on project performance in the case of selected building construction companies in Adama. Quantitative approach was applied in this study. Exploratory research design was used to investigate the effect of the independent variables such as; project planning, purchasing, transportation and storage on the overall project performance. Only permanent employees of the selected building construction companies were considered as a study population. Out of 2,187active permanent employees who have currently been engaged in the companies, a sample of 338 respondents were selected through convenience non-probability sampling technique. A total of 296 valid and usable primary date was collected from this sample respondents through a self-administered questionnaire. Both descriptive and inferential statistics were adopted with the help of SPSS 21.0. The findings of the study indicated that all the independent variables (project planning, purchasing, transportation and storage) were found to have significant effect on project success. Project Planning dimension (β = .450) has relatively the highest effect followed by Project performance (β = .361). But Material transportation (β = .223) and Material Storage (β = .176) have relatively lower contributions to the prediction model. It can be concluded that for employees of some selected building construction companies, these factors are important in assessing overall material management for the success of their specific projects.

Keywords: Material Management, Project Success, *Building construction* Companies, Transportation

CHAPTER ONE

1.1. Background of the Study

On a global scale, the construction industry has become a lucrative investment destination. The industry is important to the economy and its activities are critical to achieving the economic development goals of a national. As countries put their vital infrastructure on hold to promote development, the industry is showing the effects of the rapidly evolving construction industry. Shen and Tam (2012) claim that the industry contributes considerable importance in meeting social needs and improving quality of life. It has played a significant role in the economies of different countries that accounted for more than 18% of global GDP (Betts, 2016). The industry, however, is afflicted by issues such as raw material prices, labor capacity, technical obsolescence, a scarcity of resources, and corruption. As a result, proper building material management is the foundation for effective operations, as it affects the productivity level of all sectors of the economy. The issue is more pronounced, particularly in developing countries.

The construction industry in developing countries is increasingly competitive and material management is now considered one of the cost-cutting barriers to improving profitability and productivity, as building materials make up the bulk of any construction project cost. According to Latha (2014), material management is the process of planning, implementing, and managing construction-related activities. Zeb (2014) also defines material management as the process of initiating, designing, planning, and tracking site and office activities in any construction project. Haddad (2016) defines building materials as materials that are purchased and used to produce the final product. While Flanagan (2015) categorizes the process of asset management into five classes namely planning, procurement, planning, storage, and disposal of unused items.

Failures in material identification, planning, procurement, storage, and control resulted in lost labor productivity and overall delays, which can indirectly increase total project costs. Effective construction materials management techniques can significantly reduce these costs and contribute significantly to the project's success. Obtaining success in the project implementation process is a significant material management task (Stuckart, 2015). Modern material management techniques were developed in the 1940s, allowing them to make significant progress in developing their

product. Over the last decade, there has been a greater understanding of the various fields of material management. Many health care facilities use these approaches to provide effective patient care (National Procurement Management Agency-USA, 2012).

The construction industry is not an exception; however, the rate at which building construction projects fail in developing economies is largely dependent on the effective application of materials management techniques. According to Nwachukwu (2017), inefficient material management practices on construction project sites may contribute to the failure or abandonment of construction projects in developing economies.

The core business of the construction industry is to undertake projects involving the creation of new buildings or the renovation of existing ones for a variety of clients. As a result, it's not surprising to learn that traditionally, performance measurement in construction is approached in two ways: in relation to the product as a facility and in relation to the product's creation as a process. In particular, the former has been the primary performance indicator in determining the success or failure of construction projects (Nixon, 2012). It is influenced by a variety of strategies, all of which must be carried out correctly and adequately. An effective material handling system that is concerned with project performance includes proper planning, appropriate storage mechanisms, proper transportation, and sourcing strategies. These are the metrics that outline a firm project performance.

Material management entails coordinating all functions pertaining to input materials. These functions can only be carried out effectively if sufficient emphasis is placed on project planning, the use of qualified personnel, adequate staff training, and proper communication among those involved in the process (Keitany and Mutwol, 2014). According to Ebole (2005), important and desirable aspects of managing construction sites such as quality materials, fair value, timing, and reasonable costs are scarce in construction projects, as evidenced by urgent procurement, insufficient storage, shortage of goods, and sometimes disposal of goods by supervisors.

Previous research has shown that effective management strategies contribute to the success of a construction project in terms of delivery time, project costs, quality, and safety (Ademeso, 2012, Keitany, 2014; Sundararaja 2014). Boopathi (2016) conducted research on material management using real-time residential projects. The author argued that the project's costs are rising primarily as

a result of resource mismanagement. In this case, project planning, scheduling, and budgeting are completed. The cost of the project did not escalate because they followed the proper planning process. Material costs account for 45 percent of the total cost. As a result, it is believed that the successful implementation of operational management strategies can go a long way toward improving project success in the construction industry.

Construction is one of Ethiopia's fastest-growing industries, second only to mining. Ethiopia, according to Zemedkun (2018), is one of the East African countries that has emerged as a preferred destination for road and building construction investment. It generates more than 29% of the country's gross foreign exchange earnings. Building construction activities, on the other hand, present not only economic opportunities for the country, but also significant challenges in terms of escalating production costs that are unsustainable for citizens in particular. According to Asres (2017), regardless of the type of project, building construction costs between 55 and 75 percent of the total production cost on average due to waste and a lack of materials, resulting in delivery delays, poor quality, and high risk.

The need to investigate the influence of material management on construction performance is undeniable as the materials comprise a great deal of cost element in construction project delivery. The fact this sector is an impeding one compared to other sectors of the economy owing to the exclusive nature of projects and several antagonistic flaws are tangled. Thus, the purpose of this study is to understand the relationship between material management and project success in the Ethiopian construction industry’s context.

1.2. Statement of the Problem

Despite its rapid growth, Ethiopian construction companies have experienced a number of project failures due to poor material management. Project delays occur as a result of poor initial planning, insufficient purchasing procedures, transportation delays, and material damage as a result of inadequate storage facilities (Asres, 2017). These challenges manifest in projects as work stoppages due to material shortages, surplus materials on-site, insufficient storage space for materials, uncontrolled wastage of materials, damaged materials on-site, and erroneous material purchases. The end result is project failure.

Poor material management practices used during project implementation have contributed to an increase in the number of projects abandoned due to increased project costs and unrealistic time frames. Many of these unfinished construction projects seriously threaten public safety because some have collapsed, resulting in the loss of lives and property. It is also a significant financial risk in terms of construction project investment. According to Tekletsadiq (2018), inefficient administration and poor implementation are among the causes of project failures. The study concentrated on store management but also transportation management issues, which significantly disrupted material management. It is also important to establish a relationship between storage and transportation processes.

Ahmed (2017) reported that negligent management hampered project completion of road construction in Ethiopia. He discussed the cost variations caused by equipment damage but did not address the challenges associated with the maintenance and procurement processes in the Ethiopian context. Zelaem (2018) investigated the impact of material management on the organizational performance of selected building construction companies in Adama. According to the findings poor material handling, unreliable transportation, inadequate storage, and procurement processes were identified as the main reasons for project abandonment. That means an organization's planning, storage, transportation, and procurement contribute to the success of project delivery.

Despite significant discussions to address concerns about the destruction of building materials, no concrete solution has been reached yet. As the claims are often linked to construction workers' inadequacies; however, it has never been discovered the cause of asset management inefficiencies in construction projects and their relationship to the existing asset management system. Thus, the significance of investigating the effects of functional management on construction industry performance cannot be overstated.

The aim of this study is, thus, to investigate the effect of material management practices on the construction performance delivery by taking Grade-1 Building construction companies in Adma city. It focuses on the perception of active employees of the building construction companies to point out the significance of the relationship between project success and the company’s material management. The output of the study helps to fill the aforementioned gap by addressing how construction raw materials are managed and their influences on the performance of their organizational performance in terms of delivery success.

1.3. Research Question

The main question is how does material management practices of the selected building construction companies affect the performance of their project in Adama. This can be achieved by addressing the following research questions:

1. To what extent does material management affect the performance of building construction companies' delivery success in Adama city?
2. What is the effect of planning of materials on project delivery success of Grade-1 building construction companies in Adama city?
3. How does purchasing affect the project delivery success of Grade-1 building construction companies in Adama city?
4. What is the effect of transport of materials on project delivery success of Grade-1 building construction companies in Adama city?
5. What is the effect of storage of materials on project delivery success of Grade-1 building construction companies in Adama city?

1.4. Objectives of the Study

1.4.1. General Objective

To explore the effect of material management practices on project delivery success: the case of selected real estate companies in Adama city.

1.4.2. Specific Objectives

i. To understand the effect of material management on project delivery success of real estate companies in Adama city.

ii. To identify the effect of planning material on project delivery success of building construction companies in Adama city.

iii. To point out the influence of transportation on project delivery success of building construction companies in Adama city.

iv. To identify the effect of material storage on project delivery success of building construction companies in Adama city.

1.5. Significance of the Study

- This study could have a significant impact on the improvement of building construction projects and the improvement of building project performance because it focuses on a critical aspect of project management, which is material management. The majority of building contractors have failed in their projects due to a lack of this critical knowledge on material management. Thus, the purpose of this research is to bridge this gap in order to improve project success.
- The study is significant for the construction firms that would be aware of the efficient materials management practices to be adopted to ensure project success.
- Findings from this study will help the stakeholders develop good practices that could improve site material management.
- The study will also have valuable significance to students, researchers, and scholars who are interested in proceeding to further studies on the subject matter by proving useful literature.

1.6. Scope of the Study

This study covers the relationship between material management practices and the performance of building construction delivery success in Adama city. Delimitations in terms of conceptual, methodological, and geographical perspective are the areas of possible emphasis or significance that wouldn't be included in this research though.

The study would be geographically limited to Adama city in the eastern Oromia region. The city is one of the major metropolitan cities in the Oromia region where the construction industry has been growing fast. Taking construction companies in the city can be considered as a representative of the other construction companies in the region. Thus, other construction companies, located out of Adama will be intentionally excluded from this study as they are out of the scope.

Despite the vast scope of the issues surrounding performance success, conceptually the scope is limited to investigating only the influence of material management (in the context of planning, purchasing, transporting, and storing) practices on performance delivery success. Demographic

factors like company size, type of work, stakeholder involvement, etc. could also affect organizational performance but will not be included as they are also out of the scope of this study.

Methodologically, the study will also be delimited to a quantitative research approach for the reason that the study focuses only on pointing out the relationship between material management and project success. That means only quantitative data will be collected through a questionnaire within the period May to June 2022. Qualitative data may also help investigate the survey in-depth but won't be included in this study,

1.7. Operational Definitions of Key Terms

Some of the operational definitions of the key terms in this survey are presented below:

Material Management	This is a supply chain function that involves planning, directing, and controlling all activities concerned with materials. (Pellicer, 2013)
Project Management	This is the application of methods, skills, and knowledge in achieving specific objectives of a project in line with agreed parameters. (Christopher, 2011).
Quality of Materials	The process for ensuring that all project activities necessary to design, plan and implement a project are effective and efficient regarding the purpose of the objective and its performance. (Flanagan, 2009)
Time Management	The management of the time spent, and progress made, on project tasks and activities. (Christopher, 2011).
Waste Management	Activities/ actions involved in proper handling of waste materials. (Gulghane,2015)

CHAPTER TWO

2. REVIEW THE RELATED LITERATURE

The theoretical literature revies the related theories to the topic. These theories, not exclusive, are namely agency theory, resource-based theory, network theory, and relational exchange theory.

2.1. Theories Related to Material Management

2.1.1. Agency Theory

Agency theory was introduced by Stephen Ross and Barry Mitnick in 1973 due to a conflict of interest between owners and managers. Agency theory is relevant for the situations wherein one party (the principal) delegates authority in terms of control and decision-making about certain tasks to another party (the agent) (Eisenhardt, 2013). The Agency theory is particularly effective in planning during project implementation as it ensures duties are delegated to responsible people to make decisions affecting the project. It also underlines the dependent variable which is project performance and how it is affected by tasks such as material transport, storage, and purchasing.

Agency theory provides a useful framework to analyze relationships and behaviors in supply chains because these chains are replete with the principal agent. In the flow of materials from the supplier to the construction site, there has to be a clear flow and communication from the point the materials leave the supplier to when they arrive at the project site. This is to ensure that they are received in the right quality, quantity and also at the minimal cost possible. The theory emphasizes the contribution of planning, storage, and transport to the overall project progress. Also, to ensure once received they are stored properly to avoid damages and with good coding for easy retrieval which failure to that can lead to time-wasting. The theory is relevant in this study as there has to be a good relationship between the principal-agent and the other party to ensure swift communication and delivery of materials required in the project.

2.1.2. The Resource Dependency (RDT) Theory

Resource Dependency Theory was created by Pfeiffer and Salancik in 1987. The theory focuses on a set of power relationships based on the exchange of resources (Pfeffer and Alison, as cited by Waters, 2015). It recognizes that companies do not possess all the resources they might require in the process of value creation, hence will often become dependent on each other. This theory is

particularly effective in the transport and storage of materials. Transportation and storage must be done effectively since the material used in the process are very scarce.

The main issue is how organizations manage their power dependence relationships to maintain their functional and operational requirements (Pfeffer and Salancik, 1978). In this regard, RDT assumes that organizations often form coalitions to increase their power and make other organizations dependent on themselves (Heide, 1994). Resource manipulation and control exertion are the strategies offered by RDT to manage uncertainty and dependence in business transactions. The resource dependency theory is relevant to this study as it highlights the key project aspects such as sourcing materials and transport of the materials from the supplier that directly influence project performance. Therefore, every project is dependent on good material management to yield the required results.

2.1.3. The Network Theory

The network theory was invented by Émile and Ferdinand in the 1890s. It provides a broader view of inter-organizational interactions in a network environment. It highlights the dynamics of network environments and recognizes the influence of partner-to-partner relationships on an organization's operations. According to Halvorson (2007) by emphasizing the notion of strong and weak ties, the theory states that a network resource view assists managers to develop a more realistic assessment of individual node, resources and their implications for business resource accession and coordination are considered key triggers for inter-organizational connectedness, and are advocated to be embraced in today's turbulent business environment (Fayezi, 2010). The theory is relevant to the purchasing variable which influences the flow of materials and also ensures the right materials for the job are ordered and delivered on time.

2.1.4. The Relational Exchange Theory

The relational exchange theory centers on the idea of embeddedness, which suggests that cooperative parties act based on certain norms, as opposed to contractual obligations. It emphasizes soft control mechanisms to attenuate opportunism. According to Larson (2012), the theory predicts that trust-based relationships are less prone to partner opportunism. Besides, trusted relation assists in dedicating resources to developing and maintaining relationships, rather than managing transactional tensions or abnormal behaviors in the supply chain (Joshi and Stump, 2014). The theory is relevant in this study particularly in the accomplishment of project performance by

ensuring a mutual trust and also good relations in all concerned parties are maintained for overall project objective accomplishment.

2.1.5. Material Management Practices in Construction Project

Material management is referred to as one of the greatest elements in the performance of construction projects. In this context, it's evident that material cost stands from 30% to 70% of the entire project expenditure (Flanagan, 2009). Construction material comprises different raw materials acquired from several markets. However, their prices and presence are volatile due to certain circumstances of market conditions (Christopher, 2011).

Nowadays due to technological development, construction material necessitates exploring the international market globally. Raw materials will be reversed in favor of engineer elements and mixed gatherings (Calkings, 2009). Then, after the choice of materials till the last product was produced it includes a group of transformations which is defined as material management. This set comprises storing, identifying, retrieving, transportation, and construction techniques (Pellicer, 2013). The term material management refers to the process of designing, planning, and controlling to be sure of the high degree of quality and quantity of materials determined in a given scheduled time. Furthermore, relying on evidence from different scholars, appropriate material management is one of the pertinent elements to the performance of construction projects (Gulghane,2015). Therefore, a great number of studies elucidate that appropriate material management could lead to a higher level of production of the project and stimulate its higher performance (Pande, 2015).

However, the following are among the greatest impediment in a construction project in Rwanda: Lack of skilled personnel; dependence on external professionals; absence of domestic construction materials and lack of suppliers in the marketplace; lack of developed and advanced infrastructure and scarcity of spaces and storage in the country (Doloi, 2012). Finally, the aforementioned elements affect negatively the degree of awareness of the necessity of material management practices in the Rwandan construction sector (Abdul, 2013).

2.1.5.1. Material Management Processes and Techniques

Scientific evidence shows that material management comprises a group of procedures that need to be integrated, administered, managed, and assembled (Patil, 2013). The starting point of all phases in material management is planning. This must be assessed for the purpose to afford guidance to all

components of activities. In a study by Gulghane (2015), material planning involves the quantification, ordering, and scheduling of materials and activities to be carried out. In this regard, the usage of appropriate material management stimulates higher production and profitability to any construction company and this can render them to a high level of performance (Kasim, 2005).

In the pursuit of adequate material management, quality of service is a pertinent measurement of the project. Respecting the standard of construction materials is very pertinent to the establishment of a rigor sustainable and cost-effective structure where every construction project had various settings of specific obligations to fulfill (Patil, 2013). Contractors must choose and undertake procurement adequately taking into consideration construction materials. It is recommended to carry out research and assessment of various material properties to see whether they are compatible with various sites of buildings. Procurement of construction materials must be delivered after approval (Low, 2014). Procurement refers to the appointment of contractors and preparation of a contract but it is very important as the first step of delivering procedure (Mead and Gruneberg, 2013). All tasks, procedures start from the purchase of materials, services, and other necessities pertinent to the construction project and their execution (El-Gohary, 2014).

Several companies vindicate that construction materials and components obtained from the external supplier have a paramount percentage of the cost of the end product and adequate procurement is positively improving the competitiveness of any construction project (Rivas, 2010). Various researchers proposed that the selection of a suitable strategy of procurement is helpful to the reduction of effects occurring from circumstances like delay in delivering, low standard of raw materials, low quality, few resources, and many others.

Logistic refers to the movement and comprises of planning, execution, and follow-up and storage of all materials from raw to the finished ones to attain the expectation of clients (Safa, 2014). Planning all the aforementioned activities is helpful to the formulation of an effective construction site layout that may afford easy accessibility and transmitting materials in the site. Therefore, for controlling the accessibility and to augment the security of the site, setting up wall or fence is taken into consideration as a prerequisite (Caldas, 2014) and planning of access and transmission of material on the construction site (Kasim, 2014) are elements that necessitate being the focus during logistics for adequate material management. Different materials had not the same characteristics and

properties that render handling of materials to be problematic. Suitable material handling includes handling, storing, and control of construction material (Karim, 2014).

Adequate guarantee during storage is sometimes not considered and this leads to low quality of materials or its decline and worsening. It was proposed that the storage is necessitated for enclosing, cleaning, and drying adequate air condition and for some material had to be stacked on pallets and without humidity (Low,2014). Further, the control of material wastage is very important in controlling the construction cost. Calkins (2009) specifies that material waste is estimated to be nine percent by weight in the Dutch construction sector and between 20 and 30 percent of purchased materials in Brazil. Material waste emanates from planning, procurement, material handling, and operation procedures. Benton (2010) specified that construction materials wastage is not the same as the value of material provided and approved on the construction site. Material waste was seen as a main and growing issue in construction projects and it may lead to ineffectiveness of construction project delivery. Appropriate control will be helpful to the enhancement of production and can ameliorate waste control in the construction (Kasim, 2011).

Through the minimization of procurement cost for construction materials, a reduction of the general cost of the project occurred and improving the profitability of a company, a suitable time to take into consideration whether material ordered too early, can influence financial capital, interest rate, and storage costs (Del Pico, 2013), lack of standard or low quality in material management lead to the enhancement of construction cost. This was due to the opportunity to lose material during handling and execution steps are more than others and it needs material replacements (Othman & Potty, 2014).

Planning and procurement are deemed to be pertinent procedures that follow up and monitor the overall cost of a construction project. Material control and expedition is one of the paramount steps and is preventing shortage and surplus of material appearing on the construction site. Time is described as the level that the overall working environment enhances the achievement of a construction project on time (Said, 2012). It is the beginning of signing a contract where most of them had the same content regarding the schedule for achieving and executing the work where it is very necessary to realize the work on time. Time can be acknowledged as the ultimate measurement of project success and sustainability (Melton, 2009), the lack of respect for time scheduled necessitates reordering materials and lead to the prolonged time of consuming materials. Lack of

respect in the time assigned to a project leads to the enhancement of working expenses and the procurement decreases idling time and suitable materials adjustment decreases the extra time for modification of resources (Nwachukwu, 2010).

Lacking a suitable and enough material can put a risk at the appropriate quality of duties assumed by employees. (Hughes, 2014). Same as the materials necessitate being adequate quality based on their main characteristics (Nagapan, 2012). The adoption of adequate quality of construction materials stimulates the satisfaction of the quality of construction activities and will be approved by engineers (Mincks and Johnston, 2011). All in all, available resources could be related to specifications, satisfactory quantity, and function

2.1.5.2. Project performance

Meng (2012) explains that project performance is assessed through its product and project usage quality, timeliness, budget compliance, and degree of customer satisfaction. Low and Ong (2014) evidenced that managerial limitations, managerial time and management-related costs, the performance of managerial skills, risk management, management of human resources, and incorporation about the project success where he gives strong correlation. In the evaluation of the performance of the project, the schedule contributes more to the assessment, and relying on (Punch, 2014) the maturity in time management routines leads to the durability in project performance where the time frame is not routinized.

The timeframe is very important to achieve the project target. The phenomenon of not delaying in executing the project is linked with the schedule. Cheng (2014) evidenced that project in the construction section is attained due to a set of various factors like procurement process, adequate working conditions, financial resources, and effective plan and effective monitoring and evaluation.

The quality of projects information had positive effects on project success (Rashfa, 2014). Therefore, associated with the quality and technical obligation is a limitation. The achievement of the project in the interior of the time scheduled is seen as a motivating factor of project durability and performance. The plan of time is very pertinent to realize project goals and outcomes in a specified period by taking into consideration the project fixed objectives (Walker, 2015). Performance refers to the determining and promotion of success and assessment output relyi9ng on the fixed objectives assigned to any project (Othman, 2014). In this context, performance refers to

the individual or group fetching taking into consideration the cooperation toward a positive outcome. Performance achievement is the process of the long journey and the level of explanation of the method in which the degree of attainment takes into account six integral elements like nature of skills, knowledge, identification, features, and constant components (Ozsdemir,2013).

Another crucial dimension in project performance involves the level of customer satisfaction (Keith and Kling, 2016). A project that in the final analysis stimulates customer satisfaction would be evidenced to perform well. Monitoring the success of any project is profitable to the stakeholders and shareholders by facilitating them to approve the service obtained to safeguard managers by ameliorating service they provide to customers (Said, 2012). Project performance is related to the end product objective in terms of success and realization of the prerequisites as well as the satisfaction of clients. Therefore, project success leads to its sustainability and durability in terms of obtaining a competitive advantage, improvement of a reputation for a firm, enhancing market share, and attaining a certain level of profitability (Kirkpatrick & Feeney, 2015). The project manager whose individual profile was the ideal project manager for a specific project type was a performance in effect on customer (Cooke & Williams, 2009).

2.1.5.3. Relationship Materials Management and Performance Success

This section deals mainly with the attributes of material management and the responsibilities of those involved in carrying out the material management functions. A detailed understanding of each contributing function is required to comprehend the interfaces between material management functions. A materials management system includes the major functions of identifying, acquiring, distributing, and disposing of materials on a construction site (Stukhart, 1995).

By definition, the material management system is the management system for planning and controlling all of the efforts necessary to ensure that the correct quality and quantity of materials are properly specified promptly, are obtained at a reasonable cost, and are available at the point of use when required. Each firm has its particular materials management system where the responsibility for the various activities is spread between engineering, purchasing, and construction. Some assign full responsibility and accountability to a material manager, but for most firms, the responsibility is divided and therefore prone to problems. Components of material management include planning, purchasing & procurement, storage, handling & transport, and stock & waste management. Each of the above is indelibly linked to ensure safety, productivity, and schedule performance.

2.1.5.3.1. Planning and Performance of Projects

Waters, (2015) observed that the traditional approaches to material management use planned operations where managers design a detailed schedule for each distinct activity within the chain. By coordinating these schedules, managers control the flow of materials. The problem with the traditional approach is that it is based on a paper system and even when firms move to automation, they often automate the same procedures. This has fundamental weaknesses of taking too long, being expensive, relying on paperwork and physically moving paperwork between locations, having many people doing the administration, being unreliable, introducing errors, having more people supervising and controlling administration. These problems can be overcome when firms move to electronic purchasing and hence adopt a material management approach.

Dobler and Burt (2016) postulate that material management provides an integrated system approach to the coordination of material activities and the total material costs. They view it as something that advocates assigning to a single operating department all major activities which contribute to the cost of materials. The objective is to optimize the performance of material systems, as opposed to sub-optimizing the performance of individual operating units that are part of the material system. Chase (2011) contends that the objective of materials management is to ensure that the right item is at the right place, at the right time, and a reasonable cost. The intention of having a material management system in place is for solving materials problems from a total company point of view by coordinating the performance of the various materials flow. Fearon (2013) suggested that the introduction of computers was a great boost to the adoption of materials management, as materials function has many common databases.

According to Chary (2015), material inventory is kept in operations for three reasons; transactions, precautions, and speculation. While speculative inventory cannot be encouraged particularly in developing countries, there is a need for a transaction or regular inventory due to the lack of perfect synchronization of inflow and outflow of materials and for precautionary or safety inventory to provide cover of any inability to predict the demand of material. Ramakrishma (2015) identified that half of sales income in affirming is spent on materials. Suppose a firm is spending 50% of its volume on materials and the profits are say 10% of sales volume. A 2% reduction in materials cost boosts the profits to 11% of sales or the profits increased by 10%. To achieve the increase in profit through sales efforts, a 10% increase in sales volume would be necessary.

Barnes (2013) defined a supply network as the set of interconnected relationships between all the parties that supply inputs to and receive outputs from an operation. The focus is on a holistic approach which means the entire chain from internal to external customers. The success of any supply network depends on its ability to satisfy the needs of the ultimate customer, the end-user of its products and services. Thus, the network is holistic to be designed and managed in a way that enables it to do so effectively as deficiently as possible. It's not just the firm's operations that need to be managed to meet customer needs but all the elements of the supply chain, individually and collectively. A key facet of the supply network is the nature of relations between purchaser and supplier.

The benefits of material management to the organization were clearly explained by Siddhartha (2014) through his paper. The author also explained that the objectives of the material management to be a regular uninterrupted supply of raw materials maintain high inventory turnover, provide economy in purchasing and minimizing waste, transportation, storage, minimize the overall cost of acquisition, and maintain a high degree of co-operation and coordination with user departments. He concluded that major benefits of material management were, excessive investment in stock would be avoided, work continuity assured, improved productivity, and minimal inventory losses.

2.1.5.3.2. Purchasing and Performance of Projects

Construction materials take up a significant proportion of the total construction cost. Without careful planning and control of the flow of construction materials, the cost of materials may increase unnecessarily. One of the most important elements of a project cost management tool is cost estimation, which is the practice of forecasting the price of a complete project with a defined scope. There are several types of cost estimation in project management, including fixed, variable, direct, and indirect cost estimation. Because the project scope, project schedule, or other factors can change, it is important to update price estimates with the help of cost management software so you have an accurate idea of how much the project cost (Dainty, 2004).

Mastermann (2014) classified project procurement systems into several categories based on the relationship and critical interaction between design and construction responsibilities. The categorization of the various procurement systems are as follows: Under this system, the responsibilities of designing and construction of the project are separated and are carried out by different independent organizations namely the designers and contractors. It is sometimes called

linear or sequential contracting system or multiple responsibilities contracting approach. It is a system where the project development activities that start from feasibility study, preliminary design, documentation to construction, and handover, are carried out sequentially one after another.

Improving communication with construction organizations can effectively reduce conflicts among parties Tam (2003), especially those with several layers of contractors. Most subcontractors argued that they did not voluntarily exchange information with other subcontractors. However, this phenomenon sometimes caused unnecessary waste generation. For example, a contractor in a project with frequent variations in design drawings did not communicate with other contractors with the change of dimensions of holes for equipment and dimensions of concrete walls, other contractors have to cut their materials to suit reserved holes or reorder their materials, thus generated some unnecessary waste on-site.

Material storage management focuses on starting material into the built-up site to be recorded, the material layout, and stored over a certain period until it is taken out of the storage area to the worksite and the process is repeated. The emergence of new technologies that are not integrated and have no efficient management methods as well as inexperienced management negatively affect the storage management of overcrowded sites. There are four categories of the workflow of material storage management namely planning and arrangement, implementation and handling, control and monitoring, and supervision. Planning matters involve the determination of material requirements for carrying out production and other related work processes such as determining the types of materials to be used in construction works, quantities, and specifications to carry out construction work. Material managers should play a role in determining the storage locations, layouts, and all necessary equipment including coding and cataloging, material acceptance, material inspection, storage safety, stock records (Agarwal, 2001). Appropriate storage facilities should be provided for the onsite materials. Also, stored materials should be well monitored to detect quantities and avoid theft cases.

Construction quality is a critical factor in determining project acceptance and resultant contractual payment levels. Participants in the construction industry have become notably conscious of the role of quality as an essential means to achieve client satisfaction and gain a competitive advantage. Acceptable quality levels in construction have long been a problem to attain on time and within budget in a highly dynamic, complex, and competitive environment. With inefficient or non-

existent quality management procedures, significant expenditures of time, money, and resources are wasted on construction projects (Rounds & Chi, 1985). This lack of quality due to deficient construction quality management is detected through nonconformance to established requirements.

2.1.5.3.3. Transport and Performance of Projects

Modeling of inventory management in construction operations which involves on-site fabrication of raw materials was made by Young (2015). The research was done to decide an optimal level of material inventories on considering vibrant variations of resources under uncertainty is very critical for the economic efficiency of construction projects. This paper developed a probabilistic optimal inventory management model on the process of on-site fabrication of raw materials such as the iron–rebar process. From the research it was concluded that the amount of inflow and outflow iron-bars at the temporary shop attained stability by applying the pull system to the phase of raw material inventory management, moreover, average inventory quantity was reducing and by eliciting optimal time lags linking to the start of fabrication/assembly works. It was likely to reduce the holding time of assembled products and inventory management costs could be reduced around a total of 25%.

S-curve analysis was done to check the deviations in the progress of the scheduled project. The tracking should be done then and there to find the fault in the earlier stage itself. Pande (2015) carried out an S-curve analysis using MSP software's curve analysis was done to compare the planned and actual material consumption. The deviations curve in the S-shade graph produces by the increasing expenditure of certain parameters against time was the representation of the project path. This analysis was carried out for comparison of the planned and actual costs for the material. The author concluded that due to deviation in items the consequences would be on material procurement which affects the project budget.

Many buildings and projects are springing up in various parts of this country. Every contractor is very keen on completing their projects on time as they seek to make more money. While time is a core aspect of project management, most of the contractors lack proper quality inspection procedures to ensure the quality of the material used. Sometimes the material used is weak ending up causing further damage to the projects. These are processes that should be undertaken in the sourcing stages to avoid the issues that arise later in the project as it progresses. According to Pancharathi (2013), most of the standards and codes used for construction projects are foreign,

mainly obtained from Britain, India, and China. Unfortunately, the material used in Kenya and those countries is not the same. This is an indication that the Kenyan authorities have not invested in studying the codes and giving suitable recommendations on suitable ratios to be used in the construction. This results in substandard structures that end up collapsing.

From the professional's perspective, limited professionals to offer professional guidance on how the material should be well managed when putting up a structure. For instance, most of the contractors use technical personnel with local training in putting up structures and they lack professional skills for credible decision making. Some end up making decisions based on assumptions and not on the existing professional codes. Besides, the lack of suitable equipment has been attributed to poor material management. The workmen lack the means to measure suitable quantities when mixing up various materials in construction. This ends up resulting in weak structures which pose a threat to the lives of the users (Danso, 2014).

Ashwini (2016) explains that construction material constitutes a major cost component in any construction project. The total cost of material can comprise about 70% of the total project cost, hence the need for the contractor to consider the timely availability of this material for the successful completion of the project. Madhavi (2015) argued that in construction project operation, there is a project cost variance due to the material, equipment, workforce, subcontractor, overhead cost, and general condition. The failure of most projects is associated with mismanagement of material which results in cost overruns. Due to project cost variance, some contractors tend to limit critical material, which ends up affecting the quality of the structure.

Project costs can be controlled by taking corrective actions towards the cost variance. It is often necessary to dedicate important resources like money, personnel, and time to monitor and control the process. Gulghane (2016) describes that materials management processes require a transformation to improve the overall handling of materials for more efficiency and effectiveness on the construction site. This is because poor handling of construction materials affects the overall performance of construction projects in terms of cost, time, quality, and performance. However, the researchers associated the failure in projects with poor transportation strategies, inadequate storage facilities, which result in damage to some material such as cement, lack of adequate planning strategies, and unsuitable sourcing strategies.

2.1.5.3.4. Storage and Performance of Projects

During the past years, various academic researchers have conducted studies investigating to find out the issues causing ineffective materials management in construction projects. A research done by Gulghane and Khandve (2015) state that the problematic management of material are due to overstock materials because of improper planning, damaged materials due to logistics, handling or in application, loss of materials because of improper supervision, waiting of the materials to arrive in location due to improper tracking system, frequent movement of materials due to improper site layout, inflation, material changes in buying or purchasing situation starting from the prepared cost estimation, bulk construction material, the shortage and changes of construction materials quantity required, material inefficient on-site, stealing and loss of construction material, material shipment, work repairing delay in updating or posting, storage system on-site, inaccurate estimation of shipment quantity of materials, uneconomical order quantity of materials, poor shipping times, increasing transport cost of materials, material over usage in location of project, choosing the wrong materials for construction, increasing storage cost of materials, the poor buying ability of managers and delay of payment for materials.

From the literature review, it is very clear that material management plays a vital role in the construction field. Whether it is a small firm or a large firm the material management should be done. Material management holds a part right from purchasing materials to its utilization. Moreover, the S Curve analysis should be done to check the deviations in the planned process to avoid the delay of the project. In case of delay, EOQ analysis is recommended to complete the project efficiently within stipulated time and cost. This research was used to identify the effect of material management on 5 criteria of project performance (Ezhimathi, 2016).

In conclusion, the availability and sufficient materials and equipment affect time, quality, productivity, and performance. Appropriate quality material affects time, cost, and quality performance. On-time and reasonable time of material procurement affects time and cost performance. Efficient inventory systems and documentation affect time and waste performance. Reasonable changes affect time performance. On-time delivery affects time performance. Minimizing procurement cost affects cost performance. Appropriate site storage affects productivity and waste performance. The efficient site layout affects product performance. Easy site access

affects product performance. Unconfined working space affects productivity performance. Efficient material control affects waste performance.

Waste management is the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment, and disposal of waste, together with monitoring and regulation of the waste management process. There have been many researchers who studied construction waste minimization methods. These methods emphasized the use of modern technologies in building construction, such as precast concrete, steel form, and scaffold and drywall partition panel. Waste prevention strategies including using the efficient purchase and ordering materials, using efficient timing and delivery of materials, using efficient material storage, minimizing material losses, maximizing material reuse, preventing undoing and redoing, reducing packaging waste, and using prefabrication, have also been discussed (Cheng, 2014).

Previous studies show that serious construction waste generation is partly due to a lack of management skills, lack of environmental awareness, and structural selection. Normally, construction organizations only focus on the benefits gained from economic return. Environmental management has rarely been considered. Enhancing on-site management systems is one of the recommendations to enhance waste minimization. Reuse of construction materials can effectively minimize waste generation in the construction processes. Implementing responsibilities on waste management with clear directions and adequate supervision to each employee, including technical staff and frontline staff is suggested. Furthermore, reward schemes can be encouraged employees in waste minimization, such as proposing some useful methods which help reduce waste generation and penalize employees with low environmental awareness (Gulghane, 2015).

2.2. Empirical Review

A study was carried out by Khandve (2015) in India to assess the effects of material estimation cost using a qualitative approach. It had a sample size of 200 construction companies. The study explored the effects of estimating costs on the performance of service delivery. The author specified that material estimation leads to the adequacy and effectiveness of services provided. It also shows a strong correlation between material plan and high level of production and company profitability.

Another study undertaken by Moldavian scholars (Mincks and Johnston, 2011) reiterates that cost estimation leads to effective forecasting relying on the availability of information. In the USA, an

association of engineers published a report on the effects of budgeting and its preparation for the success of construction companies. In this regard, there is a need to formulate the ultimate goals for budget preparation in order to meet what companies have in the inventory storage (Jarkas, 2011). However, budgeting for materials is achieved relying on annual, trimestral, or semestrial information and expenses and this can stimulate construction projects to be sustainable and successful.

A study carried out in South Africa by Walliman (2011) assessed the influence of procurement on the performance of construction projects. A sample size of 72 companies participated in the study. The study assessed whether appropriate procurement procedures between contracting parties are very adequate to stimulate organizational success (IMF, 2018).

Khandve (2015) with a sample of 218 respondents from 30 consecutive companies observed that procurement consists of the identification and analysis of obligation and purchasing categories, selection criteria, choice of suppliers, the negation of contracts, and actions as the mediator between two parties and follow up and providing the association with suppliers.

A comparative study was made by Jose (2013) in Analysis of inventory Control Techniques. The various analysis studies in this paper were EOQ analysis, ABC analysis, and FSN analysis. From the analysis, it was found that there was a difference in the EOQ and the number of units purchased which means EOQ was the practice in the company. Also, the company maintained a low percentage in fact concluded that with the proper management the cost was saved. He added that the following was done by proper management of waste control, right incoming quantity, materials handling, frequent ordering, accurate forecast, and reduced lead time.

A survey carried out on handling material is the deliverance of that equipment that gives an adjustment and geographical position (Towey, 2013). Meanwhile, the choice of material handling equipment is crucial to improve the productivity procedures, give the adequate operation of workers, enhancement of production, and advancement of the flexibility of the system (Madhavi,2013). In this regard, effective material handling includes handling, storing, and following up construction materials. Therefore, it was very crucial to adopt an adequate way of transporting, loads and unloads of material that cannot be carried out in the rain (Latha, 2014). The researcher recommended that storage necessitates being surrounded, bounded and unpolluted, and

dry with adequate air circulation with some materials necessitated for loaded on pallets, not more than some safety height to avoid humidity (Low, 2014).

In fact, stock control involves raw materials, transformed materials, assembly components, usable stores, general repairs and spare materials, and finished materials (Donyavi and Flanagan, 2009). Therefore, is necessary for construction materials to be provided as required and with the advancement by appropriate management of stock control. The construction project is producing a huge amount of waste and it will stimulate complexity in the construction sector (Cheng, 2014). In conclusion of these points, with plan and design of the material management practices which is very suitable can be helpful to the reduction of waste of material and improvement of the firm's return.

A study was conducted on construction material management on project sites by Patel and Chetna (2016). This paper is written to fill a void created by the absence of proper materials management on construction sites. To manage a productive and cost-efficient and site efficient material management is very essential. Research has shown that construction materials and equipment may constitute more than 70% of the total cost for a typical construction project. One of the major problems in delaying construction projects is poor materials and equipment management.

Another research on improving effective material management by identifying common factors in building construction projects by Yohannes and Patel (2017) revealed that management in materials has had great problems for many years to most firms in a construction project. This study is based on improving current material management through identifying common factors for building construction. Having accurate materials and time is an essential aspect of the accomplishment of a construction project. This study has revealed that construction materials may constitute more than 55% of the overall cost for a distinctive construction project. One of the main difficulties in delaying construction projects is improper materials and equipment management. In this study factors affecting effective material management and inventory management were listed in accordance with the most affecting factors based on the literature review.

Madhavi and Mathew (2014) conducted a survey on material management in construction. This paper states that all the problems occurring in the company are because of improper application of material management. In construction project operation, often there is project cost variance in terms

of the material, equipment, manpower, sub-contractor, overhead cost, and general condition. Material is the main component in construction projects.

In a study conducted by Dobariya (2016), the highest causing cost overrun in the Indian construction industry was identified as price escalation of raw materials. Another study was done by Cheng (2014) about an exploration into cost influencing factors on construction projects revealed that material shortage or supply delay is a prominent project risk that will influence the project cost. Similarly, a study conducted to identify the delay factors in construction projects of Turkey found out that material is a significant factor causing delay (Gunduz, 2013).

Furthermore, it was explained that problems such as late delivery of materials, poor procurement of construction material, and shortage of construction materials are prime factors causing project delay. Unlike storage and transport costs, time delays, and quality which are is more subjective, the factors affecting the quality of a project are perceived differently by the contractor, consultant, and client. This is due to individual interest, knowledge, and judgment. Thus, the study helped justify the significance of improving the material management process in the construction industry in Kenya to implement a more successful project. Based on the empirical literature review, the following hypotheses are proposed as follows:

H1 - Planning in material management has a positive significant effect on project delivery success.

H2 - Purchasing in material management has a positive significant effect on project delivery success.

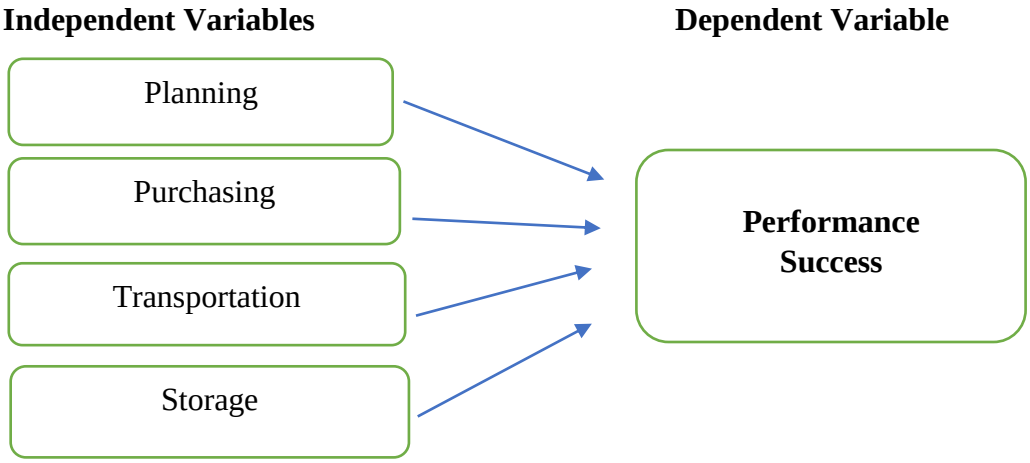
H3 - Transport in material management has a positive significant effect on project delivery success.

H4 – Storage in material management has a positive significant effect on project delivery success.

2.3. Conceptual Framework

A conceptual framework for this study emanates from the existing literature review that revealed elements of material management practices. The conceptual framework establishes the link between material management practices and the performance of construction project delivery success. As Figure-1 illustrates, material management dimensions namely planning, purchasing, transporting and storing have a direct relationship with performance delivery success. Material management

dimensions are considered as independent variables while performance delivery success is the dependent variable. This model is adopted from a study conducted by Josephine and Joyce (2021).



(Source: Josephine and Joyce, 2021)

Figure 1: Conceptual framework

CHAPTER THREE
RESEARCH METHODOLOGY

3.1. Research Approach

There are basically three types of research approaches, qualitative, quantitative and mixed research approach. Quantitative research engages in the systematic and scientific investigation of quantitative properties and phenomena and other relationships. The objective of quantitative research is to develop and employ mathematical models, theories, and hypotheses that pertain the natural phenomena (Abiy, 2009). In this case, the research design employed the quantitative research approach method for the fact that it involves the generation of data in a quantitative form for analysis. Data were quantified and statistical methods are used in data analysis to seek evidence about the characteristics or a relationship between variables.

3.2. Research Design

There are three types of research design namely exploratory, descriptive, and explanatory research. Exploratory research is defined as a research used to investigate a problem which is not clearly defined. It is conducted to have a better understanding of the existing problem, but will not provide conclusive results. For such a research, a researcher starts with a general idea and uses this research as a medium to identify issues, that can be the focus for future research This study adopted the exploratory research design to investigate the relationship between material management practices (predictors) and performance success (construct) variables.

3.3. Population

A population can be defined as the complete set of subjects that can be studied: people, objects, and organizations from which a sample may be obtained (Shao, 1999). As it is defined in the scope, the study investigated the proposed relationship between material management practices and performance success variables in the Ethiopian construction industry taking selected real estate companies that have Grade-1 level construction companies in Adama city. As of January 2022, there are a total of 56 registered and active Grade-1 building construction companies (BC-1) in the city. Based on their annual turnover of over ETB 100 mil, Ethiopian Fortune rated five top BC-1 companies are Sunshine, Rama, Acer, Bamacon, and Dugda Construction Plc.

According to MOLSA (2021) database, there are an estimated 2,817 permanent and contract employees working for the listed five construction companies that build their real estate projects. Thus, the sample frame constituted a total of 2,187 permanent and contract employee who has been actively working in the five companies for more than a year. Serving more years in the respective companies had the opportunity to have detailed information regarding the company's material handling practices and related issues

3.4 Source of Data

According to Catherine (2007), data were collected as primary, secondary or both. Primary data are originated by the researcher for the specific purpose of addressing the problem at hand. On the other hand, secondary data contains relevant data that has been collected for a different purpose, but from which the conclusion is valuable for the purpose. In this study only the primary source of data from the targeted respondents will be used for analysis.

3.5 Sampling Technique

There are two sampling strategies in use to select the targeted permanent and contract employees from the sampling frame. There are probability and non-probability methods of sampling (Creswell, 2009). The former applies to a random (equal chance) selection, while the latter is subjective and relies on the researcher's decision or reasoning. In this study, the convenience non-probability sampling technique was used for the fact that construction companies are hesitant to disclose their staff's employment history. This makes probability sampling was impractical, thus adopting convenience sampling was more appropriate for this study.

3.6 Sample Size

Sampling is the process of selecting a number of study units from a defined study population (Saunders, 2010). Determining sample size is a very important issue because samples that are too large are uneconomical while too small samples may lead to inaccurate results. Here in this study, sampling is required as the targeted population (employees of five BG-1 construction companies) are substantially larger in number to conduct the census. Therefore, proportionate sample size using Yemane's sample determination formula was:

$$n = \frac{N}{1+Ne^2} = \frac{(2{,}817)}{1+(2{,}817*0.05^2)} = 338 \text{ employees}$$

Thus, the study had a sample of 338 respondents to participate in the survey. The distribution of sample respondents from each selected companies is illustrated on Table-1 below.

Table 1*:* Proportionate Sample Size

	No. of Employees	**Proportion**	**Sample Proportion**
Acer	653	0.169	57
Dugda	345	0.130	44
Bamacon	631	0.239	81
Sunshine	492	0.346	117
Rama	696	0.116	39
Total	**2,817**		**338**

(Source: MOLSA, 2021)

3.7 Data Collection Instrument

Questionnaires were used for the collection of primary data from targeted respondents. It was prepared very carefully so that it may prove to be effective in collecting the relevant information. A structured questionnaire is a questionnaire in which there are definite, concrete and pre-determined questions. The questions were presented with exactly the same wording and in the same order to all respondents. The resort is taken to this sort of standardization to ensure that all respondents replied to the same set of questions (Kombo & Tromp, 2011). After having reviewed different literature, a self-administered questionnaire is adapted to address the effect of material management practices on performance success. The material management practices and performance success scale is adapted from the article of Josephine and Joyce (2021).

The questionnaire form includes a total of 25 items composed of 20 items intended for measuring material management practices, and 5 items for performance success, in addition to items included in the personal information section. Material management practices include the following four basic dimensions: planning (5 items), purchasing (5), transport (5), and storage (5). A Five-point Likert-scale-based structured questionnaire is used as a major instrument of data collection. The Likert scale ranges from 1- for "Strongly disagreed" to 5- for "strongly agreed".

3.8 Data Collection Procedure

After the instrument is developed the next steps was distributing the questionnaires and collecting the data back in accordance with the sampling procedure and technique stated in the previous part. In line with this, the location of the five selected BG-1 construction companies within the same neighborhoods were grouped so as to easily access and save time. Once their location is identified, the consent of management from selected companies regarding their willingness towards conducting the survey on their premises were requested. After having their approval, once again the consent of the respondents will also be requested. If agreed, the questionnaire was distributed to the respondents during their tea break or other convenient time without affecting their operations. As an option, respondents were contacted through their email address and be remained continuously to check and respond in time.

3.9 Data Analysis and Presentation

Data in this study was analyzed using both descriptive and inferential statistics. Descriptive statistics are used to interpret data in general and for testing hypotheses and investigating research objectives inferential method is used using the statistical package for social science (SPSS) version 20. Descriptive statistics was applied to interpret demographic variables of the respondents, mean and standard deviations of each study variables; whereas inferential statistics was used for testing hypothesis, correlation, and multi-regression analysis. Tables and graphs was used to present analysis results pictorially (Saunders, 2010).

The proposed research model is formulated based on the identified independent and dependent variables. It investigates their relationship using the multiple linear regression method. Multiple linear regressions are made to define the relationship and to evaluate the most dominant material management practices affecting performance success.

Dimensions of material management practices are planning (PLN), Purchasing (PUR), Transport (TRP), and Storage (STR) are considered as independent variables while performance success (PERF) is the dependent variable. In order to investigate the relation between the two variables, a multi-regression analysis model specification is designed as follows:

$$PERF = \beta_0 + \beta_1 PLN + \beta_2 PUR + \beta_3 TRP + \beta_4 STR + e$$

Where:

PERF = Performance Success; PLN – Planning; PUR – Purchasing; TRP – Transport; STR - Storage

β_0 = Constant; $\beta_{1,2,3,4}$ = Coefficients of Predictors

3.10 Validity

Validity is the degree to which the data collection process correctly calculates what it is supposed to quantify (Saunders, 2010). The questionnaires has reviewed by the advisor of this study, and managers from building companies to check the suitability of the questions, the language (style of expression), and the suggestions needed to be included to enhance the questionnaire. Besides, since there are some employees who couldn't speak English, the questionnaire will be translated into Amharic (the local official language) by professional translators. Finally, after having made all the requisite corrections, it will be reasonable to distribute them to the targeted respondents.

3.11 Reliability Test

Table 2: Reliability Test

	Cronbach's Alpha	**N of Items**
Project Planning	.761	5
Purchasing	.877	5
Transportation	.872	5
Warehousing/ Storage	.810	5
Project Performance	.888	5
Total	0.858	25

Source: *Own survey data (2022**)***

Reliability is the extent to which a measurement gives results that are consistent and fundamentally concerned with issues of consistency of measures (Bryman and Bell, 2013). Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of sample items are as a group. It is considered to be a measure of scale reliability. A "high" value for alpha does not imply that the measure is one-dimensional. Technically speaking, Cronbach's alpha is a coefficient of reliability (or consistency). According to Hair (2010), if α is greater than 0.7, it

means that it has high reliability, 0.5 is sufficient, and if α is smaller than 0.3, then it implies that there is low reliability.

The reliability test conducted above in table 2 was found to be in the acceptance range since alpha greater than 0.7. In addition, the reliability score of the construct yielded a Cronbach's alpha of r = 0.858 which implies that the instrument is reliable scale to measure the observable variables.

3.12 Ethical Considerations

In order to keep the confidentiality of the data given by respondents, the respondents were not insisted to write their name and be assured that their responses were treated in strict confidentiality. The purpose of the study is disclosed in the introductory part of the questionnaire. Furthermore, the student researcher tries to avoid misleading or deceptive statements in the questionnaire. Lastly, the links of questionnaires were sent only to voluntary participants after having their full consents, those who are not willing were not contacted.

CHAPTER FOUR

4 DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

This chapter encompasses the data analysis, interpretation, and presentation of the results. The analyses comprised of both descriptive and inferential statistics in which the former describes the demographic profile of respondents, and analysis of responses under each attribute; whereas the latter includes correlation, assumption test, and multiple linear regression analysis.

4.1 Response Rate

The data collected through a self-administered questionnaire featured personal information of the respondents, the identified four factors (Planning, Purchasing, Transportation & Storage), and Project performance in the case of selected building construction companies in Adama. A total of 338 questionnaires were disseminated to the targeted employees, of which 310 questionnaires were collected which accounted for 91.8% of the total distributed questionnaires. After having further screened for inconsistency, was found 28 responses and then rejected for missing data. Finally, a total of 296 valid and usable questionnaires were used for statistical analysis. Each response is encoded and transposed on SPSS 21.0 accordingly to make them suitable for data analysis.

4.2 Demographic Characteristics of the Respondents

The first part of the questionnaire consists of the demographic characteristics of respondents. This part of the questionnaire requested a limited amount of information related to the personal and demographic status of the respondents. Accordingly, the following variables about the respondents were summarized and described in the subsequent table. These variables include; sex, age, education, serving year, position, and building construction type of the respondents.

Referring to Table 3, male respondents constituted the highest percentage 233 (78.6%) while their female counterparts shared the rest 63 (21.4%). This indicated that the majority of projects in real estate were engaged by the male.

In terms of age majority of the respondents were in the age range of 31-40 years (54.85%) followed by 21-30 years (29.9%) the remaining 51-60 years were 11.5% and 3.74% of the respondents were 51-60 years. This implies majority of the employees were adults in age range 21-40 years.

Table 3: Demographic Characteristics of Respondents

Category		Frequency	Percent
Gender	Male	233	78.6
	Female	63	21.4
	Total	296	100
Age	21-30	89	29.9
	31-40	162	54.85
	41-50	34	11.5
	51-60	11	3.74
	Total	296	100
Education	Diploma	116	39.1
	Degree	130	43.9
	Masters	50	16.8
	Other	-	-
	Total	296	100
Service year	1-5 years	68	58.9
	6-10 years	174	22.9
	Above 10	53	18
	Total	296	100
Position	Manager	31	10.5
	Team leader	65	22.1
	Supervisor	72	24.3
	Customer representative	113	38.2
	Other	15	5.0
	Total	296	100
Real estate	Residential	142	48.1
	Building	106	35.8
	Industrial	48	16.2
	Total	296	100

Source: Own Survey, 2022

Regarding the educational background of respondents, the majority of the respondents had diploma holders (116, 39.1%), 130 of them have first degree (43.9%) & the rest 50 or 16.8% have master's degree the result implies that majority of the employees were have higher educational level status.

It was found that almost half of the respondents 174(58.9%) had 6-10 years of experience while 68 (22.9%) 1-5 years, and the rest 53 (18%) served for > 10 years in the construction industry. The result also illustrated majority of the respondents had sufficient level of experience on the sector.

As the result of table 4.1 showed majority of the respondents 113 (38.2%) were working as customer representative, 72(24.3%) of them as supervisor, 65 (22.1%) were working as team leader. The remaining 31(10.5%) and 15(5%) were working as Manager and other positions respectively.

Regarding Real estate, the result showed that 142 (48.1%) were built for residential purpose whereas, 106 (35.8%) were buildings and the rest 48 (16.2%) were industries. Majority of construction were built as residential.

4.3 Factors Affecting Project Performance

The below table presents the descriptive statistics of the four factors that are believed to affect Project performance taking some selected Real estate companies in Adama. Accordingly, the factors affecting Project performance namely are Planning, Purchasing, Transportation and storage materials are the areas identified which were believed to have relationship with project performance. The model has 25 items to measure the Project performance taking some selected Real estate companies in Adama.

To compare the respondents' perception towards the variables, descriptive statistics of mean and standard deviation were used. The mean indicates to what extent the sample group averagely agrees or disagrees with the different statements. According to Best (1987), the scale is set in such a way that respondents strongly disagreed if the mean scored value is in the range of 1.00 – 1.80; disagreed within 1.81 – 2.60; neither agreed nor disagreed within 2.81 - 3.40; agreed if it is in the range of 3.41 – 4.20; while strongly agreed when it falls within 4.21 – 5.00. In addition, standard deviation shows the variability of an observed response. Below, the results are discussed in detail.

Table 4: Descriptive statistics of variables

Study Variable	N	Grand Mean	Std.
Project planning	*296*	*4.26*	*.590*
Material Purchasing	*296*	*4.09*	*.701*
Material Transportation	*296*	*3.91*	*.908*
Material Storage	*296*	*3.75*	*.667*
Project Performance	*296*	*3.72*	*.724*

Source: Own Survey, 2022

Regarding the results on Table -4, the grand mean of Project planning dimension was found to be 4.26 (Std. .590). It indicates that the majority respondents inclined to agree on the project planning of the selected building construction companies. The standard deviation indicates less variation of the respondents in these regards as the deviation coefficient is below 1.00. Project planning policies were clearly developed in order to avoid project delivery delaying. On the other hand, they also gave a positive response the quality of project planning on the selected building construction companies. Whereas, respondents neither agreed nor disagreed on cost minimization of the company while conducting planning. Over all, It implies that the project planning were perceived positively by the majorities.

Regarding (grand mean, 4.09 with Std .701) reveals that majority of respondents agreed on the material purchasing of selected building construction companies. Respondents agree on sourcing policy and purchasing policies were identified precisely. This led the to conduct the source practicing effectively with an appropriate cost with a good communication with suppliers. But respondents didn't give a positive response on attaining project delivery based on the timely schedule.

On the other hand, material transportation (grand mean, 3.91 with std. .908) showed that majority of the respondents didn't agree on having enough transportation vehicles for each project at the selected building construction. Even though, respondents agree on transportation availability for logistics by using the specific and standardized transportation, by efficiently utilizing the transportation vehicles in order to minimize failures and cost.

Similarly, referring material storage (grand mean 3.75 with std, .667) indicates that majority of the respondents agreed on the material storage on the selected building construction companies. Respondents agreed on raw material storage were enough to keep the required materials properly and materials were handled with a strong store manager. Whereas they neither agreed nor disagreed on utilization of technologies in order to handle raw materials.

Finally, regarding project performance the respondents were satisfied (grand mean 3.72 with std, .724) they believed that appropriate planning was conducted, materials were properly managed in order to reduce additional costs and overall material handling supported to improve the over all project accomplishment. In general, they agreed that project performance got improved. It indicates that building construction project performance has been perceived positively by majority of the respondents.

4.4 Inferential Statistics

Inferential statistics uses sample measurements of the subject and make generalization about the larger population. It comprises correlation analysis among variables; assumption of data test for their suitability or fitness to the intended regression analysis model (namely normality, collinearity, linearity and homoscedasticity); and multi-regression analysis in terms of model summary, ANOVA test and coefficients determination are conducted to address the objectives of this study.

4.4.1 Correlation Analysis

This study employs correlation analysis, which investigates the strength of the relationships between the studied variables. Correlations are perhaps the most basic and most useful measure of association between two or more variables (Festinger, 2005). Pearson correlation is one of known methods for correlation analysis was used to provide evidence of convergent validity. The correlation coefficients reveal direction of relationships (either positive or negative) and the intensity of the relationship (-1.0 + 1.0). To interpret the direction and strengths of relationships between variables, the guidelines suggested by Field (2005) were followed. His classification of the correlation coefficient (r) refers 0.1– 0.29 is weak; 0.3 – 0.49 is moderate; and $\geq$ 0.5 is strong.

The result in Table 5 shows that overall dimensions of material management practices had a positive and significant relationship with project performance. Specifically, project planning had a positive and relatively the strongest relationship with project performance ($r = .627$, $p<0.05$).

Following, project planning material purchasing also had a positive and strong relationship (r = .520, p<0.05) with project performance. Whereas, material transportation (r = .473, p<0.05) and material storage (r = .321, p<0.05) have a positive but moderate relationship with project performance.

Table 5: Correlation Analysis

	PLN	PUR	TRP	STR	PERF
Project planning	1				
Material purchasing	.183**	1			
Material Transportation	.168*	.129*	1		
Material storage	.343**	.212**	.134*	1	
Project Performance	.627**	.520**	.473**	.332 **	1`

****. CORRELATION IS SIGNIFICANT AT THE 0.01 LEVEL (2-TAILED).**

***. CORRELATION IS SIGNIFICANT AT THE 0.05 LEVEL (2-TAILED).**

Source: Own Survey, 2022

Having a significant relationship is an indication that the material management are good predictors of project performance. That means, their variations might bring significant variation in project performance. The more the building construction companies' works on their material management practices project performance will improve.

4.4.2 Assumption Tests of Regression Model

Multiple linear regressions is an analysis that assesses whether one or more predictive variables (predictors) explain the dependent (criterion) variable. The regression assumptions are correlation (linear relationship), Multi co-linearity, multivariate normality, and homoscedasticity.

Multicollinearity – Multi co-linearity refers to the situation in which the independent/predictor variables are highly correlated. When independent variables are Multi co-linearity there is "overlap" or sharing of predictive power. Thus, the impact of Multi co-linearity is to reduce any individual independent variable's predictive power by the extent to which it is associated with the other independent variables. "Tolerance" and "variance inflation factors" (VIF) values for each predictor

are a means of checking for Multi co-linearity A tolerance value below 0.1 and a VIF value over 10 percent indicate a Multi co-linearity problem, (Robert, 2006).

Table 6: Multi co-linearity Test Results

Model		Co-linearity Statistics	
		Tolerance	VIF
1	Project Planning	.857	1.167
	Material Purchasing	.933	1.071
	Material Transportation	.957	1.045
	Material Storage	.855	1.169

a. Dependent Variable: PERF

Source: Own Survey, 2022

The results of the Multi co-linearity test in Table 6, show that the Co-linearity statistics analysis of variance inflation factors (VIF) value ranges from 1.169 to 1.045, and tolerance value ranging from 855 to 0.957 indicated that there was no Co-linearity problem. This could be taken as a confirmation that there were no Multi co-linearity problems to proceed with regression analysis. That means when the independent variables in this model were highly related to one another, they would have been basically measuring the same thing or they both convey essentially the same information.

Homoscedasticity - There should be homoscedasticity before running multiple regression analysis, this means that the residuals (the differences between the values of the observed and predicted dependent variable) are normally distributed, and that the residuals have constant variance (Burns & Burns 2008). If the assumption of homoscedasticity is violated (i.e., there is heteroscedasticity).

Using the plots of standardized residuals (ZRESID) against standardized predictors (ZPRED),the researcher tried to check whether the graph looks like a random array of dots evenly dispersed around zero because the Testing for Homoscedasticity lies with an assumption in regression

analysis that the residuals at each level of the predictor variable(s) have similar variances. I.e., at each point along any predictor variable, the spread of residuals should be fairly constant.

In figure -2, it shows that each of the four independent variables (the predictor variables) against the expected value (straight line). The plot in the same figure of the annexed plot shows that how the points are randomly and evenly dispersed throughout the plot. And, these patterns are indicatives of a situation in which the assumption of homoscedasticity have been met in whole variables against productivity of tea out-growers. The graph has demonstrated homoscedasticity of the study.

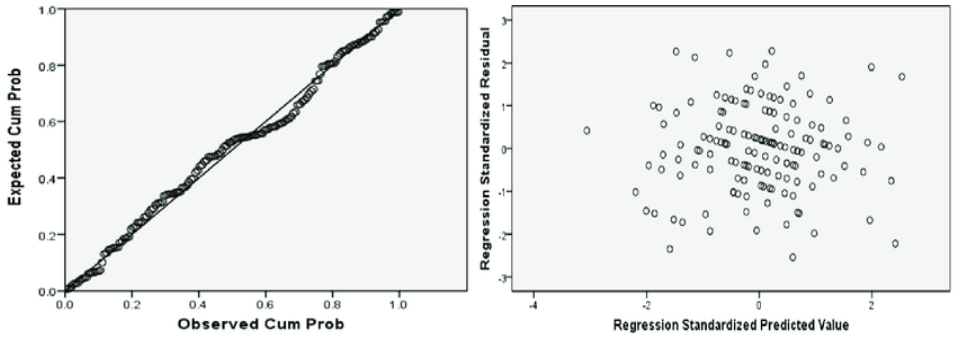


Figure 2: Homoscedasticity Test

Multivariate Normality - Test of normality is another assumption to be tested before running regression. The normal distribution is detected based on Skewness and kurtosis statistics. For the sample size above 50 responses are usually sufficient to ignore the assumption regarding normal distribution (Weinberg, 2008). Since samples size of the study exceeds by far the suggested number hence it assumes normality by default. For further confirmation, multivariate normality test has been carried out. As proposed by George (2010), the acceptable range for multivariate normality for both statistics (skewness and kurtosis) is between -2 and +2.

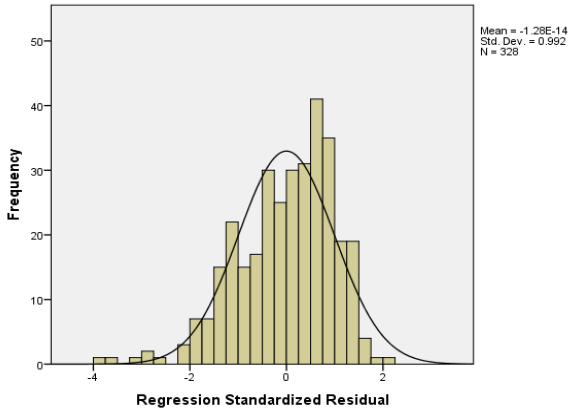


Figure 3: Normality Test

4.4.3 Multiple Linear Regression Analysis

Multiple regression estimates the coefficients of the linear equation, involving one or more independent variables that best predict the value of the dependent variable. Regression analysis is a statistical method to deal with the formulation of a mathematical model depicting relationships amongst variables which can be used for the purpose of predicting the values of dependent variables and given the values of the independent variables (Kothari, 2004). In this study, multiple regression analysis was conducted to identify the relationship and examine the most dominant material management variables that influenced the overall project performance in selected real estate firms.

Table 7*:* Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.795[a]	.632	.626	.53417

a. Predictors: (Constant), PLN, PUR, TRP, STR

As indicated in the model summary of the analysis, Table 7, the value of R (.795) indicated the overall correlation value of the material transportation with project performance, accounting for approximately 63.2% (R^2) of the variance in project performance. However, the remaining percent (36.8%) was explained by other factors.

Table 8: ANOVA Test Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	111.783	4	27.946	97.938	.000[b]
	Residual	65.058	228	.285		
	Total	176.841	232			

a. Predictors: (Constant), PLN, PUR, TRP, STR

b. Dependent Variable: PERF

As indicated in Table 8 of the ANOVA test, the F-value of 97.938 is significant at $p<0.001$. Therefore, it can be inferred that with 63.2% of the variance (R^2), material management is significant and the model appropriately measures the dependent variable – project performance.

Referring to the beta coefficients, the regression model predicts overall project performance and has been significantly explained by the four independent dimensions of material management. The last output in the analysis of the multiple regression models represents the output for the beta coefficients of each material management dimension. The regression equation for this research is presented below.

$$PERF = \beta_0 + \beta_1 PLN + \beta_2 PUR + \beta_3 TRP + \beta_4 STR + e$$

Where:

PERF = Project Performance, PP= Project Planning, Material Purchasing, Material Transportation and Material Storage. β_0 = constant, β_1 to β_4 = beta coefficients, and e = error terms.

Table 9 Estimated Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.416	.180		2.308	.022
	Project Planning	.339	.032	. 450	5.143	.000
	Material Purchasing	.256	.029	.361	8.682	.000
	Material transportation	.138	.032	. 223	4.280	.000
	Material Storage	.116	.033	. 176	10.368	.000

a. Dependent Variable: PERF

Based on multiple regression analysis in Table -8, substituting the results in the model yields:

$$\boldsymbol{PERF = .416 + .450PLN + .361PUR + .22TRP + .176STR + e}$$

The regression analysis showed that each material management dimension has a positive and significant effect on overall project performance. Project Planning dimension (β = .450) has relatively the highest effect followed by Project performance (β = .361). But Material transportation (β = .223) and Material Storage (β = .176) have relatively lower contributions to the prediction model. The results, Table -12, imply that all dimensions of material management practices have significant influences on overall project performance at a 95% confidence level ($p<0.05$), indicating that for employees of some selected real estate companies, these factors are important in assessing overall material management.

4.5 Hypothesis Test Results

Based on the ANOVA analysis and coefficient Tables, all the four dimensions of talent management (Project planning, material purchasing, material transportation and material storage) have a positive and statistically significant effect on project performance as the F-value = 97.938. In these regards, the four proposed (alternate) hypotheses are supported by the fact that:

H_1 - "Project planning has a positive and significant effect on Project performance"

The first hypothesis (H_1) was supported as the beta coefficient of project planning equates to .450 at $p<.01$. Therefore, the null hypothesis is refuted as $p<.05$ and confirmed that project planning had a positive and statistically significant effect on project performance.

H2 - "Material purchasing has a positive and significant effect on project performance"

The second hypothesis (H_2) was also supported as the beta coefficients of the material purchase were found to be .361 at $p<.01$. The null hypothesis is neglected as the p-value is less than .05, and the confirmed project performance has a positive and statistically significant effect on project performance.

H3 - "Material transport has a positive and significant effect on project performance"

Similarly, the third hypothesis (H_3) was also supported as the beta coefficients of material transport were found to be .223 at $p<.01$. The null hypothesis is neglected as the p-value is less than .05, and

then confirmed that Material transport has a positive and statistically significant effect on project performance.

H4 - "Material Storage has a positive and significant effect on project performance"

Finally, the fourth hypothesis (H_4) was also supported as the beta coefficients of material storage were found to be .176 at $p<.01$. The null hypothesis is neglected as the p-value is less than .05, and then confirmed Material Storage has a positive and significant effect on project performance.

CHAPTER FIVE

5 SUMMARY OF MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Major Findings

The general objective of the study was to analyze the effect of material management practices on project performance of selected building construction companies in Adama. In such note the major findings of the study include:

- The first objective of the study was to identify the relationship between project planning and project performance of selected building construction companies. The study found a positive significant relationship between these two variables ($r = .627$, $p<0.05$). As per the regression analysis result, the coefficient for project planning indicated that a 0.450 unit increase in the variable, a 0.450 unit increase in project performance can be expected.
- The second objective of the study was to recognize the effect of material purchasing on project performance. The study found a positive correlation between the two variables ($r = .520$, $p<0.05$). On the other hand, the regression coefficient model's result indicated that every unit increase in material purchasing will increase 0. 361 units in the project performance holding all other variables constant.
- The third objective of the study was to evaluate whether material transport affect project performance. In such the study showed a positive correlation between these two variables of $r = .473$ which is significant at $p<0.05$. As per the regression analysis result, the coefficient for material transportation indicated that a 0. 223 unit increase in the variable, a 0. 223 unit increase in project success can be expected by holding all other variables constant.
- The fourth objective of the study was to determine whether material storage affect project **performance. This variable showed a strong relationship between project successes with r** value of $r = .321$ which is significant at $p<0.05$. On the other hand, the regression coefficient model's result indicated that every unit increase in material storage will increase .176 at $p<.01$ units in the project success by keeping all other variables constant.

5.2 Conclusions

As indicated above the main objective of the study was to analyze the effect of material management on project performance in selected building construction companies in Adama. For such purpose four variables (planning, purchasing, transporting, and storing) were selected to identify their effect on the companies' project success. The study used convenience sampling technique in which 338 respondents were selected. The questionnaires included 25 items prepared according to the theoretical framework presented above in a 5-point Liker scale. Finally descriptive, correlation and regression analysis were also conducted.

Through the analysis, the study indicated that project manager's planning can easily increase the level of project success. In fact, when looked at the variables selected, if manager's project planning is good in terms clearly developed project planning project planning, assuring the quality of the project, and giving priority for cost minimization of the company was the foci of conducting planning. Similarly, the material purchasing practices of selected b construction companies are characterized by precisely formulated and implemented sourcing and purchasing policies resulted in improving the performance of the projects. Having enough and specific standardized transportation vehicles for each project logistics helped efficient utilization of the transportation vehicles in order to minimize costs and project failures. Availability of sufficient and standardized construction material storages ascertain proper handling and storage of the required materials. Adoption of technologies to manage handling of construction materials also contribute the performance enhancement of the projects. It can then be concluded that project success could be significantly explained by efficient material management practices in terms of proper planning, selective procurement, standardized transportation utilization and effective store management.

5.3 Recommendations

Based on the findings of the study, the following possible recommendations were forwarded as follows:

1) Strengthening the effective planning of each project by the management of the real estate companies enhance the improvement of project performance. This can be achieved through setting policies and procedures which help minimize unnecessary costs and wastages without compromising quality.
2) Strengthening material sourcing and purchasing practices being used shall be encouraged. Project and procurement managements are advised to conduct the procurement cost effective by establishing good communication with suppliers to ascertain on time project delivery.
3) For effective transportation and logistics, having enough transportation vehicles for each project enhances project success significantly. Availability of transportation for logistics by using the specific and standardized transportation facilitates the workflow smoothly. This can be achieved by management's commitment on efficient utilization of the transportation vehicles in order to minimize failures and cost.
4) Similarly, referring material storage, management's commitment on construction input material handling and storage improves the betterment of the project performance. This can also be achieved by assuring enough facilities to keep the required materials properly with utilization of technologies to save time and unnecessary costs.

This study focused on material management practices and their impacts of project success. The material management considered only planning, purchasing, transporting and storing construction materials for the success of each specific projects. However, there are several factors like size of the organization, staff competence, technology adoption, etc. that could affect the success of a project, Therefore, future research is required to address these determinants so as to have the clear picture of this study.

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Appendices

Appendix – I. Survey Questionnaire

Survey Questionnaire to be Filled by Employees

Dear Respondent,

My name is Fetene Yigrem, a graduating class of Harambee University, Faculty of Business and Economics, Department of Project Management. I am conducting my research entitled "THE EFFECT OF MATERIAL MANAGEMENT PRACTICES ON PROJECT PERFORMANCE OF SELECTED REAL ESTATE COMPANIES IN ADAMA" for partial fulfillment of the requirements for the master's degree in project management. This study is done to examine the effect of material management practices of the real estate companies in terms of planning, purchasing, transportation and storage of materials on project performance of selected real estate companies in Adama City. Please, you are kindly requested to be honest in filling out this questionnaire as the results of this study can be used as a basis for further study. Your confidentiality will be protected and any information collected in this study will be granted full confidentiality.

Please don't hesitate to contact me if you have any doubts, comments, or suggestions regarding the content and the subject matter as well.

My good contact no. is:

Name- **Fetene Yigrem**

Mobile- **0921558199**

Thank you for your valuable time in advance!

Part I. General Information

1. Sex ☐ Female ☐ Male

2. Age (years old) ☐ 21 - 30 ☐ 31 – 40 ☐ 41 - 50 ☐ 51 - 60

3. Education ☐ Diploma ☐ Degree ☐ Masters

☐ Other, please specify_____

4. Service Year ☐ 1 - 5 ☐ 6 – 10 ☐ Above 10

5. Position ☐ Manager ☐ Team Leader ☐ Supervisor

☐ Customer Representative ☐ Others, please specify .....

6. Real Estate ☐ Residential ☐ Building ☐ Industrial

Part II. Study Questions Related to Material Management and Project Performance

Please read each statement carefully and show your level of agreement on the statements by putting the "X" mark in the boxes using the following 5-scale Likert scales: Strongly agreed (SA) = 5, Agreed (A)=4, Neutral (N)=3, Disagreed (DA)=2, and strongly disagreed (SDA)=1.

Description	Scale				
Project Planning	**1**	**2**	**3**	**4**	**5**
The company has clear project planning policy					
The company clearly develops project plans before commencing projects					
The company's project planning strategies minimizes delays in project delivery					
The company's project planning strategies minimizes project costs					
The company's project planning strategies mitigate quality discrepancies					
Material Purchasing	**1**	**2**	**3**	**4**	**5**
The company has clear sourcing policy					
The company has clear purchasing policy					
I believe that the company usually meets its project delivery schedule through effective purchasing practices					
I believe that the company lowers project costs through effective sourcing practices					

The company has a good relationship with material suppliers					
Material Transportation	**1**	**2**	**3**	**4**	**5**
The company has appropriate transportation facility for material logistics					
The company has sufficient transportation vehicles for every project					
The company's use of specified transport platforms affects standard of materials which later affect project performance					
The company minimizes project costs through efficient utilization of transport vehicles.					
The company usually mitigates project failure arises from low standard of transport mechanisms					
Material Storage	**1**	**2**	**3**	**4**	**5**
The company has sufficient storage facilities to store raw materials					
The raw material storges are built as per project requirement					
The company has a smooth material flow controlling mechanism					
The company adopts information technologies to handle its raw materials					
The company has competent store managers/keepers					
Project Performance	**1**	**2**	**3**	**4**	**5**
The company has efficient material planning strategies contributed to completion of projects within allotted time					
Material management of the company helps in reduction of the total project cost					
The company has achieved waste reduction through suitable logistics in the management of materials.					
The material management of the company helps the project to be completed within their specification.					
I believe that the overall material management practices in the company improve the project workflow.					

Many Thanks for Your Valued Time!!!