



**ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**CONSTRUCTION MATERIALS MANAGEMENT PRACTICE AND PERCEIVED
PROJECT PERFORMANCE: THE CASE OF YOTEK CONSTRUCTION PLC.**

**A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY, SCHOOL OF GRADUATE
STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF PROJECT MANAGEMENT.**

BY

**MERON GUDETA
ID. No: SGS/0552/2009A**

**Advisor
Chalachew Getahun (PhD.)**

**DECEMBER, 2021
ADDIS ABABA, ETHIOPIA**

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APPROVED BY BOARD OF EXAMINER

Dean, Graduate Studies

Signature

Advisor

Signature

External Examiner

Signature

Internal Examiner

Signature

DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Chalachew Getahun. All sources of materials used for this thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any higher learning institution for purpose of earning any degree.

Name

Signature

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Abstract

Project failure is largely attributed to the poor material management that can result in to poor quality materials, damage to material, poor planning, late deliveries and high costs. Therefore, to prevent project failure proper material management is vital for construction industry.

The main aim of this research paper is to examine construction materials management practice and perceived project performance: the case of Yotek construction plc. in focus. A questionnaire survey administered to a purposive selected sample of 60 persons which include contractors, warehouse managers, construction managers, consultant engineers, and site supervisors, eliciting current material management practices through open-ended questions along with questionnaires to obtain important data for the study. However, 40 questionnaires were received properly.

The relationship between different material management practices and project performance in terms of cost overrun, abundance of materials waste, material management system and delay were acquired from this questionnaire.

The findings indicated that there is a direct relationship between material management practices and project performance as of the improper material management practices lessen the performance of project.

The study recommends that systematic approach is needed to manage materials, minimize costs and effects associated with inadequate materials management.

Key words: Construction project, Material management, Yotek Construction PLC

CHAPTER ONE

INTRODUCTION

1.1. Background

Construction industry is a huge sector which has great contribution for the development of the country specially the developing one like our country Ethiopia. Most of the capital budget of the developing country goes to the construction of infrastructures because the development of infrastructure is the backbone of the economic growth of the country (Addise,2005).

This huge sector faced different type of debatable problem. Poor construction material management is one of the debatable issues between the parties which are involved in the construction industry (Asmara,2015).

It is known fact that, resource planning and management will be one the most important parameters for competitiveness and profitability in today's construction technology. One important aspect of resources management is management of construction material in construction projects (Caldas et al, 2014).

Material management is defined as the management system for planning and controlling all the necessary efforts to ensure that the right quality and quantity of materials and installed equipment will be appropriately specified in a timely manner, and obtained at a reasonable cost, and will be available when needed.(Baldva,1997)

Management of construction materials is generally recognized to be the integrated coordination of materials takeoff, purchasing, expediting, receiving, ware housing, proper utilization and disposal. When these functions are not properly managed, material shortages, surpluses, and cash flow problems are likely to occur. Costly labor delays result when the required quantity and quality of construction materials are not available as per the need (Eduardo,2002).

Material cost covers around 60 percent of the project cost. According to the research done in Ethiopia the construction materials constitute 57 percent of the total budget allocated for construction work. Since material cost of the project covers large portion of the project cost, improvement on material management results in a great improvement on the overall construction project (Addise,2005).

Materials management functions include planning and taking off materials, vendor evaluation and selection, purchasing, expenditure, shipping, material receiving, warehousing and inventory, and material distribution (Narimah 2011).

Thus, when poor construction material management occurs, numerous non value-adding activities or costs would likely to arise. These include unplanned site meetings, travelling and communication expenses, idle plant and labor during the waiting time, etc. These represent a waste of resources and are typically for the contractor. Therefore, the construction material management systems should be improved to the good level.

1.2. Statement of the Problem

The fact that most of the construction materials are imported from abroad, in Ethiopia, these materials shall be stored and managed properly. Without proper storage of materials, it can lead to unexpected condition, which can affect the project. As a result, most construction industries in our country are suffering from the lack of materials availability whenever they want because of the mismanagement of construction materials.

In order to achieve good materials management on building project Calistus (2013), opine that the following areas have to be taken very seriously i.e. Training of management and other staff, inventory control of materials on site, Ensuring proper planning, monitoring and control. Mohammed (1999), recommend the following effective management of building projects which includes: Management, supervision and administration of sites, Provision of adequate storage of materials, Proper usage of materials, Materials schedule for the contract on hand, Materials delivery, Provision and accessibility, site layout, Attention to weather conditions.

Bringing imported construction materials made-to-order for a construction project is time consuming and requires high expenditure. On the other hand, those projects depending on the limited local supplier shops faced the difficulty to find the right quantity and quality of materials needed for the projects. Ultimately putting the project at stake and accelerating the cost of the project.

Phu and Cho (2014), describes usage of materials is the flow component that provides for their movement and placement. Material usage can be defined as the provision of proper handling techniques either manually or mechanically for the components held on site during construction process. Adequate care must be taken to prevent wastage when working with materials on construction project, the assembly of installation

process involves the practical incorporated into the project of materials depending on how the skills of the workmen involved. Materials on job site at times may have had a little defect due to poor storage and quality on the part of the manufacturer.

As the answer is often tie back to country's limited natural resources but never raise to find the root causes of ineffective material management in construction projects and its relation to the existing material management practice.

In this research more in depth study was conducted to understand how materials management process practice can have an impact on the construction delivery time and how material management affects project performance.

Therefore, the purpose of this study is to explore the relationship between material management and construction project performance particularly in Yotek Construction Company.

1.3. Research Questions

- What are the practices of material management in Yotek construction PLC?
- What is the relationship between the existing materials management practice and performance of the company?
- In what ways does the material management practice affects the project performance?

1.4. Objectives of the Study

1.4.1. General Objective

The general objective of this study is to explore the association between material management and construction project performance.

1.4.2. Specific Objectives

The specific objectives of the study are to:

- Identify the importance of material management in assessing the effectiveness of construction project performance.
- Show the relationship between material management and construction project performance.
- Identify factors that cause material wastage.

1.5. Significance of the Study

The findings from this research serve as a guideline to Yotek Construction PLC and other construction industry stakeholders.

This research is significant to determine the existing material management practices in Yotek Construction project sites, so as to minimize project delay and cost overrun and to maximize the performance of the project.

Furthermore, this study would generate a list of root causes for ineffective material management that can be used as a benchmark to control the existing and future projects. In addition to this how these root causes are related to the current material management practices would aware the stakeholders to be more cautious.

This research may help to the field professionals and would be valuable for the academicians too. As this study would serve as a support of what the past researchers have written about material management in construction projects.

This study could also be used to provide information for further researchers who are willing to investigate on this particular or similar case.

1.6. Scope and Limitations of the Study

This study is confined to Yotek Construction PLC because in this type of construction projects construction materials would be held major cost of the project rather than equipment and labor cost. Furthermore, although there are different types of material management, because of finance and data constraints, this study is limited to construction material management.

Moreover, while conducting this study the researcher faced the following constraints:

- Shortage of access to literature review related to the subject in Ethiopian context.
- Finance constraints.
- Some respondents did not return the questionnaire on time and some did not fill the open ended ones.

1.7 Organization of the Thesis

This research paper is organized in to five chapters. The first chapter deals with the introduction part which includes the background of the study, the statement of the research problem, objectives of the study, significance of the study, scope of the study and limitations of the study.

The second chapter deals with the review of related literature. Chapter three focused on the research methodology, research design, and data collection and sampling techniques, whereas the fourth chapter presented the result and discussion of the data. Finally conclusion and recommendations were presented under fifth chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

Unlike earlier days, today the construction industry have become highly complex due to the technological developments, globalization, uncertain economic conditions, social pressures, political instability and so on (Walker, 2015). The conventional methods are incapable to meet with the demands of today's environment that is described by the authors as being more dynamic and filled with greater uncertainty (Keith, et al., 2016). With the increasing complexity and uncertainty, project delivery is not only management of three project constraints: cost, scope and time, but perceive it to be an assessment of the uncertainty within which the project is operating and its continuing ability to respond to the reason why it was needed in the first place (Melton & Iles-Smith, 2009). Effective delivery is all about the control and management of uncertainty. Therefore, one needs to identify the uncertainty related to the project and sculpt the best strategy to deliver the project so that the chances of success are increased.

2.2. Definition of Material Management

There is no single definition of material management. According to the definition of business dictionary, material management is "The planning and control of the functions supporting the complete cycle (flow) of materials, and the associated flow of information. These functions include identification, cataloging, standardization, need determination, scheduling, procurement, inspection, quality control, packaging, storage, inventory control, distribution, and disposal." (Pataskar, 2013)

Management dictionary /MBA dictionary defines material management as follows "Materials management is a group of organizational functions responsible for the planning, sourcing, stocking, manufacturing, control and distribution activities of material used in the internal and external fulfillment of demand. Typically the term includes all logistical activities that control the transmission of tangible, physical materials through the value chain such as shipping and transport, distribution and warehousing, quality control, work in progress and manufacturing."

The material management system of different company might be different but the main objective of material management is to deliver the right quantity and quality of material

at the right place from the right source at the right price and time. Material management has different process like material planning, requisition, procurement, purchasing, storing and delivery (Narimah,2011).

2.3. Material Management Functions

Material management covers starting from material planning up to consumption of the material. The major functional area of material management includes material planning, purchasing, receiving, storing and transporting.

2.4. Material Management in Construction Project

Construction material is recognized to be a major component in the construction project cost. Depending on different project it is assumed that the material cost can represent from 30% to 70% of the total project (Donyavi & Flanagan, 2009).

Construction materials consist of various raw materials extracted from different markets. Sadly the prices and availability of these materials are highly vulnerable to the turbulences of the varying market conditions (Christopher, 2011). There by making the construction materials a highly uncertain component in the construction project. The range and variety of construction material are accelerating with the advancement of technology. This has resulted the construction industry to shift away from localized use of materials to centralized worldwide production. Gradually the simple materials are being replaced by the introduction of engineered composites and mixed assemblies. Moreover, chemical additives have enhanced the materials producing a wider array of properties (Calkins, 2009). The ample options of materials with varying properties have been considered as an accomplishment to the construction industry however the availability of too many options have caused complications in making the right choice. Experts and specialists are required to select the most compatible construction material to compliment the project. The material choice would determine the machinery and workmanship required and making the right choice from initiation can pave the path for a smoother delivery.

After the selection of material till the final product is erected it involves a series of processes, which is referred as material management. This involves storage, identification, retrieval, transport and construction methods. Material management is the system of planning and controlling to ensure the right quality and quantity of materials and equipment are specified in a timely manner. (Donyavi & Flanagan, 2009). All these

process possess high uncertainty, as they are interlinked with other series of activities with unknown variables. Therefore, according to many authors effective materials management is the key to the success to construction project. More researches even elaborate that effective material management can improve the productivity of the project and thus can lead to success (Pande & Sabihuddin, 2015).

2.5. Material Management Processes and Techniques

Material management consists of a series of processes that need to be integrated, coordinated and synchronized well to ensure that materials are available at their point of use when needed. Material management process begins from need generated from site followed by this information conveyed to store department and material is ordered in the store, indent is generated. Usually vendor selection is to be carried out for the least value and best items. Materials are received at store departments and inspection is carried out. Below in Figure 2.1 is a material management process flow chart (source from Patil & Pataskar, 2013).

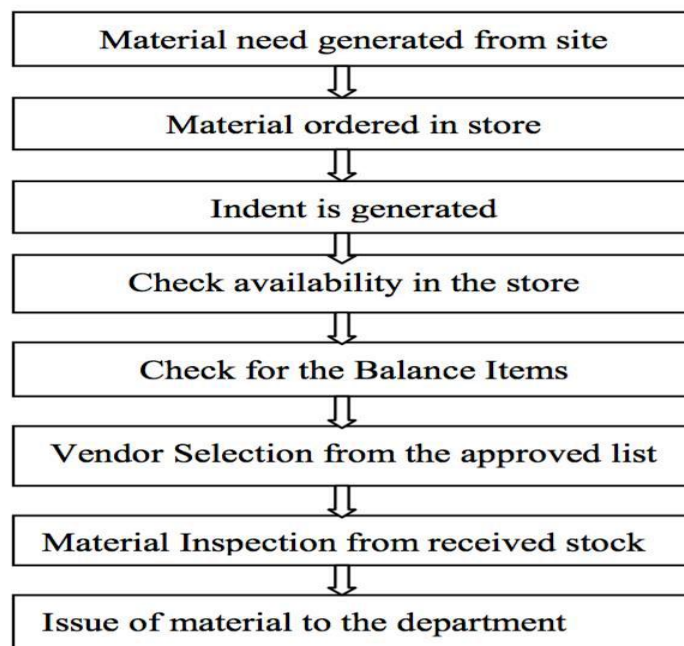


Figure 2.1: Material Management Processes (Patil & Pataskar, 2013)

2.5.1. Planning

Material planning is the initial process that needs to be carried out accurately in order to provide guide to all the subsequent activities. According to Gulghane & Khandve (2015)

material planning includes quantifying, ordering and scheduling. The materials planning process covers the set up maintenance of records and determines the target levels and delivery frequency. Adopting a good material management plan can increase productivity and profit. Hence, it can help to increase the success of project delivery.

2.5.2. Testing

Quality is a prime factor to measure the performance of a project. Quality assurance of building materials is vital in order to create strong durable and cost effective structures. Each construction project has a different set of specification and requirements. The contractors are required to select and procure suitable construction materials so that they can meet the contract specification. Unless a specific brand and model number is stated, it is advisable to conduct thorough study and analysis of the different material properties to check for its compatibility in the different zones of the building. The materials are only ordered after receiving approval (Low & Ong, 2014). Proper assessment of the various materials is important to ensure quality and durability of the final product.

2.5.3. Procurement

Procurement is not only about appointing contractors and preparing contract, but is also very much a starting point in the process of delivery (Mead & Gruneberg, 2013).

Activities included in the procurement process range from purchasing of equipment, materials, labor and services required for construction and implementation of a project. Another author has defined procurement as identifying and analyzing user requirements and type of purchase, selecting suppliers, negotiating contracts, acting as liaison between the supplier and the user, and evaluating and forging strategic alliances with suppliers. For many organizations, materials and components purchased from outside vendors represent a substantial portion of the cost of the end product, and hence effective procurement can significantly enhance the competitive advantage of a project (Morris & Pinto, 2007). Many authors have suggested that choosing best option of procurement can help to reduce the impact of uncertainties such as late deliveries, substandard raw material qualities, and resource constraints (Morris & Pinto, 2007). Therefore to successfully deliver a project it is not about adopting a procurement system with best practice tactic to fix all problems, but to embrace an approach that has the best-fit tactic that gets the job done most efficiently (Keith, et al., 2016).

2.5.4. Logistics

Logistic is defined as concept that includes movement and it may encompass planning implementing and controlling flow and storage of all goods from raw materials to the finished product to meet customer requirements. For smoothly handling the materials, space need to be carefully allocated for material handling equipment, access roads, warehouses, workshop, and lay down materials in the construction site (Pellicer, et al., 2013).

Planning these tasks accurately can help to formulate an efficient construction site layout that can provide easy access and outing of materials within the construction site. Moreover introducing slopes in the construction site can ease the circulation of materials because of the gravity effect. To control access and to increase the security of the site, setup wall or fence can be considered as a requirement for the construction site. Optimum forecasting for material movement and planning of access and routing of materials within construction site are factors that need to be taken consideration during logistics process for effective material management (Pheng and Chuan,2001).

2.5.5. Handling material

Various materials posses' different features and properties, that makes the handling of materials critical. Effective material handling involves handling, storing and controlling of construction material.

Proper protection during storage is often ignored, and this can result poor material quality or material deterioration. Moreover, it is also advised that transportation, loading and unloading of material should not be conducted in the rain. It is also recommended that the storage area needs to be enclosed, clean and dry with good air circulation and for some materials need to be stacked on pallets, not more than a certain safe height to prevent dampness (Low & Ong, 2014).

By adopting proper material handling and storage would help to keep the material intact and in good quality. It also would reduce loss of profit due to theft, damage and wastage as well as running out of stock (Canter, 1993).

2.5.6. Stock and waste control

Material waste is a significant factor in construction cost, Calkins (2009) states material waste is 9% by weight in the Dutch construction industry and 20-30% of purchased materials in the Brazilian construction industry.

Material wastes are caused by several sources such as design, procurement, material handling, and operation. Shen, et al. (2003) defined building material wastages as the difference between the value of materials delivered and accepted on site. Moreover material waste has been recognized as a major problem in the construction industry and it can also implicate inefficiency in project delivery. Adopting a proper stock control would help to increase the productivity and also can be one of the way to improve waste control in the construction site. By introducing minimizing strategies to reuse materials in both design and construction phase can be a mean to reduce waste (Dainty & Brooke, 2004).

2.6. Correlates of Ineffective Material Management

During the past years, various academics researchers have conducted studies investigating to find out the issues causing ineffective materials management in construction projects. Among these studies were;

A study carried out Zakeri, et al. (1996) suggested that transport difficulties, waste, improper handling on site, misuse of specification, lack of proper work plan, inappropriate materials delivery and excessive paperwork all have an immense effect on materials management. Another researcher, Dey (2001) emphasized that the common issues regarding material management are as follows:

- Receiving materials before they are required which may increase inventory cost and may increase the chance of deterioration in quality;
- Not receiving materials during the time of requirement causing to decrease motivation as well as productivity
- Incorrect materials take-off from design and drawing documents;
- Constant design changes
- Theft or loss of item
- Choice of type of contract for specific material procurement
- Vendor evaluation criteria
- Piling up of inventory and controlling of the same

- Management of surplus material.

In another study conducted by Sohrab and Donyavi (2009) states the common problems in material management are as follows:

- Failure to order on time which may cause delay in the projects;
- Delivery at the wrong time which may interrupt the work schedule;
- Over ordering
- Wrong materials or wrong in direction of materials requiring re-work;
- Theft of materials from delivery into production;
- Double handling of materials because of inadequate material

Moreover, a study conducted by Kasim (2008) highlighted that problems could emerge due to human error, especially because some construction firms still rely on manual methods for material management which involves paper based techniques. In addition she states that problematic use of paper based reports for exchanging information relating to materials component with supply chain can result misunderstanding and poor coordination.

In another research done by Gulghane and Khandve (2015) state that 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, in accurate estimation of shipment quantity of materials, uneconomical order quantity of materials poor shipping time, increasing transport cost of materials, material over usage in location of project, choosing the wrong materials for construction, the increasing storage cost of materials, the poor buying ability of managers, delay of payment for materials.

A study done by Kasim (2008) also investigates the problems in material management by conducting a research on 6 case studies. Case study A and B are two small projects from two different construction companies, while the other 4 case studies are larger or more complex studies. The interviewees under study were experience constructional

professionals ranging from 5- 32 years' experience. Moreover, the cost of the projects ranged from £ 1.78 million to £ 4.2 billion. 17 possible issues causing ineffective material management were revealed. The major problems that were discovered are material management activities related to constraints site storage, site logistics with regards to material handling and distribution and also ordering and delivery of materials to the construction site. The following are the identified 17 causes:

- Late delivery
- Site storage problems
- Logistics problems
- Incorrect delivery
- Inadequate loading area
- Site access problem
- Regulation consideration
- Congestion time
- Others: Incomplete delivery
- Constraints storage compound
- Material damages
- Lack of materials
- Improper handling
- Tower crane distribution problem
- Supply chain challenge
- Project size challenge
- Project location challenge

A study done by Patel and Vyas (2011) had an interesting approach to identify the problems occurring in the material management process. They have used 3 projects from Hyderabad, India to reveal the problems in the material management. Initially they divided material management process into 4 main phases, which are material identification, Vendor selection, Procurement and Construction phase. Next the problems associated with each phase were clearly identified, disclosing the usual problems occurring in these phases, this is shown in the below Table 2.1 (Patel and Vyas, 2011).

Table 2.1: Causes of ineffective material management (Patel and Vyas, 2011).

A		Material Identification
A1	Undefined scope	
A2	Lack of communication	
A3	Incomplete drawings	
A4	Lack of conformance to requirements	
A5	Nonstandard specification	
A6	Incomplete/ ineffective meeting	
A7	Difference between plans and specification	
A8	Not determining what and when materials needed	
B		Vendor selection
B1	Uncontrollable bid list	
B2	Incomplete proposal	
B3	Time spent in investigating non-qualified suppliers	
C		Procurement Problem
C1	Availability of material	
C2	Availability of quality	
C3	Matching price to competitors price	
C4	Late deliveries	
C5	Late or incorrect submittals	
C6	Poor communication	
C7	Lack of conformance to requirements	
C8	Unrealistic delivery date	
C9	Vague stated requirements	
C10	Re handling of material	
C11	Storage of materials	
C12	Theft	
C13	Damage of material	
D		Construction Phase
D1	Incorrect type of material delivery	
D2	Incorrect sizes delivered	
D3	Incorrect quantity delivered	
D4	Keeping track of material	
D5	Re-handling of material	

D6	Storage of material
D7	Loss of material
D8	Damage of material
D9	No supplier quality assurance
D10	Poor communication
D11	Receiving handling and storage of unused materials

2.7. Consequences of Ineffective Material Management on Project Delivery

A success of a construction project lies in the ability of all the stakeholders to plan effectively, as well as properly manage the resources. Furthermore this grand plan encompass of sub plans, which helps to determine, sequence, strategize how to allocate the resources effectively. Construction projects are well known for being complex and are subjected to high uncertainty and variability. Construction materials are involved throughout the construction project and variability and uncertainty can be traced back to construction material. Therefore formulating a good material management plan is highly mandatory to support the grand plan.(Bernold and Treseler, 1991).

Unavailability of materials when needed can affect the productivity and it may cause delay and difficulties to meet the schedule. On the other hand having excessive materials on site would also create problems to the managers. Storage of materials can increase cost of production thus increasing the overall cost of the project. Furthermore if the site lacks space to store all the materials may burden the managers to rent alternative storage areas which would cause more trouble and cost (Haddad, 2006).

In most contracts, the cost and time requires to complete the specified scope of works are defined in project documents. Control of quality of materials and workmanship is achieved through proper quality control plan and its implementation through a preset level of quality control and inspection of various activities and materials. Budget control is done through monitoring progress payments and variation costs. The schedule is monitored by ensuring timely approval of materials, shop drawings, timely procurement of materials and execution of works as planned. Quality control and safety are achieved through inspection of works during the construction process, ensuring the use of approved materials and workmanship (Rumane, 2011).

It is a fact that those construction projects that are unable to use their resources efficiently would reduce their productivity reflecting their poor management skills. According to a study done by (Baldwin and Bordoli ,2014) state that 40% of the time lost on the site can be attributed to bad management, lack of materials when needed poor identification of materials and inadequate storage. By formulating an ineffective materials management plan can have a negative impact on cost, quality and time, which would affect the project delivery.

2.8. Material Management Problems

Construction material management covers large part of the construction project management since material covers around 60% percent of the project cost and the building construction need so many different types of materials. This wide area of management faces different problems.

Some of the most common challenges of the construction material management described as follows:

➤ Ordering in Excess

Cash flow is the key aspect in running a construction management company. Ordering and storing excess material might tie up the cash flow and incur interest charges for the business. There is also additional expenses for excess material like storage cost, transportation cost (if transferred to other construction site), and risk of theft, obsolescence, etc. The necessary material of the project should be quantified by quantity surveyor or office engineer and should be check by the right professional before the material purchased because sometimes excess material purchased because of wrong quantity surveying of unqualified professional (Dey, 2011).

➤ Unavailability of storage space

When products are purchased in excess volume, lack of storage space results in loss of materials due to damage and theft. Specially most of the construction projects found in the city faces difficulty of storage space even it is difficult to get rental store around the construction site. This problem results difficulty on material handling because the unavailability of storage space lead the material to be stored on scattered manner that make the material supply to take more time (Narimah,2011).

➤ **Unorganized storage**

This leads to wastage of labor efforts and time, searching the materials when needed. If the material stored in unorganized manner, it takes too much time for searching the material even we may not get it although it is available in the store. The store should be well organized by placing the material according to the material type and category. The information about the stored material should be placed or posted on visible spaces in order to be easily understood.

➤ **Wrong quality or type of materials**

The quality and type of material should be check by right professional otherwise serious problem may occur. Purchase and storage of the wrong quality of material, results in re-work demanding labor force efforts and time.

➤ **Not ordering on time**

Inadequate training in handling materials and not keeping track of the material used, leads to miss out on ordering the materials. This in turn leads to delay in supply and thus a delay in project delivery. All necessary material of the project should be requested by keeping the essential lead time to minimize the occurrence of delay by shortage of material and rush purchasing which may result extra cost.

➤ **Double handling of material**

This occurs as a result of inadequate materials when required. The process not only involves wastage of time and thus a delay in delivery of the project, but also plays a vital role in the extending the budget due to surplus transmission of materials. The budget management problem may also result this problem. The necessary material of the project carefully identified by the right professional and the necessary budget should be allocated to minimize this problem. The professionals involved on material management works should be aware of this problem

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter explains the method and design that was used to conduct the research. Determining a good research strategy helps to reach to a productive conclusion. There are two types of research strategy. They are qualitative and quantitative research.

Quantitative research is 'objective' in nature. It is defined as an inquiry into a social or human problem based on testing a hypothesis or a theory composed of variables, measured with numbers and analyzed with statistical procedures (Naoum,1998). Therefore this research method can be achieved through questionnaires and surveys. In the most general terms, quantitative research contains three main things, which are, it conceptualizes reality in terms of variables, it measures these variables and it studies relationships between these variables (Punch, 2014).

Collecting data for quantitative research can be time consuming as the sample size is usually greater compared to qualitative, but analysis is usually easy as it is mostly straightforward and repetitive compared to qualitative. The other type of research strategy is qualitative research. Unlike quantitative, qualitative is subjective in nature. It emphasizes meanings, experiences, descriptions and so on. This can be achieved through interviews and attitudinal survey. Where the questions are designed to be more general or explanatory answers, conducting a qualitative research is believed to be more challenging than quantitative research especially if it needs to be done in a shorter span of time.

As a matter of fact qualitative research is an in depth study which needs to be done slowly to absorb and explore to the depth of its core and revealing new theories. Moreover, unlike quantitative research, qualitative research is multidimensional and pluralistic with respect to paradigms (Punch, 2014).

Beside these two types, nowadays it is very common to find researchers using mixed method. This research method is a combination of both qualitative and quantitative methodologies. It is believed that adopting a mixed method approach has the advantage of gaining a stronger research design and achieving more valid and reliable findings. Moreover, it is recognized that adopting a mixed method strategy can

compensate the weakness and strengths of both qualitative and quantitative research approach. For example, quantitative research is well known for conceptualizing variables and using large representative samples, while qualitative approach has the strength to reveal the in-depth meaning and explore the context with smaller samples (Punch, 2014).

Therefore by combining the strong areas of these two methods can help give a strong logic to an underlying rationale. The mixed method is further classified into 4 major design methods. The first one includes a qualitatively driven core component and a quantitative supplementary component, where the core and the supplemental components are conducted sequentially. The second type is a quantitatively driven core component and a qualitative supplementary component, where the core and the supplement components are conducted sequentially. The third type of design consists of a qualitatively driven core component and a quantitative supplementary component where the core and the supplementary component are conducted simultaneously. The next type of design is qualitatively driven core component and a quantitative supplementary component, where the core and the supplemental components are conducted simultaneously (Clark & Creswell, 2008).

In other words mixing of qualitative and quantitative can formulate triangulation designs, which can either be sequential or simultaneous. As a matter of fact using triangulation method would involve the use of multiple methods to examine the same dimension of a research problem (Clark & Creswell, 2008). Even though many researchers have praised mixed method, some avoid doing it because following a mixed method research can be costly and time consuming.

3.2. Research Design

The strategy adopted for this study is both qualitative and quantitative research approaches.

The study was therefore consists of intense literature review, questionnaire to stakeholders of Yotek Construction PLC, conduct structured interview and a statistical and qualitative analysis of the survey.

- Literature gathering
- Prepare literature review
- Identify material management processes and root causes in ineffective material

management in other countries to formulate the questions

- Preparation of the questionnaire
- Identify the targeted response group
- Distribute the questionnaire to the targeted response group
- Conduct structured interview
- Data collection
- Data analysis

A questionnaire survey (refer to Appendix I) and open-ended questions (refer to Appendix II) were used as the main tools to collect data from the targeted response group. The questionnaire was designed into 2 sections, where the second section was enlightened by open ended questions. Both the questionnaire survey and the open-ended questions helped to meet the objectives of the study. The first section consisted questions to determine the respondent's background.

One of the main aims of this research is to examine the material management processes used by Yotek Construction PLC. Collecting a set of statistical data is not enough to reveal the existing practice by Yotek Construction PLC. Therefore, material management processes used in other countries were gathered and analyzed in the literature review. From the extensive literature review, series of pre-established questions with pre-set response categories were formulated. With the limitation of the short span of time for this research, structured questions helped to minimize flexibility and variation while standardization was maximized (Punch, 2014).

The other objectives of this study are to identify the importance of knowing material wastage percentage, the benefits of implementing material management software in construction project, the demerits of not implementing material management system, and factors that increases material waste on construction site. This information helped to formulate the questions for this section.

And also to designed based on 5-point Likert Scale, which measures from 1- 5 according to the level of contribution and impact of each factor (Jackson, 2012).

Strongly Agree (1)

Agree (2)

Neutral (3)

Disagree (4)

Strongly Disagree (5)

Use of Likert scale is very common as it is very simple to develop. This data can be analyzed statistically using SPSS and Microsoft excels to ensure that the data is consistent and reliable.

3.3. Sampling Technique and Population Size

The population of Yotek Construction PLC consists of managers, surveyors, store keepers contractors and consultants. It is impossible to test everyone in the population so it is highly crucial to select a good sample to represent this population. Moreover, this sample should consist of potential participants who are able to contribute to the research. Even though client and consultants represent a significant portion of the construction industry population, their involvement in material management is insignificant. Therefore, this narrowed down the population into contractors, site managers, warehouse managers and material managers. Moreover, contractors and consultant engineers having experience over 5 years and high qualifications were purposely selected for this research. As these respondents have filled high positions in construction field, their long exposure to the work environment and their educational background helped to provide fruitful information and insight for this research.

It is a common myth to believe that increasing the sample size and frame can help to capture more data that can help to enlighten a research area. This can be very applicable if the research is concentrating very much on quantitative or statistical analysis. However, in this study, the main focus is on a specific field of interest and is more concentrating on adopting a more qualitative approach. Hence increasing the number was not the main target of this research, but selecting a considerable number with high potential sample was more important. Therefore with the time and cost constrain even though it was targeted to gain 60 respondents to the study, the researcher was able to gain successful response from 40 participants. This ended the population consisting of 40 respondents. The population size was narrowed down to this number to effectively maximize the cost and time allocated for the research. Moreover, this survey consisted of

many questions that required thoughtful answers. The time consuming nature of the survey might discourage some respondents from participating. In addition, this survey is concentrating more on construction material management and this might not be within the competence of some of the construction stakeholders. However, purposive selection of the target respondents with competence and experience helped to overcome these challenges in data collection.

In this study, purposive sampling technique was used as this research followed a mixed method strategy. Usually purposive sampling is used in qualitative studies where, the participants are purposely selected based on specific purposes associated with answering a research study question (Naoum, 1998).

In this research, the sample size depended on two things. Firstly, in order to examine the material management process types that is practiced by Yotek Construction PLC, data needed to be collected until the saturation point. Therefore, this is the first element to decide the sample size. Next is that even though saturation point is reached within a sample size of for example 10, the data collection cannot be stopped at that point because quantitative analysis is also conducted in this research. Therefore, a minimum 30 sample is needed to conduct a statistical analysis. Furthermore, according to Morse and Niehaus (2009), if the research design follows qualitative and quantitative design, the sample size can be larger (at least 30). Hence, in order to satisfy all these conditions 60 respondents were selected.

Moreover, careful consideration was given to select a wide array of contractors. Therefore, among contractors' knowledgeable main contractors who are involved in different project value was carefully selected. Unlike contractors, sub-contractors details were not accessible from the ministry's website, so snowball sampling techniques was used to select the subcontractors. Snowball sampling is a non-probability sampling technique that is used by the researcher to identify potential subjects in studies where it is hard to find. So with the help of the contractors and other professional contacts, sub-contractor samples were selected (Punch, 2014).

Furthermore, another significant criterion that was considered in this research while selecting the sample was that to select respondents who are involved in building projects. By clearly defining these boundaries helped to gather a sample that can provide a data that is more focused on this research.

3.4. Data Collection

The weight and the authenticity of the research rely greatly on the validity and reliability of the collected data. Data are often thought as ‘the facts’ – the things that are known to be true. But the truth is that data are social products. “The records created are not reality itself; rather they are a result of researchers’ attempts to observe or measure traces or evidence of phenomena situated within a complex systems.” (Byrne, 2002). In this study, data was obtained using 2 different methods.

3.4.1. Primary data collection

The primary data collection refers to the first-hand information collected directly by the researcher for the use of his/her study (Kent, 2015). Only the researcher gains the first accessibility for this information. Moreover, this information can be obtained by conducting personal investigations through respondents and survey using questionnaires. The collection modes of this information can be through various modes such as, personal interview, email, phone interviews and so on. Among the advantages of this method includes that it will provide highly accurate and reliable data.

A total of 60 questionnaires were prepared and distributed to the respondents. Interviews were conducted with the contractors and warehouse managers to gain more insight about material management processes in Yotek Construction PLC. Out of 60 questionnaires, 40 questionnaires came back successfully. Hence, data from 40 respondents were used for this research study.

Furthermore, this type of data collection is the best fit for in-depth investigations. On the other hand the disadvantage of this method is that it is time consuming and costly.

As this study is following a mixed method strategy, the primary data was collected using questionnaires and telephone interviews. The questionnaires were emailed to the targeted respondents and they were expected to fill this form and return them through mails.

3.4.2. Secondary data collection

Unlike primary data, secondary data refers to the information that have been already collected, analyzed, documented and published by another researcher or institute (Kent, 2015). This information is usually used to support the current research of the researcher. Gathering this information is not as hectic as collecting primary data, as this information can be easily accessible from brochures, leaflets and so on.

3.5. Data Analysis Techniques

To increase the credibility and validity of the findings, data collected from primary and secondary sources were analyzed by triangulating both quantitative and qualitative data together.

The collected data were edited, coded, organized and entered into SPSS to obtain descriptive statistics including frequency and percentiles. Hence, descriptive statistical technique was used for data analysis. According to Amin (2005) descriptive statistics provides us with the techniques of numerically and graphically presenting information that gives an overall picture of the data collected. Moreover, qualitative data collected from respondents via interview was analyzed, organized and summarized in line with the category of each item so as to support and clearly state quantitative data.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

Introduction

A series of statistical test and analytical study was conducted to find the association between material management and construction project performance, in case of Yotek Construction PLC. The data collected using the questionnaires were analyzed using an array of descriptive and inferential statistical analyses, facilitated by Microsoft of Excel and Statistical Package for Social Scientist (SPSS).

4.1. Demographic Characteristics of the Study Respondents

The questionnaire was distributed among 60 respondents, but only 40 questionnaires were successfully returned. Out of 40 respondents 24(60%) are males whereas 16(40%) respondents are females. The following table 4.2.1 depicts the gender of the respondents

Table 4.1: Gender of the respondents

Gender	Frequenc	Percent	Valid Percen
F	16	40.0	40.0
Valid M	24	60.0	60.0
Total	40	100.0	100.0

Table 4.2: Educational background of the respondents

Level of Education	Frequency	Percent	Valid Percent
Degree	17	42.5	42.5
Valid Diploma	15	37.5	37.5
Masters' degree	8	20.0	20.0
Total	40	100.0	100.0

Out of 40 respondents 17(42.5%) of them are degree holders, 15(37.5%) are diploma holders and 8(20%) are masters' degree holders. This shows that most of the respondents are degree and master's degree holders and hence most of the participants of this study have good educational background.

Table 4.3: Work experience of the respondents

Experience	Frequency	Percent	Valid Percent
2.00	2	5.0	5.0
3.00	3	7.5	7.5
4.00	5	12.5	12.5
5.00	2	5.0	5.0
6.00	5	12.5	12.5
7.00	2	5.0	5.0
8.00	3	7.5	7.5
9.00	4	10.0	10.0
10.00	2	5.0	5.0
Valid 11.00	1	2.5	2.5
12.00	3	7.5	7.5
13.00	2	5.0	5.0
14.00	1	2.5	2.5
16.00	1	2.5	2.5
18.00	1	2.5	2.5
21.00	1	2.5	2.5
22.00	1	2.5	2.5
25.00	1	2.5	2.5
Total	40	100.0	100.0

It is obvious from the above result that among the 40 questionnaires that were successfully returned, 12 (30%) of the respondents had less than 5 years of work experience, 16 (40%) of the respondents had 6-10 years of work experience, 7 (17.5%) of the participants had 11-15 work experience and 2(5%) of the respondents had 16-20 years work experience and 3(7.5%) of the respondents had over 20 years' experience in the construction industry. Majority of the participants of this survey are among the extremely experienced professionals from the construction industry.

4.2. Materials Management Practice and Project Performance

This section focuses on the results of the study in line with the research questions and objectives. Furthermore, the result of the study has been analyzed on the basis of the information that has been gathered through questionnaire.

4.2.1. The importance of knowing material wastes

Table 4.4: Respondents' perception on the importance of knowing material wastes

N	Items	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Total	
		frq	%	frq	%	frq	%	frq	%	frq	%	No	%
		1	Helps determine the exact required quantities	25	63	12	30	2	5	1	2	-	-
2	Increases the chance for obtaining the project finance	31	77	7	18	-	-	-	-	2	5	40	100
3	Helps preparing accurate bill of quantities	31	78	7	18	2	4	-	-	-	-	40	100
4	Helps the contractor to have a better chance to win the tender	15	40	20	50	3	7	2	3	-	-	40	100
5	Knowing the real requirements for the project (materials-time-cost)	19	48	16	40	12	-	-	-	-	-	40	100

As shown in table 4.4, the majority of the respondents 25 (63%) strongly agreed on the importance of knowing material waste percentage helps determine the exact required quantity, and 12(30%) of the respondents also agreed on the necessity of knowing material waste percentage to determine the exact required quantity for the similar reason. while 2(5%) of the respondents were neutral concerning the advantage of knowing material waste percentage, and one participant testified that he/she disagreed with the importance of knowing material waste percentage to determine the exact required quantity.

Out of 40 respondents 31(77%) claimed that they have agreed with the importance of knowing material waste percentage to increase the chance for obtaining project finance. In addition, while 7(18%) of the respondents agreed with the importance of knowing material waste percentage to increase the chance for obtaining project finance, 2(5%) of the participants showed their disagreement.

About 31(78%) of the respondents strongly agreed with the importance of knowing material waste percentage which helps prepare the accurate bill of quantity.

On the other hand, while 7(18%) of them revealed their agreement on the matter, 2(4%) of the respondents kept neutral.

Furthermore, 15(40%) of the respondents strongly agreed with the importance of knowing material waste percentage in helping the contractors have a better chance to win the tender. Whereas, while 20(50%) fairly agreed with similar purpose. 3(7%) of the respondents remained neutral. In addition, the rest of the respondents expressed that they did not agree with the case.

As indicated above, most respondents 19 (48%) confirmed that they highly agreed with the importance of knowing material waste percentage to know the exact requirement for the project in line of material, time and cost. In addition, 16(40%) respondents agreed on the idea. The rest of the respondents 5(12%) didn't react to the point. Therefore, one can understand that the majority of the respondents agreed with the advantage of knowing material waste percentage in determining the performance of the project.

4.2.2. Benefits of implementing material management software on construction project performance

Table 4.5: Respondents' perception on the benefits of implementing material management software on construction project performance

No	Items	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Total	
		frq	%	frq	%	Frq	%	frq	%	frq	%	No	%
1	Reducing the costs of project Materials	31	78	9	22	-	-	-	-	-	-	40	100
2	Better handling of materials	38	95	2	5	-	-	-	-	-	-	40	100
3	Reducing duplication of materials orders	37	92.5	3	7.5	-	-	-	-	-	-	40	100
4	Materials are timely available on site with the right quantity	15	37.5	20	50	3	7.5	2	5	-	-	40	100
5	Improving the performance of the project	27	67.5	10	25	2	5	1	2.5	-	-	40	100

As depicted in table 4.5, the majority of the participants 31 (78%) strongly agreed with the benefits of implementing material management software to reduce the costs of project of project materials and 9(22%) of the respondents also agreed on the benefits of

implementation material management software in reducing the cost of project materials.

Out of 40 respondents 38(95%) of them were highly agreed with the benefit of implementation of material management software in better handling of materials. Whereas, 2(5%) of the respondents agreed with similar purpose.

About 37(92.5%) of the respondents were strongly agreed with the benefit of implementing material management software to reduce the duplication of materials. On the other hand, while 3(7.5%) of them revealed their agreement on the matter.

Similarly, 15(37.5%) of the respondents strongly agreed with the benefit of the implementation of material management software to enable the materials to be available timely with the exact quantity, 20(50%) fairly agreed with similar purpose. 3(7.5%) of the respondents remained neutral and 2(5%) of the respondents expressed that they did not agree with the statement.

As indicated above, most respondents 27 (67.5%) confirmed that they highly agreed with the benefit of implementation of material management software in improving the performance of the project. In addition, 10(25%) respondents agreed on the idea, 2(5%) did not react to the point and 1(2.5%) of the participants disagreed with the issue. Therefore, one can understand that the majority of the respondents agreed with the benefits of implementation of material management software in managing construction materials to improve construction project performance.

4.2.3. Demerits of not implementing material management system

Table 4.6: Respondents' perception on the demerits of not implementing material management system

No	Items	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Total	
		frq	%	frq	%	frq	%	frq	%	frq	%	No	%
1	Materials are not available on time	12	30	21	52.5	5	12.5	1	2.5	1	2.5	40	100
2	Materials are not available with required quantity	19	47.5	14	35	4	10	3	7.5	-	-	40	100
3	Late delivery to the site	23	57.5	15	37.5	2	5	-	-	-	-	40	100
4	Slow response from the Consultant engineer about	11	27.5	27	67.5	2	5	-	-	-	-	40	100

	Submittals												
5	Deliver wrong materials	24	60	13	32.5	2	5	1	2.5	-	-	40	100

As shown in table 4.6, 12 (30%) of the participants strongly agreed with that the problem of not implementing material management system causes materials are not to be available on time. 21(52.5%) of the respondents also agreed with that the disadvantage of not implementing material management system in hindering materials not to be available on time, 5(12.5% of the participants remained neutral. Only 2(5%) of the respondents disagreed and strongly disagreed respectively.

Moreover, 19(47.55%) of the respondents were highly agreed with the problem of implementing material management system for not making the materials to be available with the required quantity. In addition, 14(35%) of the respondents agreed with the point. 4(10%) of the respondents remained silent and 3(7.5%) of them disagreed.

23(57.5%) of the respondents strongly agreed with that the problem of not implementing material management system causes late delivery the site. On the other hand, while 15(37.5%) of them revealed their agreement on the matter. Only 2(5%) of the participants remained neutral.

Furthermore, 11(27.5%) of the respondents strongly agreed with that slow response from the consultant engineers about submittals is caused in the absence of not implementing material management system, 27(67.5%) fairly agreed with similar purpose. 2(5%) of the respondents remained neutral.

As indicated above, most respondents 27 (67.5%) confirmed that they highly agreed with the problem of not implementing material management system results the slow response of consultant engineers about submittals. 2(5%) didn't react to the point. Therefore, one can understand that the majority of the respondents agreed with the role of implementing material management system in managing construction materials to activate construction project performance.

Out of 40 respondents, 24(60%) of them strongly agreed with the problem of not implementing material management system causes wrong delivery of materials. Similarly 13(32.5%) of the respondents agreed to the point whereas 2(5%) of the participants remained neutral. On the other hand, 1(2.5%) of the respondents disagreed with the issue.

4.2.4. Factors that causes materials wastes

Table 4.7: Respondents' perception on the factors that causes materials wastes

No	Items	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Total	
		frq	%	frq	%	frq	%	frq	%	frq	%	No	%
		1	Materials damage on site	24	60	16	40	-	-	-	-	-	-
2	Improper cutting of materials	15	37.5	25	62.5	-	-	-	-	-	-	40	100
3	Existence of unnecessary materials on site	23	57.5	15	37.5	2	5	-	-	-	-	40	100
4	Overproduction/Production of a quantity greater than required or earlier than necessary	27	67.5	13	32.5	-	-	-	-	-	-	40	100
5	Manufacturing defects	24	60	13	32.5	3	7.5	-	-	-	-	40	100

As shown in table 4.7, 24 (60%) of the participants strongly agreed with materials damage on the site is one of the factors that causes material waste on the site. 16(40%) of the respondents also agreed with the point.

In addition, 15(37.5%) of the respondents were highly agreed with improper cutting of materials increases material waste on the site. In addition, 25(62.5%) of the respondents agreed with the point.

Out of 40 respondents, 23(57.5%) of them strongly agreed with the existence of unnecessary materials on the site is one of the plenty of factors that causes material wastes on the site. On the other hand, while 15(37.5%) of them revealed their agreement on the matter. Only 2(5%) of the participants remained neutral.

Furthermore, 27(67.5%) of the respondents strongly agreed with the overproduction causes materials waste on the site, and 13(32.5%) fairly agreed with similar purpose.

As indicated above, most respondents 24 (60%) confirmed that they highly agreed with manufacturing defects causes materials waste on the site and 13(32.5%) of the participants likely agreed to the point. Therefore, one can understand that the majority of the respondents agreed with the factors that causes materials waste on the site and decreasing these factors increases project performance.

From the interview data gathered, material management plays a great role on the performance of the project. Proper material handling in Yotek construction PLC can be helpful for effective material management and enhance project performance.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

On the basis of analysis and findings of the study, the following conclusions are drawn.

1. The result of the study concludes that the importance of knowing materials waste percentage, the benefits of implementing material management software on construction project performance, the problem of not implementing materials management system and factors that cause material wastes on the site are very decisive to decide the association between materials management and construction project performance.
2. Based on the gathered information and finding of the study, it was revealed that material management has a direct relationship with construction project performance. Regarding the importance of knowing materials waste percentage, the ignorance of materials waste percentage hinders the appropriate material delivery to the project site and the abundance of material wastes on the site, which directly affects the performance of the project. On the other hand, using materials management software simplifies material management and improves project performance and the problem of not implementing materials management system lessens the performance of the project as problems like late delivery of materials, wrong material delivery of materials and over production of materials happen.
3. Basic materials management challenges that Yotek Construction company faced were;
 - The absence of materials management software
 - Using old system of materials management
 - Late delivery of materials to the site
 - The abundance of materials waste on the site

5.2. Recommendations

On the basis of the analysis and findings of the study, the following recommendations are drawn.

1. Yotek Construction should implement materials management software to handle construction materials.
2. The company should decrease factors that cause materials waste on the site.
3. Materials management system should be used to ensure good material management practices and enable the performance of the project.
4. The fact that the existing materials management process practiced by the company is backward, an updated materials management system should be used.
5. As far as materials management is directly related to construction project performance, the company should review its materials waste management and factors that cause materials waste on the site.

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APPENDIX I: The Survey Questionnaire

St. Mary's University

Department of Project Management

MBA in Project Management

Questionnaire on Construction Materials Management Practice and Perceived Project Performance: The Case of Yotek Construction PLC

Dear Respondents,

This questionnaire is designed to explore the Construction Materials Management Practices and Perceived Project Performance: The Case of Yotek Construction PLC. This study is conducted in partial fulfillment of the requirements for the Master's degree in Project Management at St. Mary's University. Its main objective is to assess material management practice and perceived project performance.

Your response is vital to the outcome of the study and you are requested to completely and objectively answer all questions. The research is going to be carried out based on your responses and other relevant data that could support it. It forms a major part of the research and the information you provide enables the researcher to critically identify the construction materials management practices and construction project performance: the case of Yotek Construction PLC. Your cooperation to respond genuinely is very important to this study because it represents the whole population. Please answer all questions. Space is provided at the end of the questionnaire for you to add further explanations or comments.

I would promise that all information you provide would be strictly confidential.

Please tick (✓) or provide your own answers where applicable.

Thank you!

Meron Gudeta

Section 1

Demographic Background

Please kindly tick (✓) your answer in the appropriate boxes or respond your answer by writing in the space provided (if required).

1. Gender:

Female

Male

2. Academic level:

Level IV/Diploma

Bachelor's degree

PhD

Master's degree

other (specify) _____

3. Working Experience:

Less than 5 years

6 to 10 years

11 to 15 years

16 to 20 years

Over 20 years

4. Current position in your organization _____

Section 2

Notice: Strongly agreed=1 Agree=2 Neutral =3 Disagree =4 strongly disagree =5

No	<i>The Importance of Knowing Materials Waste Percentage</i>	<i>Level of Agreement</i>				
		1	2	3	4	5
	<i>Advantages</i>					
1	Help to determine the exact required quantities					
2	Increase the chance for obtaining the project finance.					
3	Help for preparing accurate bill of quantities					
4	Help the contractor to have a better chance to win the tender					
5	Knowing the real requirements for the project (materials-time-cost)					
<i>Benefits of implementation of materials management software on construction project performance</i>						
<i>Benefits</i>						
6	Reducing the costs of project the cost of materials					
7	Better handling of materials					
8	Reducing duplication of materials orders					
9	Materials are timely available on site with the right quantity					
10	Improving the performance of the project					
<i>The demerits of not of implementing materials management system</i>						
<i>Problem</i>						
11	Materials are not available on time					
12	Materials are not available with required quantity					
13	Late delivery to the site					
14	Slow response from the consultant engineer about submittals					
15	Deliver wrong materials					
<i>Factors that Causes Increase Waste on Construction Site</i>						
<i>Factors causes increase waste on site</i>						
16	Materials damage on Site					
17	Improper cutting of materials					
18	Existence of unnecessary materials on site					
19	Overproduction/Production of a quantity greater than required or earlier than necessary					
20	Manufacturing defects					

Section 3

Open End Question

1. If any association between materials management and construction project performance.

Please mention it.

2. If any challenges that your company or individually face concerning materials management.

3. Any suggestion that add value to my study as professional.

APPENDIX II: Interview
St. Mary's University
Department of Project Management
MBA in Project Management

Interview on Construction Materials Management Practices and Perceived Project Performance: The Case of Yotek Construction PLC

Dear Respondents,

This interview is designed to explore the Construction Materials Management Practices and Perceived Project Performance: The Case of Yotek Construction PLC. This study is conducted in partial fulfillment of the requirements for the Master's degree in Project Management at St. Mary's University. Its main objective is to assess construction materials management practices and perceived project performance.

Your response is vital to the outcome of the study and you are requested to completely and subjectively answer all questions. The research is going to be carried out based on your responses and other relevant data that could support it. It forms a major part of the research and the information you provide enables the researcher to critically identify construction material management and perceived project performance. Your cooperation to respond genuinely is very important to this study because it represents the whole population. Please answer all questions.

1. Do you use materials management system?

Yes_____ No_____. If your answer is YES, what kind of system do you use?

2. What is the relationship between materials management practices and project performance?

3. What does the existing materials management practices look like in your organization?

4. Tell the factors that cause materials waste on the site?

5. Explain the advantages of construction materials management software to increase project.