



Research Article

Impact of Material Management on Construction Project Delivery in Shager City, Melka Nono Sub City

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Abstract

The construction industry is one of the main job makers in developing countries and is highly inexpensive. The high number of project failures proposes the existence of essential material management which have not been identified. This study aimed to explore the impact of material management on construction project and evaluate how they affect project delivery in Shager city, specifically on Melka Nono sub city. Relevant literature has been reviewed to identify impact of material management. Accordingly, 34 impact factors were identified and grouped under 8(eight) main factors these are planning-related factors, procurement-related factors, stock and waste control-related, Handling- factors, logistics- factors, time factors, quality- factors, and cost overrun-related factors. The data collection about impact of material management on construction projects was conducted by using questionnaire and interview. Statistical Package for Social Sciences was used for data collection.. Descriptive research design was employed using quantitative and qualitative approach. The main sources of the information were clients, contractors, consultants and others in construction projects of Shager city, Malka Nono sub city. Respondents were purposively selected. Out of 120 questionnaires distributed 111 were returned. The result has shown that the top significant impact of material management of construction projects in Shager city, Malka Nono sub city are Project will be constructed on time or earlier than expected, Improvement in project schedule, Providing adequate storage of materials, Reduction in duplicated order, The effective design site layout so as to aid in the management of materials on site, Reduce cost of materials, Purchase saving, and Better handling of materials. Considering the obtained results of this research, in order to accomplish construction projects material management the contractor of the project should have an experienced leader of the project and effective decision maker project manager. Client should ensure adequate preparation for fund is made before projects are started and the objective of project should be clearly stated for constructing parties.

Keywords

Construction Projects Delivery, Impact, Material Management

1. Introduction

The growth of the nation's infrastructure depends heavily on the construction industries. But, one of the biggest problems is the loss of construction materials. Compared with other industries, construction projects produce more wastage.

Most of the materials used in construction projects are lost, which significantly increases or speeds up the project's cost, reduces the contractor's profitability, and has a detrimental impact on the environment. The industry of construction uses

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material management to plan, carry out, and evaluate field and office actions [30]. Delivery problems in construction projects can take several different aspects. Numerous construction projects have flopped owing to poor material management, some of which failed because of cost overruns and other performance benchmarks that were not fulfilled. This problem arose for a variety of factual reasons, including client obstructions, a lack of materials, street closures, adjustments to the drawing and design extra effort, waiting for decisions to be made, carrying over, variation orders, changes to the bill of quantities, and delays when receiving drawings, the most of these projects result in lackluster project delivery [4].

Project contractors are involved in construction materials provision, whereas figures show that more than 65% of a construction project's budget is spent on the purchasing of construction materials, [7]. Construction materials (CM) must be kept in good condition in order to be delivered to the work site when demanded. The goal of the material monitoring system is to guarantee that the right kind and amount of materials are accurately chosen, bought, delivered, and handled on-site in a reasonable time frame and at a fair price.

Every construction project is heavily dependent on materials resource management. Studies show that materials cost between 60% to 70% of the cost of the project, with waste ranging from 5% to 27% of the total material consumed [5]. Materials and goods make up the majority of the trash produced. The contractor may not have planned well, which led to the wastage. It won't be detected or realized at the earliest point of the construction phase. When the construction period is nearing its conclusion or later, the impact is felt. The contractor's profit margin will increase with effective waste reduction measures in place [20].

Inefficient project materials management can cause major cost overruns and completion delays. Owner operators and engineering, procurement, and construction firms are attempting to improve work procedures for their projects because such cost inefficiencies will have a detrimental influence on worldwide competitiveness. The total project life cycle and project expenses will be impacted by faulty material information, such as improper bills of materials, inaccurate cycle counts, shipping errors, receipt errors, and so on. Dealing with sub-contractors outside of the materials management process influences the entire project supply chain because there is a higher possibility of inconsistent data.

The process of planning and monitoring to guarantee that the appropriate kind, quality, and time of materials and equipment are defined. Materials must be obtainable at a fair price and ready for usage at all times. A significant amount of the cost is related to the price of the materials. A good materials management system will benefit the building industry. If materials are bought in advance, capital may be restricted and interest charges on the excess inventory of goods may be incurred, making cash flow essential for the sustainability of any business. If materials needed for specific operations are not readily available, they may need to be delayed or cost more

money. Materials may also deteriorate while being stored or stolen.

Since most resources are wasted, proper material management is necessary during the pre-construction, construction, and post-construction phases of a construction project. As a result, efforts are made to create suitable methods of material storage on site. Therefore, the objectives of this study are to determine the existing method of material management, to pinpoint the root of inefficient material management, and to investigate how the material management process affects the completion of construction project delivery.

2. Literature Review

2.1. Concepts of Materials Management on Construction Projects

Material management is concerned with the planning, identification, procuring, storage, receiving and distribution of materials. The purpose of material management is to assure that the right materials are in the right place, in the right quantities when needed. The responsibility of one department (i.e. Material management department) for the flow of materials from the time the materials are ordered, received, and stored until they are used is the basis of material management [16].

Planning, executing, and controlling field and office operations are all part of the material management construction process. Making sure construction supplies are available when needed is the goal of material management. A technique for planning and controlling the activities necessary to guarantee that the proper quality and quantity of supplies are specified promptly, purchased at a fair price, and, most importantly, made readily available when needed [24]. Construction industry has complexity in its nature because it contains large number of parties as clients, contractors, consultants, stakeholders, shareholders, regulators and others [28].

Therefore, effective material management is required to manage the productivity and cost of construction project delivery.

Making sure construction materials are accessible at the point of use when required is the aim of material management. The system for planning and overseeing the actions required to guarantee that the right kind and amount of materials are appropriately specified in a reasonable time frame, acquired at a fair price, and most interestingly at the point of use when required [14].

2.2. Materials Management Process on Construction Projects

To ensure that material is available when needed, a number of processes that make up material management must be well integrated, organized, and controlled. Requests for materials

from the site are the first step in the material management process. After that, requests for resources from the store and the production of indents follow. The supplier is often chosen based on price, the best materials are bought locally, and an examination is carried out [25].

2.2.1. Material Planning

Maintaining and creating records of every component used in each facility is part of the materials planning process, which helps determine desired inventory levels and delivery regularity [29]. The flow of materials at the site will be aided by effective material record management, which will help to prevent issues like out-of-stock and late deliveries. Additionally, it offers instructions for all subsequent actions, which could have a significant impact on the project planning.

2.2.2. Material Handling

Generally, secure storage protection is disregarded, which can lead to poor material quality and material degeneration. Additionally, it is suggested that material transportation, loading, and unloading not be done in the rain. Additionally, it is advised that the storage space be enclosed, clean, dry, and well ventilated. It is also advised that some items be stacked on pallets no higher than a specific safe height in order to prevent dampness [19]. The material will be kept intact and of high quality by using correct material handling and storage techniques.

Additionally, it is advised that the storage facility be sealed, clean, dry, and well-ventilated, and that some products be stacked on pallets at a safe height or less to prevent wetness [17]. The choice of material handling equipment is important because it may enhance organizational flexibility, workforce utilization, productivity, and industrial processes.

2.2.3. Material Procurement

Providing high-quality goods at the appropriate time, location, and budget is the goal of procurement in materials management. According to [1], procurement is the process of planning the acquisition of materials, communicating delivery schedules to suppliers, and monitoring deliveries to ensure vendors meet deadlines.

2.2.4. Material Stock and Waste Control

Material waste has been recognized as a major problem in the construction industry that has important implications both for the efficiency of the industry and for the environmental impact of construction projects [3].

Material wastage in building projects was caused by a variety of factors, including inefficient design, procurement, storing, and implementation, among others. Therefore, by carefully considering the requirement for minimization and better utilization of construction materials during both the design and construction phases, waste from construction materials can be decreased. The material strategy plans have been demonstrated in 8 key areas, including planning, bench marking, buying, receiving, inspecting, storing, issuing goods, and

inventory control, according to [24].

2.2.5. Material Logistics

This idea emphasizes movement and includes planning, implementing, and controlling the flow and storage of all products, from raw materials to completed goods, in order to satisfy client demands [23]. Construction-related raw materials are frequently diverse, heavy, and large, necessitating careful treatment during the delivery process. Enhancing coordination and communication between project participants during the design and construction phases, particularly in the materials flow control process, is the main goal of logistics in any construction project [12].

2.3. Importance of Materials Management on Construction Project Delivery

Materials are essential to any industry's processes since their scarcity can impede production. The stage itself is not the only thing that might go wrong. Overabundant supplies of materials could potentially cause managers considerable issues. Production costs and project costs may go up as a result of material storage. The ability of the contractor to control the flow of supplies and his team will have an impact on the productivity of the project in any case, according to Petra Turnbull, since competent and efficient material management will decrease the amount of toxic waste and the cost of disposal. The following expenses make up the overall cost of construction: materials, labor, equipment, site charges, administrative costs, and profits [22].

2.4. The Effect of Construction Material Management on Project Delivery

In the majority of contracts, project agreements specify the cost and length of time needed to fulfill the given scope of works. By following a good quality control plan and putting it into practice through a predetermined level of quality control and inspection of various activities and materials, it is possible to control the quality of the materials and workmanship. Monitoring progress payments and variance charges helps with budget control. By guaranteeing timely approval of shop drawings, material procurement, and work execution as scheduled, the timetable is managed. Through inspection of the construction process's work, which ensures the use of permitted materials and craftsmanship, quality control and safety are achieved [19].

2.5. Causes of Ineffective Construction Material Management on Project Delivery

According to [13] problematic material management is caused by overstock materials as a result of poor planning, damaged materials as a result of logistics, handling, or application, lost materials as a result of poor supervision, delays in the arrival of the materials as a result of poor tracking system,

frequent material movement as a result of poor site layout, inflation, and material changes in buying or purchasing situations starting from the produced cost estimates, bulk construction supplies, changes in the quantity of needed materials, wasteful use of resources on the job site, theft and loss of materials, material shipments, work repairs, and updates that are delayed or putting up a storage system on site, estimating shipment quantities incorrectly, ordering uneconomical quantities of materials, ordering materials with a slow shipping time, increasing transport costs, using too many materials where they are not needed, selecting the wrong materials for construction, increasing storage costs, having poor purchasing skills, and delaying payment for materials are all examples of issues.

2.6. Impact of Construction Material Management on Project Delivery

Cost factor

The cost has been addressed by many researchers [6] as a very important success criterion, whereas, budget plan and proper cost estimation has been mentioned as prominent success factors. As suggested by the experts, the four areas that are highly relevant to project cost control are: interim payments, variation orders, cost and prolongation claims, and final account forecasts. In addition, the affecting performance under the cost factors group, such as; market share of organization, cost of variation orders, escalation of material prices, waste rate of materials, motivation cost, liquidity of organization, project labor cost, material and equipment cost, and cost of rework are conducted by [11].

Time factor

As [10] Demonstrated that, time or schedule as one of the most important project success criteria for any project. Time has been self-addressed as a criterion by that to gauge a project's degree of success. It is conjointly been mentioned as an element, which may facilitate the opposite factors/criteria be met. It is found in this study that the definition of "Time" is of great importance. "Time" as the date when a project is most likely to end can be criteria, but "Time" as a manageable component might be considered as a factor. According to [27] Stated that delay is one of the most common, important and serious problems which impacts the time factor with relation to cost of projects in the construction industry, identified four delay factors representing reason of late in development projects. They are client problems, contractor problems, resources problems, and general problems. In addition the time factor group that affects the performance in the building construction projects, such time factors are; average delay because of closures leading to materials shortage, average delay in claim approval, site preparation time, unavailability of resources as planned through project duration and time needed to rectify defects were conducted by [11].

Quality factor

According to [2] thought-about quality management method as a project success issue that facilitates the success of

alternative criteria and factors. Quality construction is one of the performances of building construction project, but they are different factors that affect the quality construction. As [26] indicated that, the top factors affecting quality are; low quality raw material, inexperienced staff supervision, non-support by the management, improper equipment utilization in site, drawing with fewer details, negative attitude of contractors and labor, improper records of the labor day work, no raw material access places, time, and health issues those are the factor that influencing the quality performance on the building construction projects.

3. Materials and Methods

3.1. Research Design

The study use descriptive research designs. According to [18] descriptive research studies are the studies that are concerned with describing the characteristics of a particular individual or a group. Descriptive research presents a picture of the specific details of a situation, social setting, or relationship.

This research is thus descriptive research for it describes and identifies the impact of material management on construction project delivery and explains the validation of findings based on proper data collection and analysis.

3.2. Research Approach

The study used mixed research approaches sequentially quantitative and qualitative approach. [9] Explains that the three methods that are commonly implemented in research are quantitative, qualitative, and mixed, where one of them is not better than the others, all of this depends on how the researcher wants to do the research study.

3.3. Data Sources and Types

The study used both primary and secondary sources to get more data and reliable information.

3.4. The Population of the Study

The contractors, consultants, clients and others expertise were target population of this study. Target population is a specified group of people or object for which questions can be asked or observed to collect required data structures and information. This study was conducted on 40 construction projects in Malka Nono sub city. Populations of this study were direct participants in the project and who have good experience about the study area. It includes contractors and consultant of the projects. Accordingly, in Malka Nono sub city administration, there are 40 contractors, 32 consultants 25 clients/owners and 75 other participants of project works (project managers, site engineers and supervisors) participating in Project. Therefore, targeted population is 172.

3.5. Sampling Techniques and Sample Size Determination

A simple random sampling method was used to select respondents from the target population. According to [8] sample size is determined after considering statistical precision, practical issues and availability of resources. There is no a single precise way for the determinations of sample size hence there are a number of inadequacy for deciding on sample size. [21] Stated that, the larger the sampling size of a research, the more accurate the data generated.

To determine sample size for the study [31] formula based on a 95% desired confidence level and a 5% desired level of precision was used.

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

Where n= sample size

N= population size

e = level of precision

$n = 172 / 1 + 172(0.5)^2 = 120$

Based on calculation by the formula, sample size of this

study was 120 respondents. The respondents' contractors, consultant and owners involved in construction projects were selected purposively. So that, 6 respondents were selected for interview, 2 respondents from the contractors, 2 respondents from construction project consultancies and 2 respondents from other project experts.

3.6. Data Collection Tools

Structured questionnaire was use to collect the quantitative data. A questionnaire that was contain 5 Point Likert-Scale approaches (i.e., from "Strongly Disagree to Strongly Agree"). For the 5-point Likert scale the respondents were asked to indicate their level of agreement with the ratings of Strongly Disagree (1), Disagree (2), neutral (3), Agree (4) and Strongly Agree (5) and close-ended types of questions are prepared and distributing for the sample respondents. The data collection was administered by enumerators who know the language and culture of the study area. Moreover, checklists was use to collect the data that is supplement the quantitative data. The questionnaire was pretested using small number of respondents to check its validity. Hence, a final questionnaire was developed by incorporating the issues obtained during pretesting.

Table 1. of Likert scale in the questionnaire.

Scale	1	2	3	4	5
Item	Strongly Dis –Agree	Dis-Agree	Neutral	Agree	Strongly Agree

3.7. Method of Data Analysis

Data collection tools were adapted after review of relevant literatures and used. Data collection was free from any bias and all data collected will include in the output. The quantitative data was analysed using descriptive statistics like frequency, percentage and mean. The data were subjected to statistical analysis for further understandings using the Statically Package for Social Science (SPSS) v27. Relative Importance Index (RII) is a statistical method which is used to determine the impact of material management on construction project delivery. This was designed to investigate the relative importance of various factors; the method was adopted in this study within various groups. The RII five-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree) was adopted and transformed the relative importance indices' for each factors as follows;

$$RII = \frac{\sum W}{A \cdot N} = \frac{1 \cdot n_1 + 2 \cdot n_2 + 3 \cdot n_3 + 4 \cdot n_4 + 5 \cdot n_5}{5 \cdot N} \quad (1)$$

Where w is weighting given to each factor by respondents

ranging from 1 to 5. (n1 = number of respondents for strongly dis agree, n2 = number of respondents for disagree, n3 = number of respondents for neutral, n4 = number of respondents for agree, n5 = number of respondents for strongly agree). "A" is the highest weight (i.e. 5 in this case), and N is the total number of respondents. The RII value had a range between $0 < RII \leq 1$. The highest value of RII, the more important factor and it is the major factors.

Finally, qualitative data collected through structured interviews, and document analysis were described thematically as supplementary evidence in addition to the discussions of quantitative data. The data was analyzed using narrative description and/ or by quoting as it is.

3.8. Validity and Reliability

3.8.1. Validity

The study was done in selected organizations that will practice projects as a way of achieving their organizational goal. An equal number of questionnaires were distributed to each organization in order to have valid representation and equal

input on the result. The questionnaire were prepared in English language and translated into the organizational working language. The questionnaire was adjusted to the context that assures' applicability in all all-selected organizations. In addition, it was evaluated and approved by the research advisor for the content of its validity.

3.8.2. Reliability

The tool for data collection was adopted from a previously internationally tested source. Furthermore, the study tool will be pre-tested on similar organizations that will not take part in actual data collection to ensure the internal consistency of items which is the level of homogeneity of a scale.

4. Results

4.1. The Impact of Material Management on Project Delivery Time

Time is a key for material management on project delivery. Experienced project managers can use management tools to plan and execute their construction projects to maximize the project's chances of material delivery. The variables in time include Project will be constructed on time or earlier than expected; Improvement in project schedule, and better relations with suppliers.

In order to investigate time related factors the questionnaires responded by respondents was analyzed by using SPSS v27. As output indicated in the Table 2 below, project will be constructed on time or earlier than expected (RII=0.931) take the first rank in time related factors while improvement in project schedule with (RII=0.927) and better relations with suppliers (RII=0.922)

ranked the second and the third place in time related factors respectively. In addition, the interviewees support the questionnaires responded by respondents and they said that time factors like Project will be constructed on time or earlier than expected, and improvement in project schedule were the most the impact of material management on project delivery of construction projects. That means material management on project delivery was it impacts on improvement of project schedule.

Hence, material management in construction industry is to planning, acquiring, storing, moving, and controlling materials to effectively use facilities, personnel, resources and capital. Therefore, the impact of material management on project delivery on the improvement of project schedule was agree based on the respondents responses. That means material management in construction project is to provide the right materials at the right place at the right time in order to maintain a desired level of production at minimum time.

Material suppliers in construction industry are the most important, because when to timely supply the material for construction projects it is to protect the delays of time. Therefore, timely flow of material is an important concern of on construction project and a concern during the monitoring stage in which construction is taking place. Decisions about material procurement may also be required during the initial planning and scheduling stages.

The availability of materials may greatly impact the schedule in projects with a fast way schedule. Sufficient time for obtaining the necessary materials must be allowed. In some cases, more expensive suppliers or shippers may be employed to save time. Materials management is also a problem at the organization level if central purchasing and inventory control is used for standard items. In this case, the various projects undertaken by the organization would present requests to the central purchasing group.

Table 2. The impact of material management on project delivery time.

Time Factor	Scale					mean	RII	Rank
	1	2	3	4	5			
Project will be constructed on time or earlier than expected		9.1	15.9	25	50	4.65	0.931	1
Improvement in project schedule			25.1	28.13	46.8	4.639	0.27	2
Better relations with suppliers			31.8	35.37	32.81	4.612	0.922	3

Source (Own, 2024).

4.2. The Impact of Material Management on Construction Project Quality upon Delivery

A number of scholars acknowledged the significance of

quality factors well-defined the scope of quality as the framework within which construction is took about, acquired or obtained. Besides, the client respond that the quality related factors especially construction mechanism is very poor and absence of having strong rules and regulation it could be affect projects quality.

The quality related factors are providing adequate storage of materials, reduction in duplicated order, the effective design site layout so as to aid in the management of materials on site and quality control. As depicted in Table 3 below, the ranks of quality related factors based on their relative importance index. The ranking result indicates that providing adequate storage of materials with (RII=0.922) the first reduction in duplicated order with (RII=0.909) the second, the effective design site layout so as to aid in the management of materials on site (RII=0.902) ranked the third place, and quality control with (RII=0.88) ranked the forth place.

Providing adequate storage of materials of the degree of agreement had 13.6%, 24% and 62.39% was neutral, agree and strongly agree respectively. Purchasing and procurement deals with the delivery of materials to be used in the tasks, the function of purchasing and procurement is to get the materials at the proper quality requirements. And the continuous monitoring of suppliers to ensure on time deliveries of materials purchased. The purpose of storage of material is to acquire the materials for the dates when they are needed, storage facilities, and handling requirements and materials storage is to manage the flow of materials in the organization.

Adequate storage of materials on construction projects site is the most important, because for protective of construction material from the dust particle, for gaining of quality of material it must be adequately storing of material is strongly agree

with 62.39%. Therefore, providing adequate storage of materials are one of the important of the impact of material management on construction project quality upon delivery in Sheger city of Melka Nono sub city.

Reduction in duplicated order of the degree of agreement had 10%, 16.4%, 25.5%, and 47.85% was disagree, neutral, agree, and strongly agree respectively. The bargain in repeated order of the material on construction projects are the most important factor of material management in construction projects.

The problem of construction projects is when it delivers the material to the construction site, disordering of material is it affect the quality of the construction projects. Basically, material management is concerned with the planning, identification, procuring, storage or proper ordering, receiving, and distribution of materials. The purpose of material management is to assure that the right materials are in the right place, in the right quantities and in the right ordering when needed.

Material management as the activities involved to plan, control, purchase, expedite, transport, store, and issue in order to achieve an efficient flow of materials and that the required materials are bought in the required quantities, at the required time, with the required quality and at an acceptable price. It is important to plan and control construction materials to ensure that the right quality and quantity installed and that the equipment are appropriately specified in a timely manner, obtained at a rational cost, and are available when needed.

Table 3. The impact of material management on construction project quality upon delivery.

Quality Factor	Scale					mean	RII	Rank
	1	2	3	4	5			
Providing adequate storage of materials			13.6	24	62.39	4.612	0.922	1
Reduction in duplicated order		10	16.4	25.5	47.85	4.549	0.909	2
The effective design site layout so as to aid in the management of materials on site			14	15.8	70.24	4.513	0.902	3
Quality control			7.5	24.98	67.52	4.414	0.88	4

This is important as improper handling and management of materials during site works have great influences on the performance of construction projects. Further, improper handling of construction materials will result in high generations of construction waste. Therefore, the respondents in Sheger city of Melka Nono sub city, reduction in duplicated order it is strongly agree with 47.85% and it is the impact of material management on construction project to quality delivery.

The effective design site layout so as to aid in the management of materials on site had 14%, 15.8%, and 70.24% was neutral, agree, and strongly agree respectively. The arrangement of material design site layout is the most important factor for the material

management on construction project site, because inlet and outlet of material it depends on first in and first out system.

Material flow on site is the process of moving materials from the site entrance through a set of function areas to the final installation areas. This can be through a model such as Site entrances, lay down areas, staging areas, assembly areas, installation areas, and wastes areas. Materials design site layout has directly affected the project cost and schedule as the efficiency of installation of construction materials and equipment highly depends on the arrangement during materials management. Poor planning leads to inefficiency, low productivity, excessive waste, and health and safety problems.

The effective design site layout is one of the most important solutions for improving productivity and efficiency and preventing wasted time and cost by using material design site layout. Material design site layout of raw materials, components and finished produced are some obstacles for material management for communication and feedback in material management impact. Therefore, the highest percentage of the effective design site layout so as to aid in the management of materials had strongly agree with 70.24%, that means to some extents it impact the material management on construction projects of quality delivery.

Quality control had 7.5%, 24.98%, and 67.52% neutral, agree and strongly agree respectively. Quality management method as a project success issue that facilitates the success of alternative criteria and factors. Quality construction is one of the performances of construction project, but they are different factors that affect the quality construction. low quality raw material, inexperienced staff supervision, non-support by the management, improper equipment utilization in site, drawing with fewer details, negative attitude of contractors and labor, improper records of the labor day work, no raw material access places, time, and health issues those are the factor that influencing the quality performance on construction projects. Quality, whether it concerns the product or process, has been considered as both a project success criterion and factors.

Some researchers named it quality performance and considered it as a major project success criterion. In addition, some other researchers addressed quality as a criterion under the name of product's quality. On the other hand, some researchers

considered quality management process as a project success factor, which facilitates the success of other criteria and factors [15]. Therefore, the highest percentage was strongly agree, quality control is the most impact of material management on construction project of quality delivery in Sheger city, Melka Nono sub city.

4.3. The Impact of Material Management on Construction Project Cost Overrun

Cost overrun is a key for material management on project delivery. Experienced project managers can use management tools to plan and execute their construction projects to maximize the project's chances of material delivery. The variables in cost include reduce cost of materials; purchase saving; better handling of materials; better field material control; reduce materials surplus and better cash flow management.

In order to investigate cost related factors the questionnaires responded by respondents was analyzed by using SPSS v27. As output indicated in the Table 4 below, Reduce cost of materials (RII=0.931) take the first rank in cost related factors while Purchase saving with (RII=0.927) take the second rank, Better handling of materials (RII=0.922) take the third rank, Better field material control (RII= 0.917) take the fourth rank, Reduce materials surplus (RII= 0.915) take the fifth rank and Better cash flow management (RII=0.908) ranked the six place in cost related factors respectively.

Table 4. The impact of material management on construction project cost overrun.

Cost factors	Scale					mean	RII	Rank
	1	2	3	4	5			
Reduce cost of materials		4.3	12.5	25	58.2	4.65	0.931	1
Purchase saving			9.11	26	64.89	4.639	0.927	2
Better handling of materials			13.4	12.58	74	4.612	0.922	3
Better field material control			12	19.8	68.2	4.58	0.917	4
Reduce materials surplus		9	10	29	52	4.57	0.915	5
Better cash flow management		5.8	13.5	52	28.7	4.54	0.908	6

Reduce cost of materials had 4.3%, 12.5%, 25%, and 58.2% was disagree, neutral, agree, and strongly agree respectively. Materials are critical in the operations in every industry since increase cost of materials can stop production. In addition, increase cost of materials when needed can affect productivity, cause delays and possible suspension of activities until the required material is available. cost of materials is not the only aspect that can cause problems.

Excessive quantities of materials could also create serious

problems to managers. Storage of materials can increase the costs of production and the total cost of any project. When there are limited areas available for storage, the managers have to find other alternatives to store the materials until they are needed. Some of these alternatives might require re-handling of materials, which will increase the costs associated with them.

As the respondents that materials should be obtained at the

lowest cost possible to provide savings to the company. Construction companies experienced an increase in costs and a decrease in productivity. The respondents say that these increases in cost were due to inflation and economic problems. Better material management practices could increase efficiency in operations and reduce overall cost. Top management is paying more attention to material management because of material shortages, high interest rates, rising prices of materials, and competition. Therefore, reduce cost of material is the most important and the respondents was strongly agree with 58.2%, so reduce cost of material is the most impact of material management on construction project in delivery of cost overrun in Sheger city, Melka Nono sub city.

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Purchase requisitions are documents listing the requirements of materials from the various stores written by the storekeeper received by the purchase department from various departments. The planning department for special purchases for non-stock items also prepares the purchase requisitions. The highest percentage of respondent's response 64.89% was strongly agrees. Therefore, purchase saving is the important impact of material management on construction project cost overrun in Sheger City, Melka Nono sub city.

13.4% of respondent believe that better handling of materials was neutral, 12.58% of agree, and 74% of strongly agrees.. This means unhandling of material on construction project it affect the cost performance. Hence, Material handling, which includes purchase, inventory, shop fabrication and field servicing, requires special attention for cost reduction.

Effective material handling as using the right method, amount, material, place, time, sequence, position, condition, and cost. This involves handling, storing, and controlling of the construction materials. Handling of materials is the flow component that provides for their movement and placement. The importance of appropriate handling of materials is highlighted by the fact that they are expensive and engage critical decisions. The highest percentage of respondent's response 74% was strongly agrees. Therefore, better handling of materials is the most important impact of material management on construction project of cost overrun.

12% of respondent believe that better field material control was neutral, 19.8% of agree, and 68.2% of strongly agrees. Better field material control is classified as a technique devised to cover and ensure all items are available when required. It is great importance that the bulk of construction materials delivery requires proper managements of material control. The highest percentage of respondent's response 68.2% was strongly agrees. Therefore, better field of material control is the most important impact of material management on construction project of cost overrun.

9% of respondent believe that reduce materials surplus was disagree, 10% of neutral, 29% of agree, and 52% of strongly agrees. The respondents strongly agree reduce materials surplus is the impact of material management on construction project of cost overrun with 52% in sheger city, Melka Nono

sub city.

5.8% of respondent believe that better cash flow management was disagree, 13.5% of neutral, 52% of agree, and 28.7% of strongly agrees. Proper management of project budget is the most important factor of to control cost overrun in the construction projects. Therefore, better cash flow management was agree with 52% of the impact of material management on construction projects of cost overrun in sheger city, Melka Nono sub city.

5. Conclusions

The main objective of this study was to explore the impact of material management on construction project and evaluate how they affect project delivery in Shager city, specifically on Melka Nono sub city. 34 material management factors were identified and categorized them under 8(eight) main factors. These are planning related factors, procurement related factors, handling related, stock and waste control factors, logistics related factors, time related factors, quality related factors, and cost overrun related factors are identified and questionnaires was distributed to the respondents to identify top significant of the impact material management project delivery factors of construction projects related to time quality and cost overrun.

According to their relative importance index, the impact of material management project delivery time factors of construction projects were ranked 1, project will be constructed on time or earlier than expected ranked 2, improvement in project schedule. As the results of the impact of material management on construction project quality upon delivery were ranked 1, providing adequate storage of materials, ranked 2, Reduction in duplicated order, ranked 3, the effective design site layout so as to aid in the management of materials on site. And as the findings revealed that; the impact of material management on construction project cost overrun were ranked 1, reduce cost of materials, ranked 2, Purchase saving, and ranked 3, better handling of materials these were ranked as top significant impact of material management project delivery in Melka Nono sub city.

6. Recommendation

Based on the finding of the research and the significance level of the factors ranked, the following recommendations are forwarded to the concerned stake holders.

Project managers are exceptionally organized and must have strong organizational skills to ensure processes are running smoothly and in line with project goals.

A leadership skill of project manager is very essential for the material management of construction projects. They are responsible for setting the teams vision and ensuring everyone is on board and motivated to bring the project through each phase.

Project manager have to be technically capability of qualities acquired by using and getting expertise in performing

physical or digital tasks and having good experience with the latest technology to get things done effectively.

Construction projects should have enough economic bases to accomplish projects successfully.

Project design should be clearly understandable to all parties of projects.

To accomplish projects within schedule formal dispute process have been resolved clearly and on time.

For the material management of construction projects all parts participated in the project have to be committed.

Abbreviations

CM	Construction Materials
HDP	Housing Development Projects
MOCM	Management of Construction Materials
PC	Public Constructions
RII	Relative Importance Index
SPSS	Statistical Package for Social Science

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Author Contributions

Aberham Jibat is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

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