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RESEARCH PAPER

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Assessment of Material Management Methods for Public Contractors in Gondar City

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ABSTRACT

This paper aims to assess the local practice of material management methods in a public construction project sites under Gondar city administration. Construction material management related literature had generally reviewed. Survey questionnaires supported by interviews were applicable to assess the local practice of material management methods. Questionnaires were distributed to public contractors from general contractor one up to building contractor eight classes, and they were received and analysed. Findings from the survey found each experience for implementing material management methods on the public project has weak practice. Most stakeholders have a good perceive construction material management issue theoretically. But, contractors did not have a skilled professional worker means material engineer, so the works related to construction material are additional works for project managers, site engineers, and storekeepers. Finally, further studies on how material management methods are included in tender process and on contract documents as law to be executed.

Keywords: inventory control system, materials management, material requirement planning, warehouse

1. INTRODUCTION

Materials management refers to an optimal way of coordinating, planning, supplying, purchasing, storing construction materials, and providing quality control [1]. The purpose of materials management is to ensure that the correct products are arrived exactly when needed: at the right time, at the right place, with the right quality, and at the right price. It consists of having perfect control over the flow of the products, which will allow the optimal functioning of the supply chain [2].

The construction materials management process has a role in the success of a construction project [3]. Costs for materials handling may range from 30-80% of total

construction costs. Therefore, there is a need for efficient materials management productivity and cost in construction projects [4]. The review has been explored the local practice in construction materials management and develops construction materials management methods to facilitate the management of construction materials mainly in building construction [5-8].

When a weak construction material management method occurs, numerous non-value-adding activities or costs are likely to arise. These include unplanned site meetings, traveling and communication expenses, idle plant and labor during the waiting time, etc [9]. These represent a waste of resources that are paid for by the contractor. Therefore, an improvement in the material management method will give success to the overall construction project [10-13].

The objectives of this study were: to assess the modern way of construction material management methods in terms of quality, cost and time consequences; to identify the impact of current construction material management practice on public building projects in Gondar city and to expand the theoretical framework for user value criteria in Gondar building material management methods [14].

2. METHOD AND MATERIALS

2.1. Research Design

The study populations were focused on public contractors in Gondar city on the following areas: city health center building, industrial zone construction, university of Gondar building, condominium building, commercial building, and schools building.

2.2. Participants

The general population investigated Gondar city building construction projects. The total population of the study is fifteen building construction companies that work in Gondar city administration.

2.3. Instruments of Data Collection

The study used mixed research methods and the census sampling method. A closed-ended type of questionnaire and semi-structured type of interview are as a way of data collection. Twenty-five questionnaires had distributed, and only nineteen questionnaires were collected back.

2.4. Data analysis

The collected data were summoned for proper calculation and percentage was plotted for result.

3. RESULTS AND DISCUSSION

3.1. Study population characteristics

The general character of the study population had investigated as follows. The study includes; contractor classifications, distributions of respondent person who manages materials in construction projects, and respondent computer software usage.

Most of the companies had 33.3% are general contractors(GC), 22.2% are building contractor(BC) three, and 11.1% are general

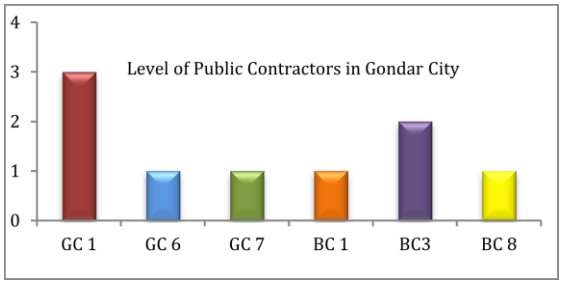

Figure 1. Classification of contractors to their levels

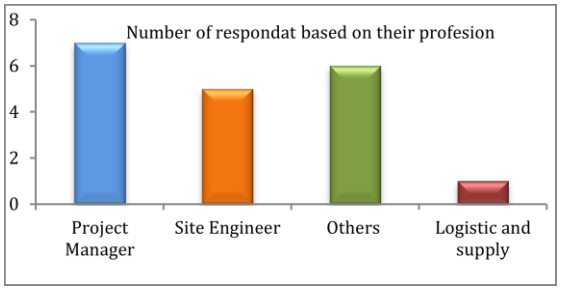

Figure 2. Distributions of a respondent person in charge of managing construction materials

contractors six and seven, and building contractor eight.

From the respondents on most companies, the person-in-charge of managing construction materials is the project manager. The remained percentages of companies take this function for; a housekeeper or warehouses man, site engineer, and material manager (logistics and supply). Generally, this shows that most company works in Gondar city administration have not construction material manager or material engineer professions.

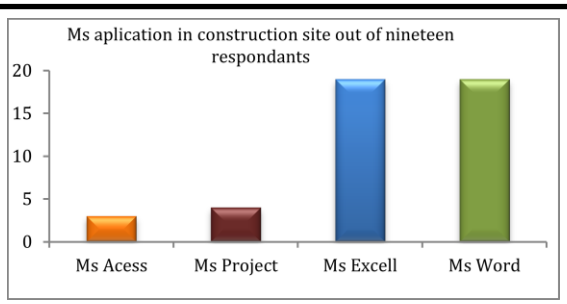

Figure 3. Shows the number of responsible professional efficiency in using popular computer software

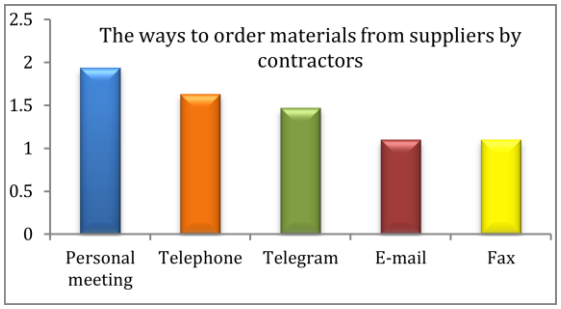

Figure 4. The ways to order materials from suppliers by contractors

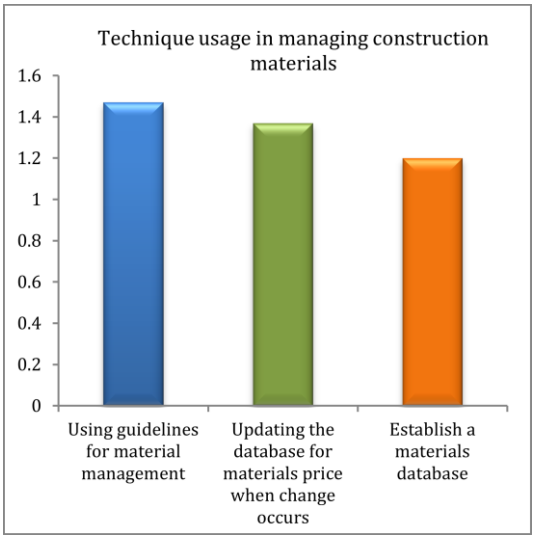

Figure 5. Technique usage in managing construction materials

The above results illustrate that most of the respondents (100%) have very-good capabilities in using MS-Excel spreadsheets and word, where (21.5%) contractors have very good in using Ms.-Project. Only (15.78%) of them have the same capabilities in using Ms.-Access.

The majority of contractors use personal meetings and telephone for ordering materials. The telegram, E-Mail, and Fax are slightly applicable for ordering a material that is not available in the local market. This result showed we are using old ways to order material face-to-face meetings and telephone in Gondar city building construction.

Table 1. Inventory techniques usage

Inventory techniques usage	Index	Frequency
Following up on the prices in the market.	1.31	Always
Reporting the problems as an example (wastage and breakage-thief and loss-shortage in delivery).	1.47	
Daily recording of using materials in the project.	1.47	
Recording the received materials on-site: for example (Delivery number-supplier name material description quantity).	1.57	Often
Providing materials purchase order including (Order number-material description- required quantity price).	1.63	
Provide a list of materials in a project that includes (Material name, material number unit price).	1.8	
Providing material cards at the site store that contains (Input-output-balance).	2.16	

Table 2. Materials stored in the company's storage

Material used	Index	
Cement	1.05	Always
Electrical materials	1.37	
Hollow Concrete Blocks	2.32	
Door and windows	2.42	
Tiles (Terrazzo or Ceramic)	2.16	
Glass	2.58	Sometimes
Reinforcement steel	2.79	
Sanitary materials	2.11	
Sand	2.79	
Pipes	2.2	
Brick	2.53	
Timber	2.58	
Aggregate	3.0	
Stone	3.8	Often

3.2. Application of construction materials management techniques in Construction projects

The result in the above figure illustrates that contracting companies used establishing a material database and updating the database for materials when change occurs is usually used.

But, a guideline for material management usage is occasionally applicable.

From the information in the above table, it is clear that contracting companies were used the inventory techniques are always or often used in construction material management.

The index in the above table shows how the construction materials are puts in storage. The most important materials that are always in the warehouse are (cement and electrical materials). On the other hand, materials warehouses are; hollow concrete blocks, tiles (terrazzo or ceramic), pipes, sanitary materials, door, and windows). The materials on the site are; reinforcement steel, aggregate, glass, timber, and brick.

3.3. Implementation of construction materials management methods

- *Challenges on Implementation of Construction Material Management methods*

Table 3. The obstacles which are facing contractors in using construction materials management methods

		Index
Higher degree impact	Unable to an understanding of the construction materials management method.	1.63
	Shortage of qualified persons in using a Construction materials management method.	1.9
	Inability implementation of material management methods.	1.95
	Shortage of user-friendly construction materials management method.	2.0
	The thinking that implementing the system wastes the time of project supervisors.	2.05
	The value of a construction materials management method.	2.11
	The simplicity of manual managing a construction material.	2.3

From the above table result, we can infer that all the above factors can be obstacles facing contractors in using construction materials management methods at a high degree level.

- *Impacts of poor construction material management*

The above table represents the impact of weak construction material management method on the projects which expressed by the respondents to causes of the following: the shortage of material is a very high degree effect, Cost overrun, conflicts between parties, and wastage of material: these all are high degree effects and delay of the project compilation has mid-degree effects of poor material management.

The above table shows that the material management methods benefits have high or very high degree effects on a construction site.

4. CONCLUSION

From the results obtained, analysed, and discussed as presented below: a modern way of material management methods are a way of ordering materials; tools of material management methods; inventory technique and software applications. The positive impacts of material management practice on building projects are reducing the costs of project materials, reducing duplication of materials orders and timely available on site with the right quantity, complying with an enhancement of quality control, better relationships with suppliers, and Waste reduction. Weak material management methods cause the shortage of materials, cost overrun, conflicts between parties, and wastage of material. The obstacles that face the contractors to implement modern material management methods are: unable to understand the concept of materials management method, shortage of qualified persons, lack of well-prepared material management guidelines, and misconception of implementing material management methods

Table 4. Impacts of weak construction material management method

		Index
Very high degree	Shortage of material	1.47
High degree	Cost overrun	1.53
	Conflicts between parties	1.84
	Wastage of material	2.42
Mid degree	Delay of the project compilation	2.6

Table 5. Benefits of implementation of material management on construction projects

Benefits of implementation of material management on construction projects.		**Index**
Very high degree	Reduce the costs of project materials	1.47
High degree	Materials are timely available on site with the right quantity	1.63
	Better relationships with suppliers	1.68
	Better handling of materials	1.84
	Complying with a schedule	1.84
	Complying with the enhancement of quality control	1.84
	Waste reduction	2.0
	Reducing duplication of materials orders	

as wastage of time by contractors. Finally from the whole study of construction material management methods in Gondar city administration, researcher concluded that a public contractor did not use convenient construction material management methods on their projects as perceived theoretically in practice.

5. RECOMMENDATIONS

To develop the practicability of material management methods: a researcher recommended the following areas: a case study on the comparison between using and not using material management methods on construction, and how the principles of material management methods can apply to the tendering procedure of a contract document.

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7. CONFLICT OF INTEREST

The authors have declared that there is no conflict of interest.

8. SOURCE/S OF FUNDING

NA

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