

Assessment of Material Management On Building Construction Sites in Nguru, Yobe State

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Abstract

The study focused on assessment of material management on building construction sites in Nguru, Yobe State, Nigeria. The study was guided by three research question which includes: Determine the causes of material wastage on building construction sites; determine the factors that affects materials management on building construction sites and recommend strategies for managing materials on building construction sites. Data for the study was collected using structured questionnaire designed to assess the views of respondents on material management on building construction sites. The survey data collected were analyzed using mean score index and rank ordering of variables were then assigned based on the calculated mean. The study reveals that material wastage on building construction sites in Nguru is largely caused by insufficient space and facilities for storing materials on site, changes in design specifications and theft & vandalism, Material management on construction sites is mainly affected by changes in design specifications, storage space and facility issues, and inefficient labor force, and that government interference does not influence these factors. The study also finds that employment of qualified workers and operators, considering material management from the beginning of the design, and proper planning, timing and scheduling of the construction works are the major strategies for managing materials on building construction sites.

Keywords: *construction sites, building materials, material management, wastage, strategies*

Introduction

Efficient materials management is a critical aspect of successful construction projects, influencing project timelines, costs, and sustainability outcomes. The effective handling, storage, and utilization of materials on construction sites play a pivotal role in project efficiency and overall performance. However, the construction industry continues to face challenges related to material wastage, inventory mismanagement, and inefficiencies in materials handling practices.

The article "Assessment of Materials Management on Building Construction Sites in Nguru, Yobe State" delved into the causes, factors, and mitigating strategies associated with materials management in construction projects. By conducting a comprehensive assessment of the current state of materials management practices, this article seeks to identify the root causes of material wastage, explore the factors contributing to inefficiencies in materials handling, and propose effective strategies for mitigating these challenges.

Through a thorough examination of the literature and empirical data, this article highlighted the importance of addressing materials management issues in construction sites and underscore the implications of poor materials management on project outcomes. By assessing the causes and factors influencing materials management practices, this article provided valuable insights for construction professionals, project managers, and stakeholders seeking to optimize materials management processes and enhance project performance.

Literature Review

Materials management in building construction sites encompasses a range of activities and processes aimed at effectively handling materials to support construction operations. According to

Sweis et al. (2017), materials management involves the strategic planning, procurement, storage, and utilization of materials to ensure that construction projects are executed efficiently and cost-effectively. This definition emphasizes the importance of proper planning and coordination in managing materials to meet project requirements. Another perspective on materials management in construction sites is provided by Tam et al. (2018), who define it as the systematic control and coordination of material flow from procurement to utilization on construction sites. This definition highlights the need for a structured approach to managing material flow throughout the construction process, emphasizing the importance of coordination and control to optimize resource utilization.

Furthermore, Cheng et al. (2020) describe materials management in construction as the integration of technology tools and systems to enhance visibility and tracking of materials throughout the supply chain. This definition emphasizes the role of technology in improving materials tracking, inventory management, and overall efficiency in materials handling on construction sites. In essence, materials management in building construction sites involves strategic planning, systematic control of material flow, and the integration of technology to optimize resource utilization and enhance project efficiency. These varied definitions underscore the multifaceted nature of materials management in construction and its critical role in ensuring project success.

Material wastage in construction sites is a prevalent issue that can lead to significant cost overruns and environmental impact. Several factors contribute to material wastage in construction projects, as highlighted in the literature. According to Ofori (2000), one of the primary causes of material wastage is poor inventory management practices, such as over-ordering, incorrect storage, and inadequate

tracking of materials. Inefficient inventory management can result in excess materials being ordered, stored improperly, or lost, leading to unnecessary wastage.

Additionally, design changes and errors during the construction process can also contribute to material wastage. As noted by Alves et al. (2014), design modifications, rework, and errors in construction drawings can lead to the disposal of materials that are no longer needed or usable, increasing wastage on construction sites. Lack of coordination between design and construction teams can exacerbate this issue and result in avoidable material wastage.

Furthermore, poor handling and transportation practices can contribute to material wastage in construction projects. According to Love et al. (2019), improper handling, loading, and unloading of materials can result in damage or deterioration, rendering them unfit for use and necessitating their disposal. Inadequate training of construction workers in proper material handling procedures can further exacerbate the problem of material wastage. Moreover, lack of awareness and accountability among project stakeholders regarding the importance of minimizing material wastage can also be a contributing factor. According to Lu et al. (2016), a culture of waste tolerance and lack of incentives for waste reduction can lead to complacency and inefficiencies that result in avoidable material wastage on construction sites.

Effective management of materials on building construction sites is essential to ensure project efficiency and cost-effectiveness. Various strategies have been proposed in the literature to optimize materials management practices. According to Sweis et al. (2017), one key strategy is to implement just-in-time (JIT) delivery systems, where materials are delivered to the construction site as needed, minimizing excess inventory and reducing the risk of material

wastage. JIT systems help streamline material flow and storage, leading to improved project scheduling and resource utilization.

Furthermore, integrating Building Information Modeling (BIM) technology into materials management processes can enhance visibility and coordination throughout the supply chain. As highlighted by Arayici et al. (2011), BIM enables real-time tracking of materials, accurate quantity take-offs, and clash detection to prevent issues related to material availability and compatibility. By leveraging BIM tools, construction teams can optimize material procurement, storage, and usage, leading to improved project outcomes.

Another effective strategy for managing materials on construction sites is to establish efficient material handling and storage practices. According to Tommelein et al. (2010), implementing lean construction principles, such as reducing waste and improving workflow efficiency, can help minimize material handling and storage costs. By organizing materials in designated storage areas, implementing proper labeling and inventory systems, and utilizing technologies like RFID for tracking, construction teams can enhance materials management and reduce the risk of material loss or damage.

Moreover, fostering a culture of waste reduction and sustainability among project stakeholders is crucial for effective materials management. As noted by Cheng et al. (2020), promoting awareness of the environmental impact of material wastage and providing incentives for waste reduction can encourage responsible material handling practices and enhance project sustainability. Engaging all stakeholders, including contractors, suppliers, and workers, in material management initiatives can help create a shared commitment to optimizing materials usage and minimizing waste.

Objectives

1. Determine the causes of material wastage on Building Construction Sites
2. Determine the factors that affects materials management on Building Construction Sites
3. Recommend strategies for managing materials on Building Construction Sites

Methodology

Data for the study was collected using structured questionnaire designed to assess the views of respondents on material management on building construction sites. Respondents were asked to rate their perceptions regarding the level of importance of these strategies on a four point Likert ordinal scale where 4 = Strongly Agree, 3 = Agree, 2 = Disagree and 1 = Strongly Disagree.

The study was carried out in Nguru local government area of Yobe state. Almost all construction works going on in Nguru are being handled by the local company, contractors and construction workers. There were more than twenty building construction projects going on in Nguru at the time of the study, only five (5) construction sites were selected based on the nature of the project, the scope of the project, the organisation of construction site, variety of construction workers involved, the stakeholders involved in the project and the location of the project.

The questionnaires were administered to contractors in their head offices and their representatives on construction sites. A total of 5 different contractors with their respective construction sites were visited and 4 questionnaires each were administered at the head offices as well as at the construction sites making a total of 40 questionnaires being distributed. Hinkel et al (1998) however believes that the minimum sample size that allows normal distribution assumptions to be used rather than using a t-distribution is 30. Hence the sample size of 40 is justifiable. Data obtained from the survey were analyzed using mean score index with 2.50 as mark point for agreed which implies that any score <2.50 is disagreed. A rank ordering of these variables were then assigned based on the calculated mean.

Means score index is mathematically represented as:

$$MSI = \frac{\sum Fx}{N}$$

Where,

MSI = mean score index of each variable;

f = frequency of responses to each rating;

X = score or rating given to each variable by the respondents; and

N = total number of responses concerning the variable

Data Analysis and Results

Table 1: Causes of Material Wastage on Building Construction Sites

SN	Causes of Material Wastage on Building Construction Sites	4	3	2	1	N	FX	MSI	Rank order
1.	Insufficient space and facilities for storing materials on site	18	13	7	2	40	127	3.18	1
2.	Delay in material delivery and supply	10	8	14	8	40	100	2.50	9
3.	Excessive purchase of construction materials	5	25	8	2	40	113	2.83	4
4.	Inadequate effective supervision	13	10	7	10	40	106	2.65	7
5.	Poor site security and protection	14	11	8	7	40	112	2.80	5
6.	Theft and Vandalism	15	11	8	6	40	115	2.88	3
7.	Climate and environmental factors	9	10	14	7	40	101	2.53	8
8.	Material loss and rework caused by low-quality work and improper handling	11	12	6	11	40	103	2.58	6
9.	Changes in design specifications	20	8	7	5	40	123	3.08	2

Table 1 give responses on causes of material wastage in building construction sites. The table shows that mean score index for all the list of causes of material wastage on building construction sites were all greater than 2.50 which is an indication that respondents agree and strongly agree with the list of causes of material wastage on building construction sites, with insufficient space and facilities for storing

materials on site, changes in design specifications and theft & vandalism having higher mean score index of 3.18, 3.08 and 2.88 and ranked 1st, 2nd and 3rd respectively. This indicates that insufficient space and facilities for storing materials on site, changes in design specifications and theft & vandalism are the major causes of material wastage on building construction sites in Nguru, Yobe State.

Table 2: Factors that affects materials management on Building Construction Sites

S/N	Factors that affects materials management on Building Construction Sites	4	3	2	1	N	FX	MSI	Rank order
1.	Modifications in design specifications	15	13	7	5	40	118	2.95	1
2.	Poor work organization and timing	10	14	9	7	40	107	2.68	6
3.	Unproductive labor force	10	18	8	4	40	114	2.85	3
4.	Fraudulent practices / carelessness and corruption	13	11	9	7	40	110	2.75	4

5.	Insufficient security personnel	12	11	10	7	40	108	2.70	5
6.	Waste on construction site	11	11	10	8	40	105	2.63	7
7.	Storage space & facility	16	12	6	6	40	118	2.95	1
8.	Transportation	11	12	6	11	40	103	2.58	8
9.	Governmental interferences	10	6	14	10	40	96	2.40	9

Table 2 shows responses on factors that affects materials management on building construction sites. The table indicates that mean score index for 8 out of 9 of the list of factors that affects materials management on building construction sites were all greater than 2.50 which is an indication that respondents agree and strongly agree with 8 out of 9 of the list, with modifications in design specifications, storage space & facility, and unproductive labor force

having higher mean score index of 2.95, 2.95 and 2.85 and ranked 1st and 2nd respectively. This implies that modifications in design specifications, storage space & facility, and unproductive labor force are the major factors that affects material management on building construction sites. However the study reveals that government interference was disagree by the respondents with mean score index of 2.40 ranked 9. This shows that government interference has no significant effects

on factors that affects materials management on building construction sites in Nguru, Yobe State.

Table 3: Strategies for managing materials on Building Construction Sites

S/N	Strategies for managing materials on Building Construction Sites	4	3	2	1	N	FX	MSI	Rank order
1.	Employment of qualified workers and operators	15	13	7	5	40	118	2.95	1
2.	Training of workers and management staff	10	13	9	8	40	105	2.63	7
3.	Employment of store keeper and security personnel	12	13	8	7	40	110	2.75	4
4.	Ordering materials with clear requirements and deadlines	13	10	10	7	40	109	2.73	5
5.	Proper Planning, timing and scheduling of the construction works	14	11	8	7	40	112	2.80	3
6.	Considering material management from the beginning of the design	15	11	8	6	40	115	2.88	2
7.	Integrating Building Information technology such as BIM into materials management processes	13	10	10	7	40	109	2.73	5

Table 3 shows responses on strategies for managing materials on building construction sites. The table shows that mean score index for all the list of strategies for managing materials on building construction sites were all greater than 2.50 which is an indication that respondents agree and strongly agree with the list of strategies for managing materials on building construction sites with employment of qualified workers and operators, considering material management from the beginning of the design, and proper planning, timing and scheduling of the construction works having higher mean score index of 2.95, 2.88 and 2.80 ranked 1st, 2nd and 3rd respectively. This reveals that employment of qualified workers and operators, considering material management from the beginning of the design, and proper planning, timing and scheduling of the construction works are the major strategies for managing materials on building construction sites in Nguru, Yobe state.

Conclusion and Recommendations

The study has examined materials management on building construction sites in Nguru. Based on the findings; material wastage on building construction sites in Nguru is largely caused by insufficient space and facilities for storing materials on site, changes in design specifications and theft & vandalism. The study also reveals that Material management on construction sites is mainly affected by changes in design specifications, storage space and facility issues, and inefficient labor force however the study shows that government interference does not influence these factors. Furthermore the study reveals that employment of qualified workers and operators, considering material management from the beginning of the design, and proper planning, timing and scheduling of the construction works are the major strategies for

managing materials on building construction sites in Nguru.

The study suggests that Contractor should train and retrain their management and site personnel to improve their efficiency in material management, and should hire skilled craftsmen and professionals to supervise their works and ensure effective material management on construction sites.

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