

## ADOPTION OF COST-EFFECTIVE APPROACH TO MATERIAL WASTAGE REDUCTION IN THE NIGERIAN CONSTRUCTION INDUSTRY

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### ABSTRACT

*This research investigated management of material wastage in Nigeria construction industry. The objectives of the study are to examine the different construction phases at which wastage of materials occurs, to identify the causes of material wastage and to proffer strategies to curb material wastage. Quantitative approach was adopted for the research. The target population for the research comprised of site supervisors and foremen whose sites are located within Eti-Osa local government area of Lagos state. Respondents for the research were randomly selected and eighty (80) copies of structured questionnaire were used to collect data from respondents. The data collected were analyzed using statistical package for social sciences (SPSS). The study concludes that poor recruitment process, poor procurement process, construction planning, as well as methods of construction deployed are the most common factors that aid materials wastage in the Nigeria construction industry; meanwhile, it was further noted that lack of experience, poor site management, improper materials processing, errors in design are the most common causes of materials wastage in the Nigerian construction industry. The study reveals that the common phases at which material wastage occurs includes storage, operation / construction and finishing, among others. Professionalism, mutual consultation among construction professionals, inclusiveness and consistent reviews are among the strategies that can be used to curb material wastage in the Nigerian construction industry. The research recommends that construction stakeholders should formulate, implement and enforce a sustainable policy on material waste management in the Nigerian construction industry; proper storage facilities should be provided for materials to prevent damages which can lead to wastage. Also, adequate specification should be made available during design phases to aid materials procurement, while construction personnel should be properly trained on the importance of good material management and waste prevention.*

**KEYWORDS:** *Construction Industry, Effective Approaches, Material Wastage & Management*

### 1.0 INTRODUCTION

It cannot be over emphasize that the contribution of construction industry to the economy growth of any country is enormous. Making life and the environment worth living, provision of buildings and infrastructures that stands the test of time and also

construction of service structures such as roads, flyovers, bridges, hospitals, high-rise buildings, schools among other basics facilities. A construction project is expected to have good quality of cost, delivery and product hence the need to prevent wastage at all phases of construction. (Adewuyi and Oтали., 2013). Babatunde., (2012) classified wastage

during construction phase into four categories, namely: cutting waste, transportation waste, theft and vandalism waste, and application waste. Moreover, Swinburne et al., (2010) classified construction waste into three major groups, namely: material waste, labour waste, and machinery waste. It is sustainably and economically essential to commence management of waste from the design/planning stage in such a way, that the waste could be controlled and minimized at an early stage. This study was conducted to investigate wastage of materials in the Nigerian construction industry with the intention to identify strategies that can be used to curb it at all stages of construction project.

## 2.0 LITERATURE REVIEW

Andualem and Akilu (2019) described waste as any incompetence that results in the use of tools, material, labor, equipment, and the capital in larger amount, than initially measured as essential for the construction. Material wastage could be due to excessive use of materials as a result of poor planning, poor supervision, wrong selection of materials, mishandling, poor workmanship and others. Materials wastage could occur during the design, procurement and construction phases of construction project. The major causes of construction materials wastage during design phase of building projects are selection of low quality products, wrong determination of types and dimensions of material, and errors in contract documents (Chikezirim and Mwanaumo, 2013).

Materials wastage can occur during procurement phase of a project due to lack of trade's skill, ordering errors and lack of possibilities to order small quantities are the major causes of construction materials wastage during procurement. Likewise,

unfriendly attitudes of project team and laborers, inappropriate storage leading to damage or deterioration, and damage of materials due to deficient stockpiling and handling of materials, are also causes of construction materials wastage. The major causes of construction material wastage during construction are workers' mistakes, lack of onsite material control, and poor coordination among project participants. Frequent design changes to building design by the client and consultants. (Andualem and Akilu (2019)). Design stage is a very crucial point for waste preventive measures in construction activities. It is no news that change is cheaper at design stage when there would be no need for any reworks that could otherwise lead to materials and time wastage. Osmani (2012) noted that about 33% of construction waste occurs because of design related factors.

## 3.0 RESEARCH METHODOLOGY

### 3.1 Research Study Area

The study area for this research was Lagos state, Nigeria, being a state that has many medium and large scales construction firms with many ongoing complex construction project.

### 3.2 Research Design

The study adopted quantitative method of research.

### 3.3 Study Population

The population comprised of large and medium scale construction firms working at Eti-osa local government area of Lagos state.

### 3.4 Sample Frame

The sample frame for this study includes the built environment professionals (architects, engineers, builders, quantity surveyors and project managers) involved in design, planning and construction stages of construction project.

### 3.5 Sampling Techniques

Stratified method was used to select ten (10) construction firms used for this research while random sampling was used to select respondents from the firms.

### 3.6 Sample size

The sample size for this study was determined using Krejcie and Morgan’s formula, and sample size of 80 was calculated for this research.

### 3.7 Data collection and analysis

Structured and close ended questionnaire was used to collect data from respondents and the data were analyzed appropriately to satisfy the quest of this research.

**Table 4.2: Factors that Aid Material Wastage**

SN	Statement	N	Mean	Std. Deviation	RL
1.	Materials Storage	80	2.47	1.475	6 <sup>th</sup>
2.	Design and documentation	80	2.57	1.385	5 <sup>th</sup>
3.	Crime and theft	80	3.01	1.326	4 <sup>th</sup>
4.	Construction method and planning	80	3.13	1.513	3 <sup>rd</sup>
5.	Poor Procurement process	80	3.20	1.444	2 <sup>nd</sup>
6.	Poor recruitment process	80	3.56	1.311	1 <sup>st</sup>
<b>Valid N (listwise)</b>		<b>80</b>			

**Source: Author’s Field Survey 2022.**

**Note: RL= Rank Level**

## 4.0 PRESENTATION AND DISCUSSION OF RESULTS

**Table 4.1: Familiarity with Materials Wastage in Construction**

	Frequency	Percentage
Very familiar	24	30
Familiar	16	20
Fairly familiar	11	13.8
Less familiar	19	23.8
Not familiar	10	12.5
<b>Total</b>	<b>80</b>	<b>100</b>

**Sources: Author’s Field Survey, 2022.**

Table 1 shows the respondents knowledge about material wastage in construction, the result shows that 30% of the respondents were very familiar with material wastage in construction, 20% of the respondents were familiar, 13.8% were fairly familiar, 23.8% were less familiar and 12.5% were not familiar. 50% of the respondents are either familiar or very familiar with material wastages in construction. This indicates that majority of the respondents understands material wastage in construction.

Table 2 shows the response of the respondents on factors that aids materials wastage in construction project in Nigeria. The analysis shows that, The first ranked on the factors that aids materials wastage in construction project in Nigeria is Poor recruitment process, followed by Poor Procurement process, Construction method and planning ranked third, Crime and theft ranked fourth, Design and

documentation ranked fifth while the last ranked factor in the analysis is Materials Storage. This implies that Poor recruitment process, poor procurement process and construction method and planning are the most common factor that aids materials wastage in the Nigeria construction industry.

**Table 4.3: Causes of Material Wastage**

SN	Statement	N	Mean	Std. Deviation	RL
1.	Inadequate planning and scheduling	80	3.31	1.218	8 <sup>th</sup>
2.	Improper preparation and handling	80	3.50	1.043	7 <sup>th</sup>
3.	Error in contract document	80	3.54	1.368	6 <sup>th</sup>
4.	Mistakes and errors in construction	80	3.61	.934	5 <sup>th</sup>
5.	Mistakes and errors in design	80	3.64	.903	4 <sup>th</sup>
6.	Improper materials processing	80	4.06	.905	3 <sup>rd</sup>
7.	Poor site management and supervision	80	4.39	.490	1 <sup>st</sup>
8.	lack of experience	80	4.39	.490	1 <sup>st</sup>
<b>Valid N (listwise)</b>		<b>80</b>			

**Source: Author's Field Survey 2022.**

**Note: RL= Rank Level**

Table 3 shows the response of the respondents on Causes of materials wastage in the Nigerian construction industry. The analysis above shows that, The first ranked on Causes of materials wastage in construction industry in Nigeria is lack of experience and poor site management supervision, followed by improper materials processing which was ranked third, followed by mistake and errors in design which was fourth in the ranking , followed by mistake and error in construction which was

ranked fifth, followed by error in contract document which was ranked sixth position in the ranking level, followed by Improper preparation and handling, while the last on the list of Causes of materials wastage in construction industry is Inadequate planning and scheduling. This implies that lack of experience, poor site management, improper materials processing, mistake and errors in design are the most common causes of materials wastage in Nigeria construction industry.

**Table 4.4: Phases of Material Wastage’s Occurrence**

SN	Statement	N	Mean	Std. Deviation	RL
1.	Costing/ estimation	80	3.22	1.091	7 <sup>th</sup>
2.	Planning/designing	80	3.25	1.207	6 <sup>th</sup>
3.	Transportation	80	3.80	1.195	5 <sup>th</sup>
4.	Procurement	80	3.84	.892	4 <sup>th</sup>
5.	Finishing	80	4.15	1.313	3 <sup>rd</sup>
6.	Operation/construction	80	4.16	.625	2 <sup>nd</sup>
7.	Storage	80	4.27	1.125	1 <sup>st</sup>
<b>Valid N (listwise)</b>		<b>80</b>			

**Source: Author’s Field Survey 2022.**

**Note: RL= Rank Level**

Table 4 shows the response of the respondents on Phases of material wastage occurrence in the construction industry in Nigeria. The analysis shows that, storage was ranked first, followed by operation/construction which ranked second, followed by finishing which is third in the ranking, followed by procurement which was ranked fourth, followed by transportation that was ranked fifth ,

followed by planning/design which was ranked sixth, while the last on the list of phases of materials wastages occurrence in construction industry is costing/estimation. This shows that storage, operation/construction, finishing are the most common phases where material wastage occurs in the Nigerian construction industry.

**Table 5: Strategy to Curb Material Wastage at Design and Construction Phases**

SN	Statement	N	Mean	Std. Deviation	RL
1.	Clear working drawings	80	3.56	.672	10 <sup>th</sup>
2.	Identification of waste prone materials	80	3.71	.455	9 <sup>th</sup>
3.	Clear client brief	80	3.73	.729	8 <sup>th</sup>
4.	Familiarity with contract document	80	3.79	.412	7 <sup>th</sup>
5.	Early engagement of qualified professionals	80	3.88	.333	5 <sup>th</sup>
6.	Effective quality management	80	3.88	.333	5 <sup>th</sup>
7.	Detailed bill of quantity	80	3.90	.302	4 <sup>th</sup>
8.	Good communication between design and construction teams	80	3.96	.335	3 <sup>rd</sup>
9.	Training and retraining of personnel	80	3.98	.274	2 <sup>nd</sup>
10.	Adequate specification and review	80	4.06	.244	1 <sup>st</sup>
<b>Valid N (listwise)</b>		<b>80</b>			

**Source: Author’s Field Survey 2022.**

**Note: RL= Rank Level**



Table 5 shows the response of the respondent on strategy to curb material waste at design and construction phases in the Nigerian construction industry. The analysis above shows that, The first rank on the strategy to curb material waste at design and construction phases is adequate specification and review, followed by training and retraining of professional personnel which ranked second, followed by good communication among the design and construction team which is third in the ranking, fourth in the ranking was detailed bill of quantity, followed by effective quality management which was ranked fifth, followed by early engagement of qualified professionals which was ranked sixth, followed by familiarity with contract document which was ranked seventh, ranked eighth was clear client brief, ninth in the ranking was identification of waste prone materials, while the last on the list was clear working drawing.

This shows that adequate specification, training and retraining of personnel, proper good communication between design and construction teams are the most useful strategy to curb material wastage in the Nigerian construction industry.

## 5.0 CONCLUSION AND RECOMMENDATIONS

### 5.1 Conclusion

The research concludes as follows:

Majority of the respondents understands material wastage in construction. Poor recruitment process, poor procurement process and construction method and planning are the most common factor that aids materials wastage in the Nigeria construction industry. It is important to state that lack of experience, poor site management, improper

materials processing, mistake and errors in design are the most common causes of materials wastage in Nigeria construction industry. Also, storage, operation/construction, finishing are the most common phases where material wastage occurs in the Nigerian construction industry. It is also imperative to submit that there is need for adequate specification, training and retraining of personnel, proper good communication between design and construction teams are the most useful strategy to curb material wastage in the Nigerian construction industry.

### 5.2 Recommendation

Based on the above conclusion, this study recommends that:

- i. Construction stakeholders should formulate, implement and enforce a sustainable policy on material waste management in the Nigerian construction industry.
- ii. Proper storage facilities should be provided by the construction companies for materials to prevent damages which can lead to wastage
- iii. Adequate specification should made available to aid materials procurement and construction
- iv. Construction personnel should be trained on good material management practice
- v. Project designers and contractors should have good knowledge of materials and how to manage them.

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