

Factors Influencing Waste Generation in Buildings Project in South-West, Nigeria

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ABSTRACT

The study was aimed to assess the factors influencing waste generation in buildings project in southwestern, Nigeria. The study randomly sampled 261 professionals through a questionnaire survey. Tables and figures were used to present the collected data and ranking and percentage were used to analyze the data collected. It was revealed that Design (Frequent design changes and poor design) lack of early contractor involvement, last-minute client requirement, engagement of inexperience designer, undefined project brief, poor design quality are the most important factors that influence waste generation during buildings project. It was recommended that site operatives and craft men should be equipped with waste minimization knowledge, they should carry along in every management decision regarding waste management plan development as a major player on sites.

Keywords: Factors; Building-waste; Waste-generation; Buildings; Building-project; South-West

INTRODUCTION

Waste is generated in all the building project phases [1]. The waste generated contribute to environmental problems [2]. Several studies defined waste generated in building construction as construction rubbles, ruins, disaster, construction materials and building construction and demolition, site clearance and other forms of waste during the building construction process [3,4]. The waste generated has instigated serious problems both locally and globally.

This is generated due to such factors as construction preparation, site preparation, material damage, material use, over-purchased, and human error [5]. For examples, construction materials such as packaging materials, area cleaning and excavation materials, metal, plaster, concrete, brick, insulation, wood, plastic, glass, asphalt, composite materials, and onsite cleaning. Due to nature, certain types of wastes are not found. Liquid waste such as asbestos and lead, paint and kerosene, hazardous materials such as food waste, tires and residue containers are some of the materials. The buildings are located at the heart of all our needs for water, energy, and materials, but at the same time, there is a waste.

Horvath [6] emphasized that the construction industry is one of the largest and most important industries, being at the same time the main consumer of natural resources and one of the largest

polluters and employers of labour. This contributes significantly to the overall cost of the construction project; therefore, material wastage has an adverse impact on construction cost, contractor's profit margin, construction duration and can be a possible source of dispute among parties to a project.

The cost of material waste generated on building sites denotes avoidable cost in construction which is eliminated or reduced. The degree to which waste can be prevented in the construction industry has been a long-debated issue. The cost reduction achieved by preventing the generation of construction waste is equally of direct benefit to all stakeholders on a construction project [6]. There are very few local studies similar to the factors influencing a generation of construction waste in Nigeria [4-11]. They all emphasized those unnecessary materials wastage in the Nigerian construction industry was due to improper management.

Adewuyi, et al. [6] assesses the level of contribution of several factors to construction material waste generation and found that first three highest contributors to material waste are found to be reworks due to non-conformance to specifications, waste from cutting uneconomical shapes, and design changes and revisions with average relative contribution index of 0.801, 0.791 and 0.773 respectively. Popoola, et al. [11] appraised material wastage on selected Building Construction sites in Osun State using percentage frequency table and relative importance index and found that

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identified factors that contribute to wastage on-site as operational attribute (poor workmanship), design and documentation attribute (lack of detailed information in the drawing), Site management and practices (Change of Instruction on-site) and Environmental attributes (Poor access road and severe weather condition).

Furthermore, Eze, et al. [5] assessment of materials waste in the construction industry: a view of construction operatives, tradesmen and artisans in Nigeria. The study revealed that formwork from wood/timber, Mortar from Rendering/plastering and Blockwork/Brickwork are the most wasteful material generated on sites; Design (Frequent design changes and poor design), Poor materials storage system and Theft and vandalism are the most important factors that influence material waste generated during construction. The study recommends that proper site supervision and management techniques, Adequate storage of material, and Staff training and awareness on waste management are the measures of minimizing construction material waste; and saving cost of disposal and transport, increased profit and save construction time loss are the most important benefits of material waste minimization. However, Adewuyi, et al. [9] revealed that the levels of material wastes generated on-site are in excess of estimator's allowance for some materials studied. Therefore, this study surveyed the factors influencing waste generation in building projects across southwestern states of Nigeria [12-19].

METHODS OF THE DATA COLLECTION

This study was conducted by the use of a structured questionnaire and a field survey to examine the factors influencing the wastage in buildings project across southwestern state in Nigeria. A total of 261 questionnaires were randomly administered to the registered firm of Architects, Builders, Engineers, Quantity Surveyor, Project Manager, across the six (6) state namely Lagos, Ogun, Oyo, Osun, Ondo, and Ekiti State.

The questionnaire administered was divided into three sections. Section A sought to know the general particulars of the respondents, section B was focused on information related to wastage variation of Building materials, while section C include list of factors that causes Wastage of material on site. The structured questionnaire was analyzed using percentage frequency table and Ranking method.

RESULTS AND DISCUSSION

Findings on Figure 1, present findings on the professional qualification of respondents. The study revealed that 37.2% of the respondents were member of Nigerian institute of quantity surveyors, 20.7% were member of Nigerian society of engineering, 41% were architect, while the remaining 1.1% of respondents was either Builders or Project Manager.

Study on Figure 2 present findings on the respective position of respondents. The study confirmed that 30.3% of the respondents' reside as the post of principal partner/managing director, 29.1% acting as the project architect, 20.31% of the respondents' served as the project structural engineer, 3.8% of the respondents' serving as the project M & E engineer, 13% of the respondents' serving as the project quantity surveyor, while only 3.4% of the respondents' served as the builder. This implies that all the relevant profession was consider during the study.

Findings on Figure 3 present finding on practice years of

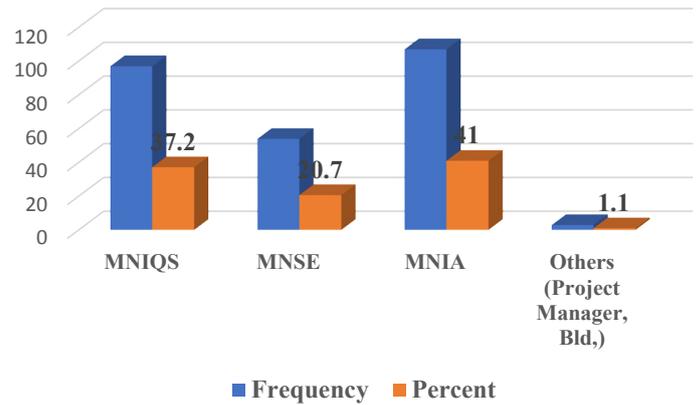


Figure 1: Profession Affiliations of Respondents.

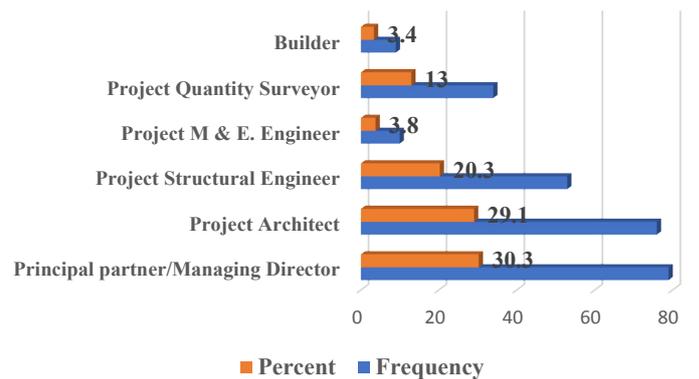


Figure 2: Position-Held by the respective Respondents.

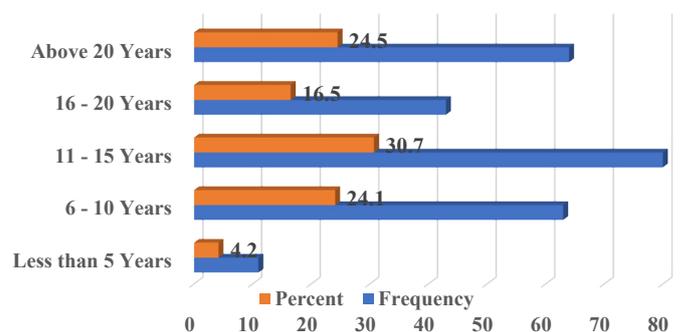


Figure 3: Years in Practices.

respondents in construction sector. The study found that 24.5% of respondents have had over 20 years of practices experience, 16.5% of respondents had between 16-20 years practicing experience in the construction sector, 30.7% had spent between 11-15years of practices in the construction sector. 24.1% of the respondents had between 6-10 years of practices experience in the construction sector, only 4.2% of the respondents had less than 5 years practices experience. This implies that majority of respondents had reasonable years of practices experience in building construction sector.

The purpose of the respondent's profile diverse is to obtain more opinions about construction waste factors from different perspectives (Figures 1-3). After, this it is necessary to analyze the score of the factors concerned at which ranked by respondents (Table 1). In response to the ranking of factors influencing waste generation in buildings projects, the study institute that among factors that moderately influences waste generation in building project, lack early involvement of contractor, lack of specific waste minimization directives, unclear project brief, and poor

Table 1: Rating of Course Factors Influences Waste in Building Project.

Factors Influencing Waste in Building Project	Don't Know	None	Little	Moderate	Great	Extreme
unclear brief/project defining	1.1	6.9	24.1	32.6	25.3	10
undefined project scope	6.9	5.7	14.9	26.1	36	10.3
choice of consultant	5.4	5	16.9	32.6	31	9.2
choice of procurement method	2.3	5.4	18.4	26.4	43.7	3.2
expected very high standards procurement process not client driven	4.6	9.6	16.9	26.1	37.5	5.4
no specific waste minimization directives	2.3	7.3	12.6	37.2	31.8	8.8
waste management not design directives	1.9	11.1	10.7	35.2	35.6	5.4
lack of early collaborative engagement	5.7	6.9	13.8	29.5	37.9	5.7
lack of contractor early involvement	1.9	11.5	15.3	46.7	16.1	8.4
design of frozen at the end of Architect plan work	2.3	9.6	13.4	32.6	34.9	7.3
last minute client requirement	1.5	5.4	9.6	31.8	35.2	16.5
cost constraint	3.1	8	14.6	31	31.8	11.5
time constraint	4.2	7.3	18.8	30.7	31.4	7.7
other design	11.5	16.9	32.6	23.4	12.3	3.4
frequent design change	4.2	8.8	19.5	22.6	29.9	14.9
design error	3.1	6.5	23.8	18.8	28.7	19.2
complicated & complex design	2.7	4.6	12.3	32.6	34.5	13.4
poor design quality	3.1	6.5	23.8	33	22.6	11.1
inexperience designer	2.3	17.2	15.3	18.8	26.4	19.9

design quality with 46.7%, 37.2%, 32.6%, 33% respectively were responsible for waste in buildings project.

Among the factors ranked that greatly influences waste generation in buildings project, choice of procurement ranked highest with 43.7%, 37.9% respondents agreed that lack of early collaborative engagement, 37.5% expected very high standards procurement process not client driven, and 36% undefined project scope were responsible for waste in buildings project. However, inexperience of the designer, design error, and last minute of client requirement (with 19.9%, 19.2%, and 16.5% respectively) were leading among factors influences waste generation in buildings project among profession in southwest states in Nigeria.

CONCLUSION

The finding of this study concludes that most important factors that influence waste generation in buildings projects are lack of contractor early involvement, unclear project brief, poor design, choice of procurement method, last minute client requirement, design error, engagement of inexperience design and labour, and undefined project scope.

RECOMMENDATION

Based on the conclusion of this study, it is recommended that there should be a management directive regarding waste management plan development, engagement of experience and qualify professional, site operatives and craft men should be aware, and trains ways of reducing buildings waste. This will reduce the construction cost, improved output and better storage and handling of materials delivered to site.

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