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Dispute And Strategies Of Demolition Waste Management In Nigerian Construction Industry: (Perception Of Professionals)

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***Abstract*- The aim of this paper is to evaluate the challenges and benefits of demolition waste management in northern Nigeria. However, the literature critically reviewed in order to establish the need for a study on challenges and benefits of demolition waste management in the Nigeria construction industry. Survey conducted using questionnaire form was used in order to achieve the research objectives. The total number of the questionnaires distributed to the targeted respondent was 100. However, only 61 questionnaires (61%) were returned. Descriptive analysis was used to test the collected data using the version 21.0 of the SPSS. The result shows that, lack of suitable demolition waste management system is the most significant challenge. Contrastingly, implementation of demolition waste management regulations was the most significant benefit of the demolition waste management in Nigeria construction industry. The descriptive analysis indicates the significant variables in the research. The paper concluded that contractors are part of the key players in the construction industry and all the stakeholders are negatively benefited. The paper confirmed that, challenges were in demolition waste management in Nigeria construction industry and there is need to provide the practice for waste materials to be minimized. The paper is beneficial to stakeholders in the construction industry. Therefore, the position of the paper is set to study the direct challenges and benefits of demolition waste management based on the perception of professionals.**

Keywords—Construction industry, Demolition, Nigeria, Strategies, Waste management.

1.INTRODUCTION

Demolition waste is one of the most difficult waste materials to process. It contains a wide range of materials, including rebar, electrical boxes and jacketing, textiles, glass, and plastics [1]. Efficiently processing construction debris for disposal and recycling requires separating the materials either before or after shredding to allow for the most productive shredding, as well as possible material reclamation [8]. Nigeria is mostly famous in nature for its Wadi and mountainous area [2]. Construction and Demolition Waste Management is an essential aspect of sustainable building [11]. In this context, construction and demolition waste management means eliminating waste where possible; minimizing waste where feasible; and reusing materials which might otherwise become waste [15].

Solid waste management practices have identified the reduction, recycling, and reuse of wastes as essential for sustainable management of resources [15]. Traditionally in Nigeria, Construction and Demolition Waste Management has concern itself with time, cost and quality. In view of the increasing concerns about the environment, a fourth dimension should now be added. The environment is a major issue that affects everyday life and the level of awareness is steadily increasing as people become better informed to recognize the influence of both global and local environmental impacts on their quality of living [4].

2.1 LITERATURE REVIEW.

The demolition waste industries generate a lot of debris that can be reused and recycled. Most demolition waste goes into landfills, increasing the burden on landfill loading [5]. Waste from sources such as, solvents or chemically treated wood can result in soil and water pollution. With concerns over scarce landfills, construction waste has been identified as a potential source of landfill reduction. [9]. this is one of the reasons that motivate the researcher. In addition to that, during the demolishing, renovating or deconstruction of buildings, it produced waste and wastage on sites. These activities immensely influence contractor's profit if it does not handled very well. Moreover, it may also create the illegal activities on the site which are burning, burying and dumping construction or demolition waste and may harm human health and environment [7]. However, with all these impacts of on the environment and human health, few researchers that or none that deals with this matter in Nigerian construction industry. This is another important issue that drawn the attention of the researcher to contribute to the body of knowledge.

Reduction is considered as the most effective and efficient method for managing Construction and Demolition waste. It can not only minimize the

generation of the waste, but also reduce the cost for waste transporting, disposal and recycling [13]; [6].). Moreover, according to [12], Materials such as wood, earthworks, steel, concrete, masonry, tiles, plasterboard, insulation materials, paints, solvent and carpets can be profitably reused on the construction site.

As the highest priority for managing C&D waste, it is not surprising that reduction has been examined extensively by many researchers. In some situations materials cannot be reused. When this occurs, waste diversion can still be achieved by recycling [10]. The waste reduction work plan should also identify materials for which recycling opportunities exist. The work plan should contain a list of potential recyclers when contacting and identifying potential recyclers, it is important to specify the material types, the volume, and the weight.

Reducing, reusing and recycling of materials appear to be profitable alternatives that increased the lifetime of landfills and reduce distortion of natural resources [10]. The recycling of construction wastes can also help to conserve natural materials and to reduce the cost of waste treatment prior to disposal [3]. The most important step for recycling of construction waste is on-site, separated waste materials can then be sent to relevant companies for proper recycling of the wastes [14]. It is obvious that demolition waste management should be implemented to have a better used of these techniques. Demolition waste management has many advantages in the construction industries. It could benefit both the client, consultant and the contractors in the industry. Construction and demolition waste materials are expensive to send to a municipal solid waste (MSW) landfill because they generally are heavy and bulky and therefore result in higher tipping fees. For this reason, tribes paying to landfill, demolition materials can save money by managing these materials separately from their MSW waste or constructing a construction and demolition landfill. Alternately, tribes with their own MSW landfills will save space, which extends landfill life by putting off future expenditures for expansion or a new facility, by creating a specific management plan for Construction and demolition waste materials.

3.1 MATERIALS AND METHOD

The research concentrates on the views written by previous researchers and also views from the pilot survey. This indicates that books, article journals, reports and also source from internet were used as a secondary data to identify the benefits and problems of demolition waste management in Nigerian construction industry. Literature review is comprehensively at the commencement of the work to substantiate the significance of the research problem and delivers a basis for the purpose of the study and research questions. The researcher discusses the approaches, that is the quantitative, qualitative and the mixed method of research. This research adopts quantitative approach as the procedure of collecting the data. The quantitative data analysis used in this research is the SPSS software. Descriptive analysis and ranking of the mean values was conducted to identify the variable that is having a significant perception of respondents. The result is discussed and the recommendations on portions that need further studies were pointed out.

In the case of a quantitative survey, structured questionnaires and schedules are preferred whereas in the case of qualitative research, semi-structured questionnaires or discussion guidelines are preferred. Therefore, in this research, questionnaire is the selected instrument used. In the other hand, sampling is defined as the process of selection of sampling units from the population to estimate population parameters in such a way that the sample truly represents the population Therefore, the sample to be taken based on the population is 100. This justifies the distribution of 100 questionnaires to the respondents. The contractors were classified based on their professional background. The classification was architecture, quantity surveying, civil engineering and others which was specified by the respondents. The questionnaires were distributed to the respondent and collected back within two (2) weeks. Though, the respondents were considered in a general perspective not their different categories.

The quantitative method that was applied for the study is questionnaire. It is the instrument used for collecting data through responses from the respondents. The researcher identified some questions, and asked the respondents to rate their answers to the questions on a five point scale (Likert scale). The research conducted only two (2) types of tests to achieve the desired objectives. These are the mean and descriptive analysis. The first test was the ranking of mean values for the variables. To achieve this, frequency test has been carried out to ensure that the data was entered correctly. Cronbach's alpha test was conducted to ensure the reliability of the data also. The variables were treated according the objectives they are under. Therefore, it has been considered in this research that, items used of likert scale type consisting of 5 choices, starting with very low (1), low (2), moderate (3), high (4), and very high (5).

4.1 RESULT AND DISCUSSION.

The number of questionnaires distributed to the respondents is based on the Krejcie and Morgan table of 1970. Therefore, one hundred and forty (100) questionnaires were distributed and out of these sixty one (61) questionnaires were returned.

Table 3. 1: Response rates

Questionnaires distributed	Questionnaires collected	Response rate (%)
100	61	61

This number constitutes 61% of the respondents and it is an acceptable number as indicated in Table 3.1.

Cronbach's alpha is a commonly used test of internal reliability. It calculates the average of all possible split-half reliability coefficients and a computed alpha coefficient varies between 1, denoting perfect internal reliability, and 0, denoting no internal reliability. The figure of 0.75 or more usually is treated as a rule of thumb to denote an accepted level of reliability (Singh, 2007).

Table 3. 2: Cronbach's Alpha Results

Variable	No.	Number of Items	Alpha Value
challenge of demolition waste management	61	20	0.810
Improving demolition waste management and benefits	61	20	0.805

The Cronbach's Alpha value shown in table 3.2 below is the Reliability Statistics table. In the table, the value is 0.810 for the variables under the challenge of demolition waste management. Also the variables under the ways to improving demolition waste management practices were having the value as 0.805. This is suggesting very good internal consistency reliability for the scale with this sample Values above 0.7 are considered acceptable; however, values above 0.8 are preferable (Pallant, 2011).

Table 3.3 provides the results of the professionals that participated in this survey. Quantity surveyors were 36.10% and they are the majority in the survey. Architects constitute 32.75% of the contractors in the survey. Civil engineers and others constituted 16.40% and 8.20% respectively. Builders constitute the least percentage among the others which is only 6.55% of the respondents.

Table 3. 3: Professional background

		Frequency	Percent
Valid	ARCHITECTURE	20	32.75
	CIVIL ENGINEER	10	16.40
	QUANTITY SURVEYOR	22	36.10
	BUILDING	4	6.55
	OTHERS	5	8.20
	Total	61	100.0

Years of experience plays has important role in this research. Table 3.4 indicates that 34.43% of the respondents are ranging between 1 - 5 years of experience in the construction industry. Those ranging within 6-10 years make 31.15% of the respondents while 22.95% are those that have 11-20 years of experiences. Only 11.47% of the respondents that had more than twenty (20) years of experience in the construction industry.

Table 3.4 presents the number of the projects undertaken by the respondents in 2017. Only eight (8) respondents out of 61 undertake 1 – 5 projects in this year. This constitutes 13.11% of the respondents. Furthermore, 18.04% of the respondents undertake 6 – 10 projects in this year. Two (2) percent only of the respondents have undertaking more than 10 projects in this year. Therefore, this is indicating that the practice of demolition waste management is low because 65.57% of the respondents did not participated in the practice in this year of research. However, this could be an encouragement for researches to be conducted on the said matter, for a solution to be derived.

Table 3. 4: Years of experience

		Frequency	Percent	
Valid	1-5 YRS	21	34.43	
	6-10 YRS	19	31.15	
	11-20 YRS	14	22.95	
	MORE THAN 20 YRS	7	11.47	
	Total	61	100.0	

Presentation and discussion of Mean Ranking for Objective One (1)

Table 3.5 Descriptive table illustrates the results of descriptive analysis for objective number one (1). The result was arranged from the highest mean to the lowest. The result shows that lack of suitable demolition waste management became the highest in the ranking with 4.70 mean value.

Table 3.5: Mean Values for Objective One

Variables	**Mean Values**	**Standard Deviations**
Lack of a suitable demolition waste management system	4.70	1.03
Inadequate recyclers	4.55	0.88
Lack of a suitable demolition waste recycling approach	4.05	0.79
Pollution by simple landfill sites	3.50	0.89
Low performance in demolition exercise	2.95	0.94
Low economic feasibility	2.75	0.91
Pollution due to illegal dumping	2.65	0.83
Lack of market of potential demand for recycled materials	1.58	0.85
The less amount of waste delivered to a disposal site	1.54	1.09
Unspecific standards on recycled materials	1.05	0.81

This obviously pointed out that there is serious need for demolition waste management practice in Derna. Inadequate recyclers that could facilitate the practice of demolition waste management seconded in the ranking followed by none availability of suitable demolition waste recycling approach. The result also shows that, pollution by simple landfill sites, low performance in demolition exercise, low economic feasibility and pollution due to illegal dumping followed with mean values as 3.50, 2.95, 2.75 and 2.65 respectively.

Additionally, the remaining three variables were lack of market for recycled materials, less amount of waste delivered to a disposal sites and unspecific standards on recycled materials had 1.58, 1.54 and 1.05 mean values.

Presentation of Mean Results for Objective Two (2)

Table 3.6 provides the result of descriptive analysis for objective number two that is looking for the ways of improving the practice of demolition waste management in nigerian construction industry. Implementation of demolition waste management regulation became the highest variable that was ranked by the respondents in the survey.

Table 3. 6: Mean Values for Objective Two

Variables	Mean Values	Standard Deviations
Implementation of demolition waste management regulation	4.80	0.95
Assigning an appropriate person responsible for the demolition waste management	4.20	1.02
Evaluate waste production on site	4.15	1.06
Investigate waste transportation systems	3.65	0.87
Investigate waste storage	3.50	0.97
Efficient use of waste materials	3.42	0.99
Investigate waste separation	3.10	0.89
Evaluate site layout	2.85	0.88
Develop a system of worker incentives	2.55	0.89
Examine the design details of building	2.25	0.88

The variable obtained 3.60 as mean value, which is very high in the Likert scale. The next variable has 4.20 mean value and became second in the ranking table. Assigning an appropriate person responsible for the demolition waste management was rated second by the respondents in the survey conducted. The third in the ranking is evaluating the waste production on site, which is rated 4.12 as high in the Likert scale.

Investigate waste transportation systems, investigate waste storage, efficient use of waste materials and investigate waste separation obtained mean values as 3.65, 3.50, 3.42 and 3.10 respectively. Evaluating site layout, developing a system of worker incentives and examining the design details of building ranged under moderate level in the likert scale. They obtained mean values as 2.85, 2.55 and 2.25 respectively.

5.1 CONCLUSIONS

This section discusses the conclusion of the finding based on the objectives of the research. The section summarizes the results obtained in the research and confirmed the achievement of the objectives. The first question that this research is to answer is the identification of the challenges demolition waste management in the Nigerian construction industry. Questionnaires were sent to potential respondents to reveal their opinions. Three (3) most significant problems were confirmed based on their average mean values. Lack of a suitable demolition waste management system is the most significant problem in the survey. Other problems are inadequate recyclers and Lack of a suitable demolition waste recycling approach as indicated in Table 4.8. These are the most significant problems identified and it indicates that objective one was achieved.

The second objective of this research is to identify possible ways that could improve and benefits of demolition waste management in the Nigerian construction industry. Based on that, three most significant factors were identified from the survey conducted. Implementation of demolition waste management regulation, assigning an appropriate person responsible for the demolition waste management and evaluating waste production on site are the most significant factors that could improve the demolition waste management practice. The construction industry is the prime consumer of these research findings. The participants in the industry are going to benefit if the stakeholders adopt the regulations governing the practice of demolition waste management. The client's satisfaction is to be met since there will be less waste debris after demolition exercise. Even if there is waste, it could be managed appropriately. The society at large benefits from this research, because social vices caused due to the unethical disposal of demolition waste could be reduce to the barest minimum.

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