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ABSTRACT

The research study on the Impacts of waste management on construction industry in Nigeria. In order to addressed the problem on materials wastage, the study examined materials wastage on construction sites Nigeria, the effects on the cost of project and determine the effective of material management policies exist on the site of construction firms. To achieve this, a field survey was carried out in which data collection was developed through administration of questionnaires and 50 questionnaires were administered applied in case studies carried out on selected construction sites in Lagos state, Nigeria. From the analysis of the data obtained, it was revealed that wastage occurs mostly on sites during storage and handling of materials and this has negative effect on both the client plan and contractor profit. It was concluded that wastage of materials will occur variously on the site from different sources at a corresponding degree, wastage level is higher during construction and employment of professionals to helps in minimize wastage of materials.

It was recommended that waste management should be incorporated into the course study of building and civil engineering students in various higher institutions. A significant change in the level of technological development should be the priority of the government and the Nigerian building construction and employment of professional will reduce wastage in the building construction industry. Adequate control (both pre-action and post-action) measures should be ensured so that materials schedule is strictly adhered.

Keywords: Construction, Management, Materials, Professionals and Waste

1.0 INTRODUCTION

Construction site consists of unwanted materials produced or incidentally by the construction. This includes building materials such as mortar, nails, electrical wires, as well as waste originating from sure preparations such as dredging materials, tree stumps, and rubble. Construction waste may contain asbestos and other hazardous substance which are dangerous to human health.

Chadwick (1982) viewed that materials as one of the resources usually required for the construction of physical infrastructure. He adds that the cost profile of materials forms about 51% by cost of construction, the quality of materials used and the management of materials waste in building projects are of paramount importance. Obviously, the control of quality of materials used can be save from materials wastage. It is generally an accepted phenomenon that not all the materials requested and delivered to construction sites are used for the purposes for which they are ordered.

Many building waste is made up of materials such as bricks, concrete and wood damaged or unused materials for various reasons during construction. Observational research has shown that this can be as high as 10% to 15% of the materials that go into a building, a much higher percentage than the 2.5 to 5% usually assumes by the quantity surveyors. Since considerable variability exists between construction sites, there is much opportunity for reducing this waste.

Government or local authorities often make rules about how much waste should be sorted before it is hauled away to landfills or other waste treatment facility. Some hazardous materials may not be moved before the authorities have ascertained that safety guidelines and restrictions have been followed. Among their concerns would be the proper handling and disposal of such toxic element as lead, asbestos or radioactive materials.

In the first decade after Independence, the tempo of what is referred to as modern construction was at low level in Nigeria. This was restricted to isolated Urban center's that were essentially the seat of government as it marked the transitional stage or nation's growth. Hence, the low level of economic activities was precipitated by 1967 to 1970 civil war (Wahab and Alake 2007). Between 1971 and 1975, the need for reconstruction and rehabilitation of programs incidental from the massive destruction during civil war.

Akinkurolere and Franklin (2006) mentioned that effect of waste management is out growing significance for the construction industry. Adding the cost of storing and transporting construction waste along with the loss of revenue from not reclaiming waste materials. It makes financial sense for construction comprises take action to minimize waste.

The use of recycle aggregate derived from concrete rubbles in the production of ready mixed concrete was demonstrated in the example of an office building, erected in Darmstadt, Germany.

Materials as one of the resources employed by the construction industry pass through a number of processes before they are finally Incorporated in the construction.

These processes bring about the inadequacies of the materials such that at the end not all the materials procured and delivered to sites are used for the purposes for which they are ordered. This excessive loss in materials is called WASTE.

Materials wastage isn't extra cost over and above the materials used, plus their handling as contained in the estimated price for the job. Building research establishment divides materials wastage into your distinct categories namely design wastage, taking off and ordering waste.

Wahab and Lawal (2011) stated that waste is one of the serious problems in construction industry. Many researchers and construction professionals indicated that there are many wasteful activities during design and construction process, also described waste emanates during different stages of construction which are during planning, estimating and construction stage.

Ekanayake and Ofori (2000) shows that waste occur during design, operational, procurement and material handling. The majority of these consuming time and effort without adding value for the client these resulting losses in material, delay times and execution of unnecessary work. Waste has direct impact on the productivity, material loss and completion time of project which resulting in loss of a significant amount of revenue.

Construction sector represents one of the most dynamic and complex industrial development all over the world. Construction activities in the context of the Nigeria economy cannot be treated with a wave of hand (Illigurth, 2000). Oladiran and Olatunji (2008) claimed that construction industry contributes between 3-6% of the gross development product (GDP) in developing

countries and records from the federal office of statistics specifically ascertain that the contribution of construction industry to Nigerian gross development product is hovered around 2% for the past 15 years and this accounts for about 69% of the Nation's Gross Fixed Capital Formation (FOS, 1997).

Enshassi (1996) buttressed the need for the re-unification when he suggested that effective materials control demands concentrated and coordinated action of numerous people performing a variety of functions within the industry. He farther suggested that waste seen on site is not necessarily caused by failure or inadequacy of individual functions involved in materials management system. Control of materials is relatively a new practice in the construction industry. In the present situation, the management and the designers are mainly concerned on how to control cost without any emphasis on waste control measures.

2.0 LITERATURE REVIEW

Waste Management in Construction Site

High proportion of municipality waste is construction related, so its reduction becomes important. However, construction companies benefit in reducing waste generation by reducing transportation and landfill deposition costs and the purchasing costs of virgin materials (Chandrakanthi 2002). Bossink and Brouwers (1996) discovered that about 1-10% by weight of the purchased construction materials depending on the type of material leaves the site as waste. Research made it known that, about 50-80% of the construction waste can be reused or recycled.

Materials Management

McDonalds and smithers (1998)**,** Materials management generally includes procurement, distribution, warehousing of product and materials in an organization. In materials management,

you deal with financial parameters and the need of your internal customers. Needs for material management includes the followings; to have adequate materials in hand when needed, to pay the lowest possible price, consistent with quality and value requirement for purchases materials, to minimize the inventory investment, to operate efficiently.

Effects of Materials Wastage on Construction Site

Wahab and Alake (2007), mentioned that there is a fixed amount of materials required for a given unit of work (usually measured), the cost of the wastage that occur are therefore borne by the contractor. No matter how little, wastage of materials represents a loss. The higher the level of waste, the higher the loss to the contractor's profit. A very serious case of materials wastage can lead to a complete loss of profit. It should however be pointed out at this stage that it is not in all cases that the contractor alones bears the brunt of losses through wastage on contractor site.

Minimization Techniques of Materials Waste

Andy (2002) stated that waste minimization as technique that avoids, eliminates or reduces waste at its source. Designing out waste at the earliest stage of the construction process offers the greatest opportunities for waste minimization. Akindoyeni (1989) investigated that in order to reduce waste, the designers' decisions need to be carefully described in the specification documents. This document communicates to the supplier the quantity of materials and to the operative the care that must be taken in fixing the materials. On the other hand, Chadrakanth (2002)

3.0 METHODOLGY

This research employed the use of survey in the collection of data because people's opinions were sought through questionnaire.**).** In this research work, the population is consisting of construction professionals in the selected 20 construction firms in Lagos state. Data were generated using questionnaire administered face to face to the respondents by the researcher. Having selected the

sample size, data were collected from the sample. The sample size for the research were fifty respondents (50), respondents which were accumulated from 5 respondents of the 10 construction firms in Lagos state. The sample of fifty (50) respondents were selected using stratified sampling method. It is usually applied to a heterogeneous population. In doing so, a representative sample can be obtained from the population.

4.0 PRESENTATION AND ANALYSIS OF DATA

Table 1: Major causes of material wastage on construction site

FACTORS	INDEX	RANKING
Re-work due to workers mistake	48.00	7th
Lack of on-site materials control	56.00	6th
Inadequate supervision	56.00	6th
Use incorrect materials	60.00	5th
Selection of low quality products	60.00	5th
Choice of wrong construction method	68.00	4th
Waste from uneconomical shapes	74.00	3rd
Severe weather condition	84.00	2nd

Design changes and revisions	88.00	1st

Source: Researchers' computation from field work, 2019.

From table 1, 88.0% strongly agree that design changes and revisions are the major causes of material wastage on construction site. 84.0% the subjects are with the thought that Severe weather condition are the causes of the wastage of materials but 74.0% believes economical shapes are the cause of wastage on construction site. of all the subjects 60% feels that using of incorrect materials caused the wastage. Lack of on-site materials control, 56.0% thinks that is the major cause of material wastage. Some 48.0% of the respondents feel they have some works does get re-work due to worker's mistake. Due to inadequate supervising, 56.0% respondents strongly agree that building materials will be wasted. choice of wrong construction method does lead to wastage of materials on construction sites, 6.0% disagree, while 68.0% of the respondents Strongly Agree. Selection of low quality products has 60.0% strongly agree, while 6.0% disagree that material wastage is caused by low quality.

Table 2: Materials that are usually wasted on construction sites

FACTOR	INDEX	RANKING
Use incorrect materials	60.00	5th
Design changes and revisions	88.00	1st
Inadequate supervision	56.00	6th
Severe weather condition	84.00	2nd
Lack of on-site materials control	56.00	7th
Waste from uneconomical shapes	74.00	3rd
Re-work due to workers mistake	48.00	8th
Choice of wrong construction method	68.00	4th

Selection of low quality products	60.00	5th

Source: Researchers' computation from field work, 2019.

From table 2, 88.0% of respondents revealed that design changes and revisions are the major causes of material wastage on construction site, 84.0% the subjects are with the thought that Severe weather condition are the causes of the wastage of materials but 74.0% believes economical shapes are the cause of wastage on construction site. Of all the subjects 60% feels that using of incorrect materials caused the wastage. Lack of on-site materials control, 56.0% thinks that is the major cause of material wastage. Some 48.0% of the respondents feel they have some works does get re-work due to worker's mistake. Due to inadequate supervising, 56.0% respondents strongly agree that building materials will be wasted. Choice of wrong construction method does lead to wastage of materials on construction sites, 6.0% Disagree, while 68.0% of the respondents Strongly Agree. Selection of low quality products has 60.0% strongly agree, while 6.0% disagree that material wastage is caused by low quality.

Table 3: Methods of reducing material wastage on construction site

FACTORS	INDEX	RANKING
Allying with the right materials	50.00	4th
Segregating waste efficiently	26.00	1st
Using experienced, professional worker	50.00	4th
Selection of high quality products	38.00	2nd
Re-using existing materials	58.00	5th
Minimizing land fill cost	46.00	3rd
Avoiding ambiguities and mistakes	60.00	6th
Maximizing waste's potential	50.00	4th

Source: Researchers' computation from field work, 2019.

From table 3, 26% of the respondents revealed that segregation of waste is the best method of reducing materials wastage on construction site, which shows that the lower the percentage of respondent the higher the ranking of the method of controlling the waste of materials on construction site, while others were, selection of high quality products 38%, minimizing land fill cost 46%, maximizing materials and using experience, professional workers 50%, re – using existing materials 58% and avoiding ambiguities and mistakes 60%.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

From the research conducted. impacts of waste management on construction industry in Nigeria the following were conclusions of the research, few construction firms possess evidence of adhering strictly to materials schedule which shows that a considerable amount of the nation's resources is wasted, wastage of materials will occur variously on the site from different sources at a corresponding degree, wastage level is higher during construction, employment of professionals helps to minimize wastage of materials.

5.2 Recommendations

The following recommendations are made on basis for the presentation made in this study;

Waste management should be incorporated into the course study of building and civil engineering students in various higher institutions, a significant change in the level of technological development should be the priority of the government and the Nigerian building construction and employment of an experienced professional will reduce wastage in the building construction industry, adequate control (both pre-action and post-action) measures should be ensured so that materials schedule is strictly adhered to so as not to jeopardize the construction work, proper site

accounting system carried out from time to time will help in, providing valuable data on which to base future estimate of likely material wastage on contracts, detect materials wastage level immediately at the construction site so that remedial measure can be taken immediately, adequate penalty should strictly ensure for negligence and poor handling of materials as well as incentives should be made available for good handling of materials, a clear-cut construction management policy from inspection will reduce greatly construction waste, workshop and special seminar should be organized in building construction industry, so that they can be a way of the implication of materials wastage in their daily operations

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