

## MODERN APPROACH TO CONSTRUCTION WASTE MANAGEMENT IN SITES IN ABIA STATE NIGERIA

<sup>1</sup>Emery Joseph Otah and <sup>2</sup>Mekwa Mekwa

<sup>1</sup>Department of Building Technology, School of Environmental and Design Technology

<sup>2</sup>Department of Architecture, School of Environmental and Design Technology Abia State Polytechnic, Abia State, Nigeria.

**Corresponding Author:** emryjoe@yahoo.com 08124300991

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### ABSTRACT

The construction sites are one of the known sources of waste in a fast developing country as Nigeria. Globally, awareness is being created to achieve zero-waste operational processes in all activities. The concept of Reduce, Reuse and Recycle is a waste management principle that is relevant to the construction sector to enable any project attain safety, timely completion, quality work and save cost for a successful project. Waste in construction comes from Wood, Concrete, Offcuts from Reinforcements, Fine and Coarse Aggregate, etc as construction materials used in a construction site. The aim of this study is to assess the level of awareness of waste management, its practice and to proffer measures that can help save cost without sabotaging quality and ensuring safety through sustainable waste management practices. This would be done through objectives of analysis of the barriers. A simple descriptive survey research methodology was adopted for the study. Analysis through mean rank score and percentage. Findings showed a low level of awareness and adoption. Recommendations includes sensitization of stakeholders on benefits of waste minimization on project cost, adoption of technology and Government Legislature to govern management and disposal of construction waste.

**Keywords:** Construction Waste, Construction Industry, Professionals, Management.

### INTRODUCTION

Construction activities have been known to generate large and diverse quantities of waste. As a developing, country and the glaring infrastructural deficit, construction activities would definitely be going on. These activities produce waste no matter what. The call globally is for minimizing waste, re-using and recycling of these waste and properly dispose.

According to Ekanayake and Ofoni (2004), any material apart from earth material which needs to be transported elsewhere to the construction sites or used within the construction site itself for the purpose of land filling, incineration, recycling, reusing or composting rather than the intended specific purpose of the project due to material change excess non-use or non-compliance with the specification or being

a by-product of the construction process is regarded as a construction waste.

Similarly, Cheung (1993), stated that construction waste can be defined as the by-product generated and removed from construction, renovation and demolition workplaces or sites of building and civil engineering structures. This definitions show that waste are generated whether in construction, deconstruction, demolition or renovation. Mostly debris that is generated in these activities from construction materials such as wood, concrete, metals, bricks, rocks, etc.

The management of these waste contributes to the success of any project. According to Dania et al (2007), Construction Waste Management (CWM) is an aspect of Sustainable Development, which is fueled by the growing concern for the effect of man's activity on the environment. The

management of construction process to reduce, reuse, recycle and efficiently dispose waste has bearing on the final cost, quality, time and impact of the project on the environment. Since waste is indispensable during construction, its management is the focal point in discussions.

According to Coventry and Guthrie (1998), fundamental reason for reducing, reusing and recycling of waste are the economic and environmental advantages. Abia State is already battling with the issue of waste from trading, agriculture and domestic waste and its disposal, adding construction waste from the construction industry is not good in the pursuit of sustainable development goal of urban renewal and reducing of environment hazards.

There is deficit of buildings and similar infrastructure in Abia State, which makes construction activities visible at all nooks and crannies of the state. These construction activities produces waste which are also adding to the already inefficient waste management activities in the state.

According to the US Green Building Council (2001), construction waste accounts for up to 30% of total waste output in the United State alone, put at about 136 Million tons per annum. As a result, construction and demolition waste management has become one of the major environmental problems in many Munilipals, Faniran and Caban, 1998, Guthrie et al (1999), Poon et al (2004),. The construction industry while contributing to overall socio-economic development of any country is a major exporter of natural resources and a polluter of the environment which it contributes to re-environments/degradation through resource depletion energy consumption, air pollution and generation of waste in the acquisition of raw materials. (Watuka and Aligula, 2003),.

Cheremisinoff (2003), opined that the daily struggle for survival has pushed consideration for clean and healthy environment to the background. This post-Covid era emphasis the need for clean environment.

The industry seems not organized and lack effective material planning. This supports the findings of Oladeria (2009), Ameh and Itodo (2003), Adewuyi and Otali (2013), Janyamsth and Ramazzein (2014), Adewuyi and Odesola (2015). The increasing quantities of waste has created a bad image for the industry. It also states that ineffective planning and control of construction sites could result to poor performance of construction projects. The problem gets worse by the growing rate in which wastes are generated, depletion of landfill spaces which has resulted in open dumping of waste at unauthorized locations within the city metropolis. Building professionals seems not to be conscious of the environmental effects of these waste in this era of covid-19 and many diseases. There are few data from previous projects on measures to reduce waste during construction. This paper will also contribute to the pool of knowledge on how waste can be managed.

This study tends to access the level of practice, factors hindering construction waste management and proffer measures and new approaches for waste management to improve success of construction projects. The aim of this study is to access the waste management practices in Abia State and proffer suitable approach to effective construction waste management. While the objective of the study include evaluation of sources of waste in construction site, the level of practice of waste management in construction site and factors which affect the practice of construction waste management.

## 2.0 METHODOLOGY

The design used in this study is descriptive survey design. It was used because the study is demanding an existing condition. Data for the study were sourced with questionnaire. Forty-Eight (48), questionnaires were randomly administered to building construction professionals handling projects in Abia State. The data was analyzed using statistical method such as mean and percentage as Relative Importance, index was used in its ranking.

A five-point likert scale rating was used:

1. Strongly Disagree(SD), 2. Disagree(D), 3. Neutral(N), 4. Agree(A), 5. Strongly Agree(SA),

**QUESTIONNAIRES DISTRIBUTED AND RETURNED**

**Table 1** Questionnaire administered to the respondents

S/N	QUESTIONNAIRES	FREQUENCY NO.	PERCENTAGE (%),
1.	Returned	40	83
2.	Unreturned	8	17
	<b>Total</b>	<b>48</b>	<b>100</b>

Table 1 shows that 48 questionnaire were administered to the respondents out of which 40 were duly completed and returned representing 83%.

**Table 2: Respondents Profile**

			FREQUENCY NO.	PERCENTAGE (%),
Highest Educational Level	(a) OND		2	5
	(b) HND		4	10
	(c) B.Sc		30	75
	(d) M.Sc		4	10
	(e) Ph.D		-	-
	<b>Total</b>		<b>40</b>	<b>100</b>
Profession	(a) Architect		10	25
	(b) Builder		10	25
	(c) Civil Engineer		15	37.5
	(d) Quantity Surveyor		5	12.5
	<b>Total</b>		<b>40</b>	<b>100%</b>

**Source:** Field Survey (2022),

Table 2 shows the respondents profile, it can be observed that the majority the respondents with the highest frequency are B.Sc holders 75%, while M.Sc is 10%, HND is 10% and none has Ph.D. It shows that the respondents are knowledgeable and have the ability of providing the professional requirement for achieving the aim of the research.

**Table 3: Working Experience of Respondents**

Table 3 shows that (37.5%), of respondents have working experience of 6 – 10 years and the least percentage (%), have a working experience of 0 – 5 years. Therefore, the respondents can be said to have adequate knowledge and experience in waste management in construction site

**Table 4**  
**Interest in firms to implement waste management plan.**

Types of Response	Frequency	Percentage (%),
Yes	40	100
No	0	0
<b>Total</b>	<b>40</b>	<b>100</b>

**Source:** Authors Field Survey (2022),.

From the above, it shows that 100% of the firms visited are aware of the need for waste

management plan in construction sites and interested in measures towards effective waste management.

**Table 5**  
**Common Sources of Waste in Construction Sites in Abia State.**

S/N	COMMON SOURCES OF WASTE	RANKING					RII	RANK
		1	2	3	4	5		
1.	Formwork (Wood/Timber),	0	0	50	30	20	0.74	1
2.	Mortar from rendering/plastering	5	20	20	35	20	0.69	2
3.	Sandcrete Block	5	20	20	35	20	0.69	2
4.	Concrete	5	20	20	35	20	0.69	2
5.	Reinforcement	15	5	48	10	25	0.65	5
6.	Tiles from walls, floors and other surfaces	0	20	55	20	5	0.62	6
7.	Paint	0	20	55	20	5	0.62	6
8.	Ceiling boards	0	15	70	15	0	0.60	8
9.	Aluminum Roofing Sheet	0	20	65	15	0	0.59	9

**Source:** Authors Field Survey.

From the table, it shows that formwork from wood or timber are the most common source of waste in sites, mortar from

rendering and broken sandcrete blocks respectively are following most common sources of waste in construction site.

**Table 6**  
**Measures for Waste Minimization**

S/N	MEASURES	RANKING					RII	RANK
		1	2	3	4	5		
1.	Proper Site Supervision & Management	0	5	15	70	50	0.89	1
2.	Adequate Storage of Materials	0	0	40	35	25	0.77	2
3.	Staff Training and Awareness	0	5	40	50	5	0.75	3
4.	Use of Low Waste Technology	0	5	40	50	5	0.75	3
5.	Proper Procurement Management	0	0	50	30	20	0.74	5
6.	Proper Implementation of Waste Management	0	0	50	30	20	0.72	6
7.	Just in time delivery of works/delivery	0	0	50	30	20	0.72	6
8.	Employment of Skilled Workmen	5	20	20	35	20	0.69	8
9.	Mechanical handling of Materials	5	20	20	35	20	0.69	8
10.	Prefabrication of construction components off-site	15	5	48	10	25	0.65	9
11.	Recycling of Some Waste	0	20	55	20	5	0.62	10
12.	Appointment of Waste Officer	0	20	55	20	5	0.62	10
13.	Use of more efficient cost equipment	0	15	70	15	0	0.60	12
14.	Careful handling of fills and past	0	20	65	15	0	0.59	13

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

From the table above it shows that proper site supervision and management is the

most acceptable measure to minimize waste. This is followed by Adequate storage of materials.

**Table 7**  
**Barriers to Efficient Waste Management**

S/ N	BARRIERS	RANKING					RII	RANK
		1	2	3	4	5		
1.	Ignorance of Waste Management Practice	0	5	15	70	50	0.89	1
2.	Abundance of quackery	0	0	40	35	25	0.77	2
3.	Weakness in legislature	0	5	40	50	5	0.75	3
4.	Inadequate waste dump	0	5	40	50	5	0.75	3
5.	Unstructured nature of construction industry	0	0	50	30	20	0.74	5
6.	Lack of awareness of environmental impact	0	0	50	30	20	0.74	5
7.	Other factors	0	0	50	30	10	0.72	7

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

From the table above it shows that ignorance of Waste Management Practice is the most acceptable barrier to efficient waste management. This is followed by Abundance of quackery in the industry.

**3.0 DISCUSSION**

From the findings in Table 6, it shows that measures waste minimization are that there should be proper site supervision and management, also adequate storage materials and proper staff training and awareness. This agrees with the finding of Tam et al, (2018). That the existing waste control ordinances allow for skewed distribution of commitment and responsibilities of controlling waste among project stakeholders. It is essential to have a waste management plan instituted by the management of any site. Musa et al, (2004), corroborated by suggesting his findings that efforts must be directed at minimizing construction waste by improving managerial capacity of professional at the design, procurement and production stages of construction work.

In Table 7, ignorance in practices topped the chart. This supports the findings from Faniran and Caban 1998, that the lack of knowledge about construction methods and design process led to waste production. Similarly, Nagapan et al (2012), explain the effect construction waste has on the success of any project.

Construction waste can have a significant impact on cost, time, quality and sustainability, and also on the success of the project. Nagapan et al (2012), Emery (2021), opined on use of drones and CCTV for project monitoring.

Francis and Rafi (2004), Faniran and Caban, 1998 emphasis on the fact that lack of knowledge about construction methods and design process led to waste production. SRP Musa et al (2015), the construction industry produces a variety of different wastes and these waste have adverse effect on the environment and the performance of many projects.

**4.0 CONCLUSION AND RECOMMENDATION**

This study has succinctly evaluated waste management processes, practices for efficient project delivery. In a state like Abia, that is, has poor waste management practices generally, adding construction waste is making a bad case worse. The following recommendations are made against the backdrop of the research findings:

- i. Formwork design especially for wood should be part of working documents for designs as professionals should have standard forms for works.

- ii. Adequate sensitization of waste management practice by stakeholders. The environmental impact especially in this post-Covid era.
- iii. Use of modern technology such as closed circuit television (CCTV), and Unmanned Aerial Vehicle (Drones), should be encouraged in site for project monitoring.
- iv. Government should make suitable legislature that will govern the waste management to encourage recycling of waste and make dumpsite available.
- v. Waste management plan should be laid down in all projects from design, procurement and construction stages to minimize, recycle and dispose waste appropriately.
- vi. The use of technology can minimize waste such as use of Automatic wall cement plaster render machine and concrete mixers etc.
- vii. The use of ready-mixed concrete technology for concrete works.
- viii. Use of prefabrication of building component in construction

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