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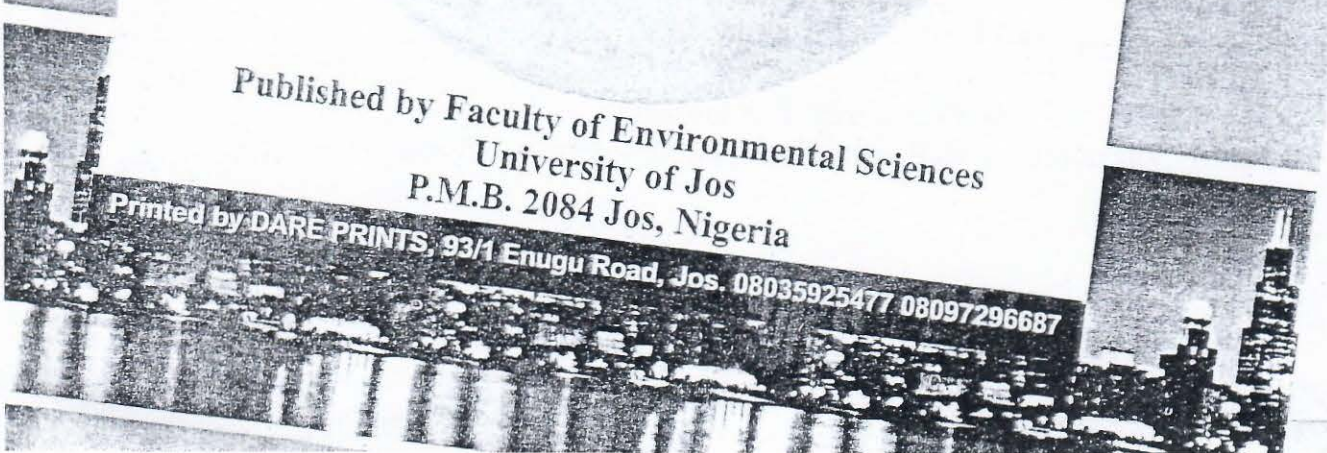

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AN ASSESSMENT OF CONSTRUCTION WASTE MANAGEMENT PRACTICES AMONG FIRMS IN ABUJA

W.E. Dzasu; F. Dama and A. Haruna
Department of Building, Federal University of Technology Yola

A. Calistus
Department of Building, Federal University of Technology Minna

ABSTRACT *The study examined construction waste management practices in Abuja the capital city of Nigeria. The results obtained were analyzed using the ranking order method. The study established that construction waste re-use ranked top amongst construction waste management practices engaged in by firms in the study area. The research identified Damage by mishandling; Weather and other natural occurrence; Vandalism; Rework and alteration of designs; Lack of recycling facilities; over ordering of construction materials and components as the main causes of wastes on construction sites. Minimizing of construction waste that leaves site for land fill ranked top among the benefits of efficient construction waste management. Other benefits were discovered to include, maximization of material recovery, prolonged supply of natural resources, reduced liability, keeping job sites & the environment cleaner & safer, conservation of valuable landfill space and reduction of cost associated with waste disposal while ensuring compliance with all environmental legislation was ranked least as benefit derivable from efficient construction waste management. The study recommended among others the efficient enforcement of existing environmental legislations in the Federal Capital Territory. Re-use, Recycling and Deconstruction activities should also be encouraged among industries through the provision of facilities/equipments, technologies and market to make these practicable.*

INTRODUCTION

The worldwide decay in Environmental quality and the gradual depletion of the natural resources has been a dominant theme for research and public policy in recent times. According to Mendie (1999), many of the environmental problems are due to the activities of man in the pursuit of development. This depressing situation has resulted in unsound and unsustainable development processes including poor handling and management of waste disposal. The global growing awareness on environmental issues and the drive towards conservation and sustainability of resources has led to a steady and rising tide in the number of environmental policy instruments introduced at international, national, regional and local levels. For instance, there is now a substantial body of European Union (EU) environmental policy with a clear direction about the place that environmental considerations must have in all EU policy instruments and legislation (Stritih, 1999).

According to John (1997), the well accepted tenet for future development is that the development must be sustainable development and true growth be sustainable growth.

Brundtland (1987) defines sustainable development as: "development that meets the needs of the present without compromising the ability of the future generation to meet their own needs". Also, a study by the California Integrated Waste Management Board (2006) shows that construction and demolition waste materials account for almost 22 percent of the waste stream and according to the U.S. Environmental Protection Agency (EPA), 136 million tons of construction waste are produced annually in the United States; of this, an estimated 11 million tons per year is waste from new construction.

Common construction waste materials include lumber, drywall, metals, masonry (brick, concrete and so on), carpet, plastic, pipe, rocks, dirt, paper, cardboard, or green waste related to land development. Of these, metals are the most commonly recycled material while lumber makes up the majority of debris that still goes to a landfill. Research findings by Tool Base Services (2004), have indicated that engineered wood product wastes can be beneficially reused onsite during construction rather than going to a landfill, that ground wood waste can be used as a landscaping mulch, for erosion control during construction, or as a substrate for a heavy use area. The findings also indicate potential environmental risks from ground engineered wood products to include surface water contamination, changes in the chemistry or

biology of the underlying soils and negative effects on plant growth.

Research findings by the California Integrated Waste Management Board (2006), have shown that many of the waste arising from construction works can be reduced, reused or recycled , thus prolonging the supply of natural resources, reduce liability, keep job sites and the environment cleaner and safer, conserve valuable landfill space and potentially saving money in the process. Effectively managing waste on a construction jobsite is a vital component of sustainable building. In this context, managing waste means minimizing the construction waste or demolition debris that leaves the jobsite for landfill disposal (Napier, 2007). The objectives of construction waste management program are to maximize material recovery, minimize waste, and reduce total waste management costs on a per-house basis. From the forgoing therefore, construction waste can and should be managed in the same way as other home building operations to avoid the inescapable consequences of unsustainable developments and Environmental degradations.

Large amount is being invested by the federal government, the private sector and individuals in Real estate development especially in the provision of housing and other core infrastructural needs. The various activities of the construction industry has considerable impact on the environment as opined by Moneke (2001) who noted that construction projects and development do not just stand on their own; they exact impact on their environment. Kolawale and Achuenu (1997) also noted that the environment and construction are interdependent and the need to keep a balance between them cannot be overemphasized. Consequently, this study is aimed at realizing the following objectives;

1 To identify the factors that constitutes main causes of wastes generated by construction firms.

2 To examine the methods of construction waste management system practiced by firms in the study area.

3 To determine the benefits of efficie construction waste management syste practiced by firms in Nigerian

METHODOLOGY

Both theoretical and empirical metho were adopted in the collection of data for th study. The theoretical aspects involved a revie of related literature, journals, periodicals and th internet. While the empirical study involve visits to Development Control Departments, th Federal Capital Development Authority, Feder Ministry of Environment and Housing, Abuj Environmental Protection Board and othe relevant government agencies and head office of construction firms.

The data for this study was collecte through questionnaires. A total of fifty five (55 questionnaires were administered to staff o Abuja Environmental Protection Board (AEPB and to professional staffs of some selecte construction companies in the FCT, Abuja. A total of 50 duly completed questionnaires were returned.

The data collected were analyzed usi the ranking Method. The rating value of 4, 3, and 1 were assigned to the options "Strong Agree", "Agree", "Disagree" and "Strong Disagree" respectively in obtaining responden perception on construction waste managemer activities by respondent's organization.

The ranking method is suitable for number of measures, which is above six and les than thirty (Youngman, 1981).

In using the ranking method, weights or scores o 1.....n are assigned to the factors to b measured. The rank Sum and Relative Index ar determined thus:

$S = \sum nW$ - (1)

$RI = S/4n$ - (2)

(Where, S = is the rank sum, n = number o respondents, W = corresponding weight/score o rank category, RI = is the relative index)

The relative index ranges from 0 – 1. The item with the highest relative index is considered the first in the rank order.

DATA PRESENTATION AND ANALYSIS OF RESULTS

Table 1. Distribution of Construction Activities Engaged in by Sampled Organizations

SERVICES OFFERED RESPONDENT'S FIRM	No.	% RESPONSE
1. Building Construction Works	30	60
2. Civil Engineering Construction Works	16	32
3. Building/ Civil Engineering Construction Works	2	4
4. Others	2	4
Total	**50**	**100**

Table 1 shows the distribution of the type of services provided by the sampled organizations. 60% of the respondents indicated that their organizations engaged in building construction works only, 32% indicated their firms engaged in civil engineering construction works only, 4% said their firms carry out both Building Construction and Civil Engineering Works while 4% showed that their firms engaged in other construction activities other than Building Construction and Civil Engineering Works or are staff with government agencies. This result reflects that greater percentages (92%) of respondents for the study are directly engaged in either Building or Civil Engineering construction activities on a day to day basis.

Ranking of Construction Waste Management Activities Practiced By Respondents Organization

From table 2, it can be seen that re-using construction waste is ranked 1st in the waste management activities practiced by respondent's organization with relative index of 0.925. This shows that construction waste materials should be used as many times as possible. The study further identified the disposal of construction waste as 2nd in the activities of construction waste management practiced by respondents' organization with a relative index of 0.865. This result is a reflection of the visible dumping of construction waste on road sides and within living premises in major towns and cities in the study area.

Construction waste reduction which involves minimizing the amount of waste produced is ranked 3rd with relative index of 0.815 in the waste management activities of respondents' organizations. Also from table 3, deconstruction is ranked 3rd with relative index of 0.75 as one of the activities involved in construction waste management and 5th with relative index of 0.75 in the construction waste management activities practiced by respondent's organization. The table further shows that recycling of construction waste is ranked 6th in the construction waste management activities practiced by respondent's organization with relative index of 0.525. This could be as a result of lack of interest in recycling construction waste, lack of recycling facilities and technology as well as market for recycled products.

Table 2. Ranking of Construction Waste Management Activities Practiced By Respondents Organization

Activities	4	3	2	1	Rank Sum (S)	n	Relative Index R.I=S/4n	Rank Order
Waste Avoidance	13	27	8	2	151	50	0.755	4th
Reduction	14	35	1	-	163	50	0.815	3rd
Reuse	35	15	-	-	185	50	0.925	1st
Recycling	-	9	37	4	105	50	0.525	6th
Deconstruction	10	34	2	4	150	50	0.75	5th
Disposal	28	17	5	-	173	50	0.865	2nd

Table 3. Ranking of Factors that constitutes Main Causes of Construction Waste In Respondents Organization

Factors	4	3	2	1	Rank Sum (S)	n	Relative Index R.I=S/4n	Rank Order
Damage by mishandling	8	24	14	-	144	50	0.72	4th
Weather and other natural occurrence	18	20	12	-	156	50	0.78	3rd
Vandalism	-	19	27	4	115	50	0.575	5th
Rework and alteration of designs	21	18	11	-	160	50	0.8	2nd
Lack of recycling facilities	27	15	4	4	165	50	0.825	1st
Over ordering	2	8	30	10	102	50	0.51	6th

Table 4 Ranking of the Benefits of Efficient Construction Waste Management in Abuja Metropolis

Benefits	4	3	2	1	Rank Sum (S)	n	Relative Index RI=S/4n	Rank Order
Minimize construction waste that leaves site for landfill	35	15	-	-	185	50	0.925	1st
Maximize material recovery	14	35	1	-	163	50	0.815	5th
Prolong supply of natural resources	13	27	8	2	151	50	0.755	8th
Reduce liability	-	37	9	4	133	50	0.665	10th
Keep job site and the environment cleaner and safer	28	17	5	-	173	50	0.865	3rd
Conserve valuable landfill space	10	34	6	-	154	50	0.770	7th
Ensures sustainable development & environmental protection	27	23	-	-	177	50	0.885	2nd
Ensures compliance with all environmental legislation	8	33	9	-	149	50	0.745	9th
Reduce cost associated with waste disposal	14	35	1	-	163	50	0.815	5th
Enhance the reputation of the construction firm	9	38	3	-	156	50	0.780	6th
Reduce the amount of materials sent to landfills	23	23	4	-	169	50	0.845	4th
Reduce the environmental & health safety risks staff may be exposed to	23	27	-	-	173	50	0.865	3rd

FACTORS THAT CONSTITUTE MAIN CAUSES OF CONSTRUCTION WASTE

The results in table 3 shows that lack of recycling facilities is ranked 1st with relative index of 0.825, reworking and alteration of designs is ranked 2nd with relative index of 0.8. Weather and other natural occurrence is ranked 3rd with relative index of 0.78. Damage by mishandling, vandalism and over ordering are ranked 4th, 5th and 6th with relative index of 0.72, 0.575 and 0.51 respectively.

BENEFITS OF EFFICIENT CONSTRUCTION WASTE MANAGEMENT

Table 4 gives the responses to the list of benefits derivable from efficient construction waste management practices. The result shows that efficient construction waste management practices minimizes construction waste that leaves site for land fill and ensuring sustainable development and environmental protection are ranked 1st and 2nd with a relative index of 0.925 and 0.885 respectively. Cleaner and safer job sites & the environment is ranked 3rd with relative index of 0.865, reduction in the amount

of materials sent to landfills and reduction in cost associated with waste disposal are ranked 4th and 5th with relative index of 0.845 and 0.815 respectively. Enhancement in the reputation of the construction firm; Conservation of valuable landfill space; Prolonged supply of natural resources and ensuring compliance with all environmental legislation are ranked 6th, 7th, 8th, and 9th with relative indexes of 0.78, 0.77, 0.755, and 0.745 respectively. Reduction in liability is ranked 10th with relative index of 0.665. The high relative index values of the various benefits of efficient construction waste management practices in Abuja metropolis by the respondents is an indication that the need for efficient and effective construction waste management practices in Abuja and other cities of the country cannot be overemphasize.

CONCLUSIONS

The work examined construction waste management in the Nigerian capital city Abuja. The study established that some of the construction waste management practices engaged in by firms in the study areas include waste avoidance; construction waste reduction; construction waste re-use; construction waste re-cycling; deconstruction and construction waste disposal.

The research identified Damage by mishandling; Weather and other natural occurrence; Vandalism; Rework and alteration of designs; Lack of recycling facilities; over ordering of construction materials and components as the main causes of construction waste on construction sites.

The benefits of efficient construction waste management was discovered to include minimizing of construction waste that leaves site for land fill, maximization of material recovery, prolonged supply of natural resources, reduced liability, keeping job sites & the environment cleaner & safer, conservation of valuable landfill space and reduction of cost associated with waste disposal among others.

RECOMMENDATIONS

Based on the findings of this study, it is recommended that for an efficient construction waste management to be achieved, the Abuja environmental protection agency should be adequately staffed and empowered financially to enable them enforce the environmental legislations efficiently. Areas in the legislation that are obsolete should be reviewed to meet with modern requirements and practices. More and appropriate licensed landfills for construction waste disposal should be provided. Construction firms and the general public should be properly informed and well enlightened on the existence of these landfills. Re-using, Re-cycling and Deconstruction activities should be encouraged and practiced by construction firms. Facilities/equipments and technologies as well as markets that will make this practicable must be encouraged by the firms and other relevant institutions.

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