



SCHOOL OF ENVIRONMENTAL TECHNOLOGY
FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA, NIGER STATE, NIGERIA

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SETIC **2020** **INTERNATIONAL** **CONFERENCE**

BOOK OF PROCEEDINGS

MAIN THEME:

Sustainable Housing And Land Management

 **3RD -5TH MAY, 2021**

 **SCHOOL OF ENVIRONMENTAL TECHNOLOGY COMPLEX,
FUT, MINNA, NIGER STATE, NIGERIA**

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Federal University of Technology Minna, Nigeria



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SETIC 2020 International Conference:

“Sustainable Housing and Land Management”

School of Environmental Technology, Federal University of Technology, Minna

3rd – 5th, May 2021.





PREFACE

The School of Environmental Technology International Conference (SETIC 2020) is organised by School of Environmental Technology, Federal University of Technology Minna, Nigeria. In collaboration with Massey University New Zealand, Department of Civil Engineering Faculty of Civil Engineering and Built Environment Universiti Tun Hussein Onn Malaysia, Malaysia Centre For Professional Development and Industrial Project Development School of Professional and Continuing Education (SPACE) UTM-KL Malaysia, Global Academia, Department of Architecture, Faculty of Engineering and Architecture, Istanbul Gelisim University Istanbul Turkey, Sustainable Environmental and Technology (SET) Research Group, Department of Architecture, Universiti Sains Islam.

The main theme for this year conference is "SUSTAINABLE HOUSING AND LAND MANAGEMENT". This promotes and encourage innovative and novelty for policy issues for inclusive and sustainable housing; access to finance for housing and land development; sustainable building materials; building cost management; sustainable and resilient cities; geoinformatics for land management; rapid urbanization; sustainable land use and spatial planning and gender issues in access to land.

The responses from participants for this conference are overwhelming, well attended, and successful. The operation mode was virtual for all participants who choose the oral presentation mode and physical for all poster medium presenters. Our participants are from various Universities and other sector across the globe, from countries like United State of America (USA), Turkey, Malaysia, China, Saudi Arabia, Kenya, New Zealand and South Africa just to mention a few. Hence, this conference provides a good platform for professionals, academicians and researchers to widen their knowledge and approach on latest advances in research and innovation. Papers presented in this conference cover a wide spectrum of science, engineering and social sciences.

Finally, a note of thanks must go to SETIC 2020 Local Organizing Committee (LOC) for their remarkable dedication in making this conference a success. We hope the event will prove to be an inspiring experience to all committee members and participants.

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ACKNOWLEDGEMENTS

The effort put together in achieving the success of SETIC 2020 is predicated on the feat of the first and second edition of School of Environmental Technology International Conference held in 2016 and 2018, respectively. The support and goodwill from Vice-Chancellor of Federal University of Technology, Dean School of Environmental Technology, Dr Dodo Y. A., Dr Moveh S. and many other highly motivated people are highly appreciated.

It is also my privilege and honour to welcome you all, on behalf of the Local Organizing Committee (LOC) to the 3rd edition of the Biennial School of Environmental International Conference (SETIC 2020). This Conference which was earlier schedule for 7th to 11 April, 2020 is holding now (3rd to 5th May, 2021) due to the challenges of COVID-19 Pandemic and the ASUU-FGN crisis which made our public Universities in Nigeria to be closed for about one year. We thank God for keeping us alive to witness the great SETIC2020 event, in an improved form exploiting the new-normal situation posed by the Pandemic for a hybrid (i.e. both physical and virtual) form of Conference participation.

The conference provides an international forum for researchers and professionals in the built environment and allied professions to address fundamental problems, challenges and prospects Sustainable Housing and Land Management. The conference is a platform where recognized best practices, theories and concepts are shared and discussed amongst academics, practitioners and researchers. This 2020 edition of SETIC has listed in the program a Round Table Talk on Housing Affordability beyond COVID-19 with selected Speakers from across the globe available to do justice on the topic of discussion.

Distinguished Conference participants, permit me to warmly welcome our Keynote and Guest Speakers:

- Prof. Ts. Dr. Mohd Hamdan Bin Ahmad, *Deputy Vice Chancellor (Development) Universiti Teknologi Malaysia (UTM)*;
- Assoc. Prof. Dr. James O.B. Rotimi, *Academic Dean Construction, School of Built Environment, College of Sciences, Massey University of New Zealand*;
- Assoc. Prof. Sr. Dr. Sarajul Fikri Mohammed, *General Manager, Centre for Professional Development and Industrial Project Development School of Professional and Continuing Education (SPACE), UTM-KL*.
- Prof. Ts. Dr. Zana'il Abidin Akasah, *Visiting Professor on Sustainable Solar Integrated Design Building Design, International Micro Emission University (IMEU)/HIMIN Ltd. China & Senior Research Fellow, The Architects Resourcery, Jos, Nigeria*;
- Ar. Dr. Elina Mohd Husini, *Department of Architecture, Faculty of Engineering & Built Environment, Universiti Sains Islam*;
- Asst. Prof. Dr. Yakubu Aminu Dodo, *Department of Architecture, Faculty of Engineering and Architecture Istanbul Gelisim University, Istanbul Turkey*

and the five Speakers for our Round Table Talk on "Housing Affordability beyond COVID-19"

- Dr. Muhammad Mustapha Gambo, *Manager, Policy, Research and Partnerships, Shelter Afrique, Nairobi, Kenya*;

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- Prof. Dr. Soumia Mounir, *Department of Architecture Ecole Nationale*

- Prof. Dr. Soumia Mounir, *Department of Architecture Ecole Nationale d'Architecture d'Agadir [The National School of Architecture of Agadir], Morocco*
- Dr. Said Alkali Kori, *General Manager, Projects and Portfolio management, Family Homes Fund, Federal Ministry of Finance, Abuja;*
- Ts. Dr. Sasitharan Nagapan, *Department of Civil Engineering, Faculty of Engineering and Built Environment, Universiti Tun Hussein Onn Malaysia, Malaysia;*
- Dr. Mercy Nguavese Shenge, *AIA Assoc. Historic District Commissioner, City of Rockville, MD, USA.*

For accepting to share from their knowledge, wealth of experience and be available to interact with participants on varied issues on “Sustaining Housing and Land Management”.

As reflected on the Conference program, the Conference activities will be Virtual for power point presenters to run in four parallel sessions on the Zoon platform while the participants for Poster presentations (mostly Postgraduate students) are expected to have their Posters displayed in the Environmental Complex Building of the Federal University of Technology, Minna. With a total of One Hundred and One (101) articles captured in the Conference Proceedings covering the seven subthemes of the Conference, I have no doubt that we are all in for an impactful experience at SETIC2020 as we brainstorm, exchange ideas, share knowledge and participate in evolving more approach to sustainable housing and land management drives.

I implore us all to enjoy every moment of the deliberations and ensure we maximize the great opportunity offered by the Conference to network for better research and career development as we also make new friends.

I also on behalf of myself and the LOC express our appreciation to the Dean, School of Environmental Technology and the entire Staff of the School for giving us the opportunity to steer the ship for SETIC2020. To the Reviewers and various Committees that served with us, I say thank you for helping us through despite the pressure of work.

Thanks, and God bless you all.

Olawuyi, B.J. (PhD)
Chairman, LOC
SETIC2020

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DECLARATION

PEER REVIEW AND SCIENTIFIC PUBLISHING POLICY

DECLARATION

PEER REVIEW AND SCIENTIFIC PUBLISHING POLICY STATEMENT

3rd May 2021

TO WHOM IT MAY CONCERN

I wish to state that all the papers published in SETIC2020 Conference Proceedings have passed through the peer review process which involved an initial review of abstracts, blind review of full papers by minimum of two referees, forwarding of reviewers' comments to authors, submission of revised papers by authors and subsequent evaluation of submitted papers by the Scientific Committee to determine content quality.

It is the policy of the School of Environmental Technology International Conference (SETIC) that for papers to be accepted for inclusion in the conference proceedings it must have undergone the blind review process and passed the academic integrity test. All papers are only published based on the recommendation of the Reviewers and the Scientific Committee of SETIC

Babatunde James OLAWUYI
Chairman SETIC2020
Federal University of Technology, Minna, Nigeria

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ACKNOWLEDGEMENT TO KEYNOTE SPEAKERS AND GUEST SPEAKERS

SETIC 2020 organisers wishes to thank our keynote speakers, and Guest speakers for accepting to create time to share from their rich wealth of knowledge and interact with delegates and participants on varied issues being examined at this year's conference. A brief profile of each keynote speaker is provided here, this would allow for future interaction and networking with them.



Key-Note Speaker I

Prof. Ts. Dr. Mohd Hamdan Bin Ahmad
Deputy Vice Chancellor (Development)
University Teknologi Malaysia



KEY-NOTE SPEAKER II

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International Micro Emission University (IMEU), NISBM
LEO China & Senior Research Fellow The Architects
Remunary, Jua Nigeria



Key-Note Speaker III

Associate Prof. Dr. James O.B. Rotimi
Academic Dean Construction, School of
Built Environment, College of Sciences,
Massey University of New Zealand



Key-Note Speaker IV

Assoc. Prof. Sr. Dr. Sarajul Fikri Mohamed
General Manager, Centre for Professional Development
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UTM, Malaysia



Guest Speaker I

Asst. Prof. Dr. Yakubu Aminu Dodo
GREM, MyCREST MAARCHES
Istanbul Gelism University, Istanbul Turkey



Guest Speaker II

Ar. Dr. Elina Mohd Husini
Department of Architecture Faculty
Engineering & Built Environment,
Universiti Teknikal Malaysia

ROUND TABLE PANEL SPEAKERS

Round Table Talk

On Housing Affordability Beyond Covid-19

Main Theme

SUSTAINABLE HOUSING AND LAND MANAGEMENT



Dr. Muhammad Mustapha Gambo
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Istanbul Gelisim University, Istanbul Turkey
Moderator*



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Influence of Material Waste Management on Construction Project Delivery in Abuja, Nigeria

Garba. Y. Y., Yisa. S. N. & Umar. M. I.

Department of Building, Federal University of Technology Minna, Nigeria

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Abstract:

Construction Waste Management is an aspect of Sustainable Development, which is fueled by the growing need of man for infrastructural amenities. Improper control of materials during different stages of construction has some influence on construction project delivery. The aim of this study was to assess the influence of materials waste management on construction project delivery in Abuja by identifying the sources of construction material waste, evaluating the influence of materials waste management on construction project delivery and the performance techniques and strategies of reducing construction materials waste in a construction project. Quantitative methodology was used, involving the use of questionnaires to obtain data which was analysed to obtain the RII. The result revealed that the most influence of materials management on construction project delivery are; time overrun/delay, productivity, cost overrun/increase project cost, environmental impacts, brings contractors to disrepute among others, the results also reveal that the performance of some of the strategies of reducing the effects of materials waste management which are; materials planning method, materials handling, proper planning, monitor, and control of materials, and materials waste control. The researcher recommends the use of these strategies and measures to minimize the influence of materials waste management on construction project delivery

Keywords: Waste Management, Project Delivery, Material Waste, Sustainable Development, Infrastructures

1.0 INTRODUCTION

Constructions projects are sophisticated and complex processes that needs to be carried out by individuals with special set of skills and knowledge that is channeled toward achieving sustainable project deliver (Ocheoha & Moselhi 2013). According to Umar (2021) proper material waste management on construction sites leads to project that are delivered within acceptable cost and required standards thus providing facilities that are useful and functional to occupy. Waste management in construction site is very essential because improper management of materials during site activities has the potential to severely affect project performance and delivery (Mohammed, 2019). According to Takim & Akintoye (2012) the major issues that affect materials management activities include constraints on storage areas, site logistics concerning materials handling and distribution, ordering and delivery of materials to the construction site, improper storage, transportation difficulties and inappropriate materials delivery and non-compliance with specification according.

Construction activities generate wastes at various stages of the construction process from inception, right through the design, construction and operation stages of the built structure (Wahab & Lawal, 2011). According to Gulghane & Khandve (2015) construction waste is a complex waste stream made up of a wide variety of materials which are in the form of building debris, rubble, earth, concrete, Steel, timber, and mixed site clearance materials, arising from various construction activities including land excavation or formation, civil and building construction site, clearance, demolition activities, roadwork, and building renovation.

Wastage of materials will lead to increase in total cost of building project; this assertion is supported by (Mohammed, 2019). who opined that building material wastage on construction sites contributes to cost overruns, time overrun, productivity, litigation and environmental pollution. This implies that in-depth review, identification of causative factors of waste, assessment of these factors and any improvement in materials wastage management on construction sites will enhance the cost performance of projects delivered in Nigeria. This study therefore, intends to provide answers to the following research questions which include:

Garba et al: Influence of Material Waste Management on Construction Project Delivery in Abuja, Nigeria

What are the causes of construction material waste?

What is the influence of materials waste management on construction project delivery?

2.0 LITERATURE APPRAISAL

2.1 Material Management

Materials management practice involves planning, coordinating and assessing the requirement for sourcing, purchasing, transporting, storing of materials to minimize wastage and optimize profitability (Umar 2021). According to Phu & Cho, (2014). Materials Management involves management system for planning and controlling all necessary efforts to make certain that the right quality and quantity of materials and equipment are specified in a timely manner, are obtained at a reasonable cost and are available when needed.

2.2 Construction Waste

Waste in construction occurs in various construction stages ranging from design to finishing and they emanate from wooden materials, concrete, gravels, aggregate, masonry, metals, plastic, plumbing and electrical fixtures, glass and material handling (Napier, 2012). According to Mohammed (2019), construction waste are materials transported off the construction sites or used within the construction sites for land filling, incineration, recycling, reusing or composting other than the intended specific purpose of the project as a result of material damage, excess, non-use, or non-compliance with the specifications or being a byproduct of the construction process. Construction waste are unwanted materials generated during construction, they include rejected structures and materials, materials which have been over-ordered or are surplus to requirements, and materials which have been used and discarded (Ahmed 2019)

2.2.1 Construction Material Waste

According to Gulghane & Khandve, (2015) construction waste can be divided into three namely: material, time and machinery. However, this research focuses on materials waste which according Kevin (2012) refer to materials on construction sites that are unusable for the purpose of construction. Similarly, according to Ameh & Itodo (2013) material waste include materials that are not needed on the site and needs to be transported away from the construction site, these materials are not used for their intended purpose of the project due to damage, excess or non-use or which cannot be used due to non-compliance with the specifications, or which is a by-product of the construction process.

2.3 Causes of Construction Materials Waste

According to Mohammed (2019) the main causes of construction waste are: Poor coordination of all parties during the design stage, Design changes, Lack of attention to the standard size of specific products, Error in contract documentation, Material delivery procedures, Material storage and internal transport. Similarly Shant, & Daphene, (2014) identifies Inappropriate storage, Errors by tradesman, Inclement weather, Equipment problems, Use of incorrect material, Accidents, Poor site management and supervision, Lack of coordination of responsibilities between contractor and subcontractors as some of the causes of construction material waste.

Ekanayake *et al.* (2009), found the causes of construction waste in Singapore construction industry sites are Lack of attention paid to dimensional coordination of products, Changes made to the design while construction is in progress, Lack of attention paid to standard sizes available in the market, Designer's unfamiliarity with alternative products, Complexity of detailing in the drawings, Lack of information in the drawings, Errors in contract documents,

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Incomplete contract documents at commencement of project. Selection of low quality products.

Incomplete contract documents at commencement of project, Selection of low quality products, Errors by tradespersons or laborers, Accidents due to negligence and Damage to work done caused by subsequent trades. Similarly Adewumi & Otali (2013) identify the use of incorrect material, Delays in passing of information to the contractor on types and sizes of products to be used, Equipment malfunctioning, Damages during transportation, Inappropriate storage, Materials supplied in loose form, Unfriendly attitudes of project team and laborers, Theft, Ordering errors (e.g. ordering significantly more or less), Lack of possibilities to order small quantities, Purchased products that do not comply with specification as causes of construction material waste.

2.4 Influence of Materials Waste Management on Construction Project Delivery

Management of construction material is a new practice in the construction industry Ocheoha & Moselhi (2013). Therefore, reviews of literature summarize the influences material waste management will have on project delivery in Table 2.0. The influence of materials waste management on project delivery can be identified both from a positive and negative perspective effects. From positive effects, effective material management has a positive impact on time optimization, cost saving, quality maximization, productivity improvement and waste minimization. On the other hand, this research work will focus on the negative effects on project delivery such as time delay, cost overrun, poor quality, loss of productivity and excessive waste generation. However, in the table below more influence of materials waste management are listed.

Table 2.0 Influence of Materials Waste Management on Construction Project Delivery

S/N	Influence of Materials Waste Management on Construction Project Delivery
1.	Time overrun/delay
2.	Cost overrun/increase project cost
3.	Dispute
4.	Arbitration
5.	Litigation
6.	Quality
7.	Productivity
8.	Total abandonment
9.	Insolvency as a result of loss
10.	Decrease in turnover
11.	Brings contractors to disrepute
12.	Environmental impact

Source: literature survey 2021

3.0 RESEARCH METHODOLOGY

Quantitative methodology was used which involves the use of questionnaire to obtain data. Questionnaire was used to collect data on the influence of materials waste management on construction project delivery in Abuja. The target population of the research was total 245 officially enlisted construction firms in Abuja obtained from the headquarters of the Federal Capital Territory Administration (FCTA), Abuja. Since not all the firms could be included in the study a purposive sampling technique was adopted. This involves the deliberate selection of 43 construction firms in Abuja to constitute the sample size for this research work.

4.0 DATA PRESENTATION ANALYSIS AND DISCUSSION OF RESULTS

4.1 Demography of Respondents

It can be seen from the table 4.1 that builders are the majority of the respondents with BSC/BTECH holders having the highest numbers while 5-10 years' experience being the majority of the respondents. Table 4.1 summary the respondents profile

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Table 4.1: Summary of Respondents Profile

Variable	Characteristics	Number of Respondents	Percentage (%)
Profession	Builders	15	34.9
	Architects	5	11.6
	Civic engineers	15	34.9
	Surveyors	8	18.6
	Total	43	100
Academic Qualification	HND	9	20.9
	BSC/BTECH	24	55.8
	PGD	7	16.3
	MSC/MTECH	3	7.0
	Total	43	100
Years of experience	Below 5	11	25.6
	5-10	21	48.8
	10-15	6	14
	15-20	3	7
	Above 20	2	4.6
	Total	43	100

Source: Field Work (2021)

4.2 Influences of Materials Waste Management on Construction Project Delivery

Table 4 presents the result of the study. There are various Influences of materials waste management causes posited in various literatures. Respondents were requested to choose in terms of relevance among the Influences of Materials Waste Management as seen in the Table.

Table 4.3: Influence of Materials Waste Management on Construction Project Delivery.

Influence of Waste Management	RII	Ranking
Time overrun/Delay	0.842	1
Cost Overrun/Increase project cost	0.833	2
Dispute	0.753	6
Arbitration	0.712	9
Litigation	0.740	7
Quality	0.735	8
Productivity	0.842	1
Total abandonment	0.791	4
Insolvency as a result of loss	0.702	10
Decrease in turnover and Profit	0.777	5
Brings contractor to disrepute	0.814	3
Environmental Impact	0.814	3

Source: Field Work (2021)

4.3 Discussion of Results

From the survey carried out, it is impressive to know that all the influences of materials waste management on construction project delivery have high RII rating as it is above 0.60. The respondents ranked "Time overrun/Delay" with a very high RII rating of 0.842 as the most important influences of materials waste management on construction project delivery, While "Insolvency as a result of loss" was the least with rating of 0.704.

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5.0 CONCLUSION AND RECOMMENDATION

Influences of materials waste management on construction project delivery were identified

5.0 CONCLUSION AND RECOMMENDATION

Influences of materials waste management on construction project delivery were identified from literature survey and were used to obtain data. RII was used for data analysis with "Time overrun/Delay" identified as the most important Influence of materials waste management on construction project delivery, while "Insolvency as a result of loss" was the least relevant Influence of materials waste management on construction project delivery. Construction firms should be encouraged to integrate materials waste management in all aspect of project implementation so as to achieve sustainable project delivery.

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