



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

**EDITORS IN CHIEF**

R. E. Olagunju

B. J. Olawuyi

E. B. Ogunbode

**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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Vice-Chancellor:  
Federal University of Technology Minna, Nigeria

**Host:**

**Prof: R.E. Olagunju mnia**  
Dean, School of Environmental Technology  
Federal University of Technology Minna, Nigeria

**School of Environmental  
Technology International  
Conference  
(SETIC 2020)**

**3RD – 5TH MAY, 2021**

**Federal University of Technology Minna, Niger  
State, Nigeria**

**CONFERENCE PROCEEDINGS**

**EDITORS IN CHIEF**

**R. E. Olagunju**

**B. J. Olawuyi**

**E. B. Ogunbode**

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SETIC 2020 International Conference:

“Sustainable Housing and Land Management”

School of Environmental Technology, Federal University of Technology, Minna  
3<sup>rd</sup> – 5<sup>th</sup>, May 2021.

# Proceedings of the 3rd School of Environmental Technology International Conference (SETIC 2020)

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SETIC 2020 International Conference:

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3<sup>rd</sup> – 5<sup>th</sup>, 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 Technology 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. Zanail 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”

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

Papers in the SETIC2020 Conference Proceedings are published on [www.futminna.edu.ng](http://www.futminna.edu.ng),  
AND ALSO SELECTED PAPERS WILL BE PUBLISHED IN REPUTABLE JOURNALS



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## ORGANISING COMMITTEE

### CHIEF HOST

**Prof. Abdullahi Bala**  
Vice-Chancellor,  
Federal University of Technology Minna, Nigeria

### HOST

**Prof. Olagunju Remi Ebenezer**  
Dean  
School of Environmental Technology,  
Federal University of Technology Minna, Nigeria

### CONFERENCE CHAIRS

Conference Chair	Parallel Sessions
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Prof. Kemiki O.	Building Cost Management
Prof. (Mrs) Zubairu S. N.	Gender Issues in Access to Land
Prof. Nuhu M. B.	Access to Finance for Housing and Land Development
Prof. Ajayi M.T.A	Policy Issues for Inclusive and Sustainable Housing
Prof. Sanusi Y.A	Rapid Urbanization, Sustainable Land Use and Spatial Planning
Prof. Jimoh R.A.	Sustainable Building Material

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Prof. Jimoh R.A.	HOD, Department of Building
Prof. Kemiki O.A	HOD, Department of Estate Management and Valuation
Dr. Mohammed Y.	HOD, Department of Quantity Surveying
Prof. Musa A.	HOD, Department of Surveying and Geoinformatics
Dr. Umaru E. T.	HOD, Department of Urban and Regional planning

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Dr. Muhammad I.B.	Member	Deputy Dean, School of Environmental Technology, Federal University of Technology, Minna
Dr. Ogunbode E.B.	Member	Department of Building, Federal University of Technology Minna, Nigeria
Dr. Sule A. I.	Member	Department of Estate Management and Valuation, Federal University of Technology Minna, Nigeria
Dr. Akande O. K	Member	Department of Architecture, Federal University of Technology Minna, Nigeria
Dr. Adamu A.	Member	Department of Quantity Surveying, Federal University of Technology Minna, Nigeria
Dr. Ajayi O.O.	Member	Department of Surveying and Geoinformatics, Federal University of Technology Minna, Nigeria
Dr. Morenikeji G.	Member	Department of Estate Management and Valuation, Federal University of Technology Minna, Nigeria
Dr. Mohammed B.B.	Member	Urban and Regional planning, Federal University of Technology Minna, Nigeria
Dr. Hassan I.O.	Member	Department of Building, Federal University of Technology Minna, Nigeria

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Dr. Ibrahim Saidu	Member	Department of Quantity Surveying, Federal University of Technology Minna, Nigeria
Dr. Musa Haruna	Member	Urban and Regional planning, Federal University of Technology Minna, Nigeria
Dr. Odumosu J. O.	Member	Department of Surveying and Geoinformatics, Federal University of Technology Minna, Nigeria
Dr. Isah A. D.	Member	Department of Architecture, 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.



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## ROUND TABLE PANEL SPEAKERS



**Round Table Talk**  
On Housing Affordability Beyond Covid-19

**Main Theme**

**SUSTAINABLE HOUSING  
AND LAND MANAGEMENT**

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

**Prof. Dr. Soumia Mounir**  
Department of Architecture Ecole Nationale  
d'Architecture d'Agadir [The National School of  
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**Dr. Said Alkali Kori**  
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Management Family Homes Fund Federal  
Ministry of Finance, Abuja.

**Ts. Dr. Sasitharan Nagapan,**  
Department of Civil Engineering Faculty of Civil  
Engineering and Built Environment Universiti Tun  
Hussein Onn Malaysia, Malaysia

**Dr. Mercy Nguavese Shenge**  
AIA Assoc. Historic District Commissioner,  
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**Moderator**

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## Effective Implementation of Health and Safety Practices on Construction Site: Barriers and Movers

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### Abstract

Full implementation of health and safety (H&S) practices in construction has been a tough battle over the years. The literature indicates that enforcement by statutory authority is one of the key factors for effective implementation. However, the level of enforcement by the statutory authority in Nigeria is very low. Hence, the need for active means of implementation of H&S practices in Nigerian construction. Therefore, this paper investigated the barriers and movers of effective implementation of H&S management practices in construction site in Abuja the Federal Capital City of Nigeria where there were several ongoing projects during the study. Structured questionnaire and review of relevant literatures were used to obtain data for the study. Importance index was the major statistical tools used in analysis of the data obtained. The study identified absence of provision for cost of H&S practices in the bill of quantities, lack of record of performance as prerequisite for tender selection, inadequate training of staff and clients influence as the most important factors inhibiting effective implementation of H&S practices in Nigerian construction site.

**Keywords:** Construction, Health, Safety, Implementation, Practice.

### INTRODUCTION:

The construction industry provides the necessary infrastructures that stimulate National development and it provides about 25% of the total work force in Nigeria (Cheah *et al.*, 2007; Rao *et al.*, 2015). The industry is labour intensive and incorporated floods of human resources and machines, therefore health and safety management practice on the construction site is paramount (Enhassi *et al.*, 2008; Alhageri, 2011).

It has been reported worldwide that the construction industry is one of the most risky and hazardous industry, and that in every six fatal accidents; one must be on a construction site. (Spillane and Oyedele, 2013; Umeokafor *et al.*, 2014). This was further eluded that about 60,000 and above fatal accidents occurred on construction sites around the world every year (Health and Safety Executive, 2004). This risky and hazardous nature of the construction job is still controllable, depending on the work conditions which is humanity controllable, (Olutuase, 2014). The worries and questions being raised by many researchers and some constructions professionals is that why should worst safety and health conditions persist on construction site in Nigeria and other developing nations of the world, seeing that there are windows through which health and safety conditions of the construction workers can be improved.

The answers of these questions raised are not farfetched from the assertion of Makinde (2014) that there is a need for special attention to health and safety management practice on construction firms in Nigeria. The target of this paper is to investigate the various factors that negatively and positively influence effective implementation of H&S practices on construction site in Abuja with a view to effectively implement H&S practices in Nigerian construction.

## LITERATURE REVIEW

### **Factors hindering health and safety practices implementation on construction sites**

The factors hindering the effective implementation of H&S practice on construction sites are not limited to weak statutory occupational Health and safety regulations/provisions; lack of management and stake holder's commitment to occupational H&S; lack of enforcement of H&S regulations by the enforcement authority; bribery and corruption; absence of H&S officers on site (inspectors) to monitor implementation; in adequate training of construction workers; lack of awareness and improper medium for communicating information; activities of the informal sector; leaving the implementation of H&S practice at the discretion of the construction firms or employer; inadequate/untimely provision of personal protective equipment (PPES); lack of H&S signs and notice on site, and lack of regular safety audit (Oyedele, 2013; Enhassi *et al.*, 2008; Alhageri, 2011).

### **Strategies for effective implementation of Health and safety practices on construction sites**

Othman (2012), Nzuve and Lawrance (2012) outline some of the measures that can be used to overcome the factors that hinder the effective implementation of H&S practice in construction projects. These measures are to: identify hazard from the beginning or from the earliest design stage and through all other steps in the engineering process; isolate workers from harmful substances; potential dangerous substances should be replaced with the one that secure a healthy and safety working environment; train workers and medically examine them before employment, and make available all medical programmes that could lead to standard or effective H&S of employees on construction site.

## METHODOLOGY

This study aims to investigate the barriers and movers for effective implementation of H&S practices on construction site with a view to effectively implement H&S practices in Nigerian construction. To achieve this aim, survey research design was adopted. To be precise, the survey research design adopted in this study involved collection of quantitative data through structured questionnaire. The study population included all the firms that were registered with Federal Capital Development Authority (FCDA) Abuja. The preliminary investigations on the registered firms with FCDA during the study indicated that the firms of all categories (Small, medium and large firms) that have fully registered with FCDA were 188 in number. This 188 served as the targeted population of the study. In order to obtain the true representation or sample size of the population, purposive technique was adopted (Bernold and lee, 2010). Therefore, emphasis was placed on the firms that have ongoing project (s) on site, and their employees were willing to participate in the study. These conditions were serious elimination weapons that was used to reduce the total number of firms from 188 to only 34. The 34 are from both medium and large construction firms in the study context.

After extensive literature review on the barriers and movers of H&S practices on site, a structured questionnaire was designed to seek information on the opinions of construction stakeholders on the factors that hinder the effective implementation of H&S practice on construction sites. The designed questionnaire was also used to obtain data on probable movers for effective implementation of H&S regulation on construction sites. The questionnaire was

administered directly to the managers of each studied site and collected after filling by the respondents. This implies that a total of 34 questionnaires were distributed to the selected 34 sampled construction sites in Abuja. All the 34 questionnaires were duly completed and returned indicating 100% response rates for the study. The participants of the questionnaire study were asked to rank the barriers/movers of H&S practices implementation on site on a Likert of 1 to 5 which was used to establish the mean item score (MIS) of each discovered variables. The academic qualifications of the respondents ranges from first degree to PhD holders. All the respondents were well experienced as they have been involved in different projects over the years. The data obtained was analysed through descriptive and non-descriptive statistical methods of data analysis.

## RESULTS AND DISCUSSION

The result of the analysis of data collected for this study is presented in tabular form and discussion follows.

*Table 1: Bearers to effective implementation of Health and Safety Practice on Nigeria Construction site.*

Factors	SI	Ranking
v. Absence of provision for the cost of health and safety measures from BOQ	0.913	1
v. Lack of commitment to health and safety at work place by stakeholders of construction project	0.862	2
/i. Designer not taken into consideration health and safety problem associated with subsequent maintenance and up keep of building at designer stage.	0.821	3
ii. Absence of government safety inspectors to monitor implementation of HSP on construction sites	0.781	6
ii. Lack of management’s commitment on health & safety practice at work place	0.790	5
x. Refusal of the employees to use personal preventive equipment (PPE) provided	0.690	9
x. Non-availability and inadequacy of clinical services for employees	0.770	7
xi. Refusal of employees to adhere to HS laws and instruction	0.811	4
ii. Lack of orientation for new workers	0.670	11
ii. Inadequate and total absence of first aid and medical arrangements	0.683	10
v. Absence of induction training	0.700	8
v. Lack of safety plans	0.632	14
/i. Lack of clarity or total absence of emergency exit	0.641	13
ii. Lack of regular safety audit	0.656	12
ii. Inability of the management to identify hazards	0.541	15
x. Lack of health and safety signs and notices	0.512	16
x. Unfriendly site conditions and security	0.490	18
xi. Willful interference with anything provided in the interest of health and safety	0.500	17

Table 1 present barriers to effective implementation of health and safety practices on Nigeria construction sites. The respondents indicated eighteen (18) factors that militate against successful implementation of H&S practices in Nigeria construction sites. Based on the MIS of the variables, it can be emphasized that absence of the provision for the cost of H&S measure in tender document (BOQ), lack of stakeholder’s commitment to H&S at work place, and designers not taken in consideration H&S problem associated with subsequent maintenance/up keep of building at design stage are the significant factor that inhibit effective implementation of H&S practices in

Nigerian construction site. Hence, for effective H&S practices implementation in Nigerian construction, there is need to bring up strategies that can be adopted to overcome the aforementioned barriers for effective H&S implementation in the study context.

Table 2: Movers of Effective Implementation of Health and Safety Practice on Construction Site

Factors	RII	Ranking
• Adequate provision for cost of health and safety measures in tender documents	0.884	1
• Management commitment to health and safety measures (HSM) at work place being noticed and physically seen	0.867	2
• Adequate safety training	0.830	3
• Integrating health and safety of construction workers into design and planning process	0.794	4
• Availability of clinical services for employees	0.776	5
• Adequate and timely supply of PPE	0.743	6
• Safe system of work plans to mitigate personal health and safety issues	0.725	7
• Provision of adequate information of hazard	0.678	8
• Regular health and safety audit	0.614	9
• Presence of government safety inspectors to monitor the implementation of HSP on site	0.587	10
• Taking into account safety problems associated with maintenance and up keep of building	0.546	11
• Must not place at risk the health or safety of any person at the workplace	0.531	12
• Create a sense of security in doing work	0.512	13

Table 2 present factors that enhance effective implementation of H&S practices on Nigeria construction sites. The respondents identified thirteen (13) factors as movers of effective implementation of health and safety practices on construction sites in Abuja Nigeria. The factors were equally ranked based on their importance as movers of effective implementation of H&S practices on construction sites. Based on the outcomes of the study, adequate provision for cost of health and safety measures in tender documents, management commitment to H&S measures at work place and adequate safety training are the significant factors that can be adopted for effective implementation of H&S practices in Nigerian construction site. It is important to also note that all the important index values were more than fifty percent (50%). This implies that all the factors indicated by the respondents in this study play significance role(s) in enhancing effective implementation of H&S practices on construction site in Abuja. This result shows that even though construction job is highly risky and hazardous, it could still be controlled to reduce the risk and the hazard level to the nearest minimum. This will improve the H&S of the workers, which will consequently improve the performance of individuals and the firms at large.

**SUMMARY OF FINDINGS**

Based on the study conducted, it can be observed that absence of provision for the cost of H&S measures from the BOQ; lack of commitment to H&S measures at work place

by construction actors, and designers not taken into consideration H&S problem associated with subsequent maintenance and up keep of building at the designer stage are the significant factors that have been hindering the effective implementation of H&S practices in Nigerian construction site. It was also noticed that adequate provision for cost of H&S measures in tender documents, management commitment to health and safety measures at work place, and adequate staff safety training are the noteworthy strategies that can be used to reduce some of the factors that hinder the effective implementation of H&S practices in Nigerian construction.

## CONCLUSION

This study revealed that the state of implementation of H&S practices in Nigerian construction site is very poor due to certain factors such as absence of provision for the cost of H&S measures from the BOQ and lack of commitment to H&S measures at work place by construction actors. Therefore, for effective implementation of H&S practices in the study context, the aforementioned barriers need to be overcome through certain strategies such as adequate provision for cost of H&S measures in tender documents, management commitment to health and safety measures at work place, and adequate staff safety training by firm management.

Based on the findings and conclusion of this study, it is recommended that a framework for effective implementation of H&S practices in Nigerian construction site should be developed. Such framework should be developed through the significant mover of H&S practices identified in this study. Hence, such framework will enable minimum standard of H&S practices on construction sites to be strictly enforced at every phase of a project.

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