

# **PROCEEDING 16**



FEDERAL UNIVERSITY OF TECHNOLOGY  
MINNA, NIGER STATE, NIGERIA



SCHOOL OF ENVIRONMENTAL TECHNOLOGY  
INTERNATIONAL CONFERENCE (SETIC) 2018

# CONFERENCE *Proceedings*

**CONTEMPORARY ISSUES  
AND SUSTAINABLE PRACTICES  
IN THE BUILT ENVIRONMENT**

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Asimiyu M. JUNAID  
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Richard A. JIMOH  
Luqman O. OYEWOBI

**School of Environmental  
Technology International  
Conference  
(SETIC) 2018**

**10-12 APRIL 2018**

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

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**Volume 1**

**Editors**

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## Conference Proceedings of the School of Environmental Technology International Conference (SETIC) 2018

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10th – 12th APRIL 2018

School of Environmental Technology,  
Federal University of Technology, Minna, Niger State, Nigeria.

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## FOREWORD

The organising committee of the 2<sup>nd</sup> School of Environmental Technology International Conference is pleased to welcome you to Federal University of Technology Minna, Niger State Nigeria.

The conference provides an international forum for researchers and professionals in the built and allied professions to address fundamental problems, challenges and prospects that affect the Built Environment as it relates to Contemporary Issues and Sustainable Practices in the Built Environment. The conference is a platform where recognised best practices, theories and concepts are shared and discussed amongst academics, practitioners and researchers. The scope and papers are quite broad but have been organised around the sub-themes listed below:

- Architectural Education and ICT
- Building Information Modeling
- Construction Ethics
- Energy efficiency and Conservation
- Environmental Conservation
- Facility Management
- Green Construction and Efficiency
- Health and Safety Issues
- Information Technology and Building Maintenance
- Information Technology and Construction
- Information Technology and Design
- Innovative Infrastructure Development
- Resilient Housing Development
- Smart Cities Development
- Social Integration in Cities
- Sustainable Building Materials Development
- Sustainable City Growth
- Sustainable Cost Management
- Sustainable Property Taxation
- Sustainable Architectural Design
- Sustainable Urban Transportation Systems
- Theory and Practices for Cost Effectiveness in Construction Industry
- Urban Ecology Management
- Urban Land Access
- Disasters, Resilient Cities and Business Continuity

We hope you enjoy your time at our conference, and that you have the opportunities to exchange ideas and share knowledge, as well as participate in productive discussions with the like-minded researchers and practitioners in the built environment and academia.

**Local Organising Committee**  
**School of Environmental Technology International Conference (SETIC) 2018**  
**APRIL 2018**

in the preparation of the revised papers. It was after this rigorous and time consuming process that we were able to accept 177 papers for presentation at the conference. It gives me great joy therefore to congratulate all the authors whose papers made it to the conference. It is my sincere believe that the presentation of the different ideas in your paper would go a long way in improving the knowledge of the participants and also generate meaningful discussions over the tea breaks, lunch and beyond.

I wish to express my utmost gratitude to each of the Seventy-three (73) reviewers for a wonderful job done well and for tolerating our deadlines and Oliver Twist syndrome. It is your dedication and expertise that has ensured that the conference is a success.

Special thanks to all our keynote speakers, Arc. Umaru Aliyu, (ficiArb, fnia, ppnia) (*President, Architects Registration Council of Nigeria (ARCON)*), Prof. Stella N. Zubairu (*Former Dean Postgraduate School, Federal University of Technology Minna*), Dr. Julius A. Fapohunda, (*Editor-in-Chief, International Journal of Sustainable Energy Development & Leader, Sustainable Building and Urban Growth Research Unit, Cape Peninsula University of Technology*).


It is important to appreciate the roles and efforts of the following people for their selfless and very significant contributions made towards the successful organization of the conference: Oyetola Stephen, Alonge Olubunmi, Lynda Odine, Adedokun John, Idowu Oqua, Bamidele Eunice and Muhina Lami (for being available to run around at very short notice).

The organisation of this conference would not have been this easy without dedicated individuals offering to serve. My heartfelt gratitude goes to Dr. Taibat Lawanson, Dr. R.A. Jimoh, Dr. I. O. Oyewobi, Dr. N.I. Popoola, Dr. Lekan Sanni, Dr. I.B. Muhammad, Dr. A.A. Shittu and Dr. A. Saka for their unflinching support all through the process.

It is our sincere hope that this conference will serve as a forum for the advancement of research in the urban sphere towards achieving a sustainable environment. It is our sincere believe that academics and professionals in practices will continually participate in this forum.

Worthy thanks goes to the members of the Local Organising Committee for the tireless effort. The success of the conference goes to these wonderful people. You have made SETIC 2018 to ROCK.

Once again I wish to thank you all for creating time out of your busy schedule to attend this conference. Please do enjoy your stay at Federal University of Technology Minna, and the city as a whole. Ensure that you make use of the different fora created throughout the conference to build new relationships for the future and strengthen existing relationships. I look forward to seeing you all in future.



Olatunde Folaranmi ADEDAYO  
SETIC 2018 LOC Chairperson  
APRIL 2018

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# **DECLARATION**

## **PEER REVIEW AND SCIENTIFIC PUBLISHING POLICY STATEMENT**

10th APRIL 2018

TO WHOM IT APRIL CONCERN

I wish to state that all the papers published in SETIC 2018 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

Names and individual affiliation of members of Review and Scientific Committee for SETIC Conference 2018 are published in the SETIC 2018 Conference Proceedings and made available on [www.futminna.edu.ng](http://www.futminna.edu.ng)

Olatunde Folaranmi ADEDAYO  
Chairman SETIC 2018  
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Papers in the SETIC 2018 Conference Proceedings are published on [www.futminna.edu.ng](http://www.futminna.edu.ng).

## REVIEW PANEL

We wish to express our deepest and sincere gratitude to the following people in no particular order who provided comprehensive scientific reviews and made commendable suggestions towards improving the over 258 abstracts and 182 full papers submitted to SETIC 2018. They provided constructive comments to authors regarding their papers, it is necessary to state that there was no reported case of conflict of interest by any of the reviewers or the authors.

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## ACKNOWLEDGEMENTS

We have tried to build on the success of the maiden of SETIC held in 2016 which came with good feedbacks and memories. The success of the 2<sup>nd</sup> School of Environmental Technology International Conference holding at the Main Campus of the Federal University of Technology Minna, Nigeria is predicated on the support and goodwill from Vice-Chancellor of Federal University of Technology, Dean School of Environmental Technology and many other highly motivated people.

I sincerely wish to appreciate you for attending this Second edition of SETIC and to warmly welcome you to the city of Minna the capital of the *POWER STATE*. It is a great honour to have you in the beautiful campus of Federal University of Technology Minna, Nigeria. I am aware of the great sacrifices made by many of you to be present in this occasion and I will definitely not overlook the long distances some of you have had to cover to get to the conference venue. We genuinely appreciate all your efforts. It is our singular hope and desire that this 2<sup>nd</sup> edition of the conference (SETIC 2018) meets your expectations and gives you unquantifiable experience and tremendous developmental networking opportunities for a life fulfilling career.

We are grateful for the presence of the Vice Chancellor of the Federal University of Technology Minna Professor Abdullahi Bala whose leadership and distinguished academic career has served as inspiration and encouragement to many academics within and outside Nigeria. His desire to continue on the path of greatness for this Humble University of ours has seen the University become a destination for International conferences, Public lectures, Book Development, Presentations and Seminars that meet International standards. We are happy to have you as the Chief host to declare the conference open and deliver the welcome address.

We are grateful to the former Dean of School of Environmental Technology, Federal University of Technology Prof A.M. Junaid and the Ag. Dean of School of Environmental Technology Prof. S.N. Zubairu for providing the healthy platform, academic backing, management and guidance for the organisation of the conference. You increased the level of challenge from 2016 and provided the required resources, direction, energy and strategies for achieving its success, it is a great honour of having the opportunity to work closely with you and learning never to give up.

I wish to thank also all the special guests particularly leaders of the Industry, Built Environment and Academia.

A special thanks goes to the Bursar of Federal University of Technology, Mrs. Hajara Kuso for the timely responses to all our requests regarding the financial aspects of access to funds for the conference.

SETIC is beginning at the foundation this year and for this I wish to thank all those who have supported us through various forms of participation. Specifically I wish to thank the delegates and the partners for contributing significantly to the conferences. I wish to thank Prof. S.N. Zubairu Prof. A.M. Junaid, Prof. O. O. Morenikeji and Prof. Y.A Sanusi, who all genuinely and consistently monitored the progress of the conference preparations. My desire in 2016 was for SETIC to become a constant feature in the calendar of the University and global conference listings, am a happy person today seeing this desire fulfilled with the SETIC 2018 edition.

Delegates to SETIC 2018 are from different academic and research institutions that are spread across different countries. This offers participants a wonderful opportunity for exchange of cultural, social and academic ideas during the conference periods. It is also an opportunity to create awareness about programmes and events at the participants' individual institutions. I encourage you all to make good use of the networking opportunities that are available.

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# EFFECT OF HEALTH AND SAFETY MANAGEMENT PRACTICES ON SAFETY PERFORMANCE OF CONSTRUCTION CONTRACTORS

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The construction industry plays a significant role in the economic development of a nation. However health and safety performance of the industry is a challenge to the developmental initiative of the country. The research addressed the problem of inadequate measures of H&S management practices and regulations capable of guiding construction activities on the safety performance of building contractors. This led to the evaluation of the effect of the H&S management practices on the safety performance of contractors with a view to determining measures for effective safety performance. The use of quantitative approach was adopted for this research. The research data were collected with the use of a well-structured questionnaires. The questionnaires were administered to 50 selected construction companies registered with Federation of Construction Industry in Abuja. The response rate of the questionnaire was 84%. Mean item score (MIS) was used to rank the major H&S practices and regulations in order of implementation by construction companies on a 5 - point Likert's scale. Correlation analysis was used to determine the relationship between H&S management practices and safety performance of contractors on sites. The research found that H&S management practices of construction contractors have non -significant influence on the safety performance of contractors on sites. The research recommends that contractors should be compelled to draw up safety responsibilities and put more emphasis on the role of management of H&S practices and provisions should be made to make it a statutory duty for every contractor to have a safety management programme on site for improved safety practices.

**Keywords:** Contractors, Health, Management, Performance, Practices, Safety

## INTRODUCTION

The construction industry plays a significant role in the economic development of a nation. The manner in which health and safety in the industry is considered is a major subject to be evaluated in any nation (Okolie and Okoye 2013). International labour office noted that accidents related to work and sickness account for about 3.9% of every case of death. A quarter of the world population have been affected by various level of work related accident per year.

The British were the first to introduce programmes related to health and safety in Nigeria (Onyeje) (2011). Under the programme, specialist on occupational health usually go out to industries to monitor if safety measures are adopted. This resulted in the 1974 labour act, the 1987 factory act and the 1987 act on the compensation of workers who suffer loss as a result of occupational accident or death. There are other important acts on labour health in Nigeria. These include the 1990 labour act and the 2004 act, which meant for the compensation of workman. In a similar note, Adeogun and Okufor (2013), reported that several workers are exposed to the risks of unhealthy work environments by their employers because these acts are not enforced.

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Nigeria is a signatory to the occupational and safety law of the 1981 convention in Geneva and has not till date implemented it in its construction industry. On this premise, Idoro (2008, Idoro, 2011), made a conclusion that there is little or no effort on the part of authorities in charge of health and safety and has not reflected in their scope of operation. This has resulted in increased accident rate in many industries.

Most efforts made in the improvement occupational safety has not seen reasonable result and as a result construction workers have been confronted with injury and in some cases, death (Okoye, 2010).

There is a high rate of accident in Nigeria and this is associated with ineffective management practices like inefficient monitoring, reporting and control safety practices. Despite the fact that some level of improvement has been noticed, there have also been cases of unreported accidents in construction sites. This is because workers are not adequately educated on the principles of health and safety at work places.

In the report of Famakin and Fawehinmi (2012), the rising cases of accidents in construction site has resulted in high awareness level on the importance of health and safe practices and hence its inclusion in the criteria for the award of contracts. It can therefore be noted that with adequate observation of health and safety practices in every construction site, there will be better performance level in every construction projects in Nigeria.

It is as a result of these that this study set out to examine the effect of health and safety management practices on safety performance of contractors using Abuja as a case study. The choice of Abuja was for the fact that Abuja being the capital city, experiences rapid growth in terms of construction of public buildings especially for commercial and official purposes. Most of these buildings are constructed in Abuja Central Area and most of the old residential buildings are bought and converted to public buildings for commercial and official purposes. Majority of the people resident in Abuja have businesses in this area. Therefore the level of compliance to the requirements of health and safety performance in these building types can never be over emphasized due to the population of lives and worth of properties accommodated therein. As a result of the problem identified, the following are the questions to be answered by this research:

- i. What are the health and safety practices required on building projects sites?
- ii. What are the regulations capable of guiding construction activities on sites?
- iii. How well do building contractors comply with health and safety practices on project sites?
- iv. How can health and safety management practices improve safety performance of construction contractors on sites?

### **The Concept of Health and Safety**

The construction industry has been considered as a hazardous industry with reference to health and safety since most of its activities is a potential source of risk and danger to construction staff and users of such facilities (Idoro, 2011). The International Labour Organisation (2001, 2005) and Khem and Braimah (2014) reported that about 40% of death in the world occupational environment is linked to construction activities. In the view of Akpan (2011), many developing countries are characterised with poor management, policy with respect to health and safety of staff leading to regular occurrence of accidents, hospital bills, payment of wages for employees on admission and compensation affected workers. Other challenges noticed in such circumstances include increase in the cost of labour, absence from duties, poor relationship between management and workers, reduced efficiency in operation and poor performance. Some factors that trigger high risk of accident include carelessness, overconfidence, refusal or inability to make provision for health and safety measures and none availability of seminars and workshop for stakeholders (Okpan and Agha, 2013). Awodile and Ayoola (2005) and Olatunji and Aye (2007) reported that the increased occurrence of death, disability and unfavourable environmental conditions in Nigeria are associated with poor safety and health practices.

In the study of Idoro (2011), it was reported that there were two (2) accidents in every 100 workers and in every 100 workers, 5 cases of injuries are reported. This has posed a threat to the general performance and efficiency in the construction industries. This level of risk is generally unacceptable and measures taken to reduce it have not been satisfactory among developing countries (Gibb and Bust, 2006; Khem et al., 2007; Khem, 2008). These issues with regards to life, properties, time and moral according to Ogunseun (1994) justify the

reason for adopting Construction Policy in Nigeria. In addition, it was asserted by Tanko and Anigbogu (2012) that most construction worker does not wear Personal Protective Equipment (PPE) which is meant to ensure general health and safety among worker in construction sites. This is because they sometimes do not feel comfortable wearing the Personal Protective Equipment (PPE).

The above reports reveal that the efforts made to minimize health and safety hazards on construction sites in Nigeria are inadequate. In the light of this, Idubor and Osiamoje (2013) stressed the need for companies to consider the safety of their employees as their responsibility and maintain high operational standard with regards to safety. Adeniran (2013) reported, that it was with the realization of the fact that "labour cannot be considered as a commodity but a vital economic factor that must be protected by the government and various agencies such as Federal Ministry of Labour Employment, Labour and Productivity and Federal Ministry of Health among others. These departments are responsible for formulating policies, administering policies, operational principles and laws that protect worker against unfavourable work conditions.

Construction companies have different level of health and safety practices as determined by their organizational characteristics. The organizational characteristics of construction companies are the unique or distinguishing features which define the performance of the construction companies. Some of the important ones are age, size, experience, annual turnover and growth rate of construction companies (Dada *et al.*, 2012; Shittu *et al.*, 2016). In developing countries and indeed Nigeria, the number of large construction companies are small when compared to the number of small and medium size companies (Kheni, 2008; Idoro, 2011). These small and medium-sized construction companies (construction SMEs) lack the capability to manage complex construction projects in a safe manner. They are therefore known to have peculiar health and safety problems as reported by Shittu *et al.* (2016). Kheni *et al.* (2007) and Kheni *et al.* (2008) found that only foreign contractors in Nigeria incorporate the policies of health and safety practices in their construction sites and these policies are those of their countries of origin. On the contrary, indigenous companies do not have a wide perspective of the policy of health and safety but are only limited to issues of clean working environment.

In the light of this, Kheni (2008) recommended that developing countries should have a holistic perspective of health and safety practices when dealing with construction sites in Nigeria.

## RESEARCH METHODOLOGY

This study adopted a quantitative research approach. The study encompassed a review of literature survey from journals, conference papers and past projects to identify the major barriers in the evaluation of health and safety management practices. Data collection was from both primary and secondary sources. The secondary source of data was based on published and unpublished material on previous similar works while the field work represented the primary source of data. Data collection was done through the review of literature and well-structured questionnaires.

The first stage of the study was done by literature review to identify the health and safety management practices of construction contractors, the health and safety regulations capable of guiding construction activities on sites. Data obtained was also used to determine the relationship between contractors' health and safety management practices and safety performance of contractors on sites.

The questionnaires were self-administered to contractors, consultants, project managers, quality and safety managers, and contract administrators/managers. The study's population size was 50 which included contractors, consultants, project managers, quality and safety managers, contract administrators/managers among others and those who have responsibility for ensuring that health and safety practices is achieved and managing cost and project schedule registered with the Federation of construction industry FOCI in Abuja. The sample population in this study is few (50) and therefore it was possible to sample all members of the population for the study as reported by Watson (2001). The sample size therefore comprised the total number of construction firms registered with and contained in the list of contractors compiled by FOCI, Nigeria which is 50 just as population. FOCI had 84 registered construction firms in Nigeria out of which 50 only operate in Abuja. It was not

necessary to adopt any special method to select members since all members of the target group will be used. Watson (2001) makes this justifiable by reporting that on the off chance that your populace is little (200 individuals or less) it might be desirable over do an enumeration of everybody in the populace as opposed to test. The method of data analysis used was both descriptive and inferential methods to analyse the collected data.

## RESULTS AND DISCUSSIONS

The ranking of the health and safety practices of construction companies identified from review of literature was done in this section in order of importance on a five – point likert scale. The level of implementing the important H&S practices by construction companies was done using mean score on a five – point scale. The results of the level of implementing the important H&S practices by construction companies (on a 5 – point scale) were the variables subjected to Mean Item Score and used to represent the H&S practices used in the Mean Item Score Analysis. This was followed by the ranking of the level of compliance of construction companies with the H&S Regulations which was also carried out using mean score on a five – point scale.

### Important Health and Safety Practices

From the review of literature, 58 health and safety (H&S) management practices were identified and ranked in order of importance using a five – point scale. These health and safety practices were categorized in to five core practices which are Company's Commitment, H&S Communication, H&S Planning, Workers' Consultation and Participation and H&S Education and Training. The mean score used to rank the health and safety practices revealed 15 important H&S practices from the 58 practices identified. The most important health and safety practice was revealed to be "Use of more directly employed labour" with a mean score of 4.83 while the least important health and safety practice was "Safety Pre-task Planning" with a mean score of 2.51.

The identified important health and safety management practices of contractors were ranked using MIS and the results are presented in table 1.

Table 1: Level of Implementation of contractors' health and safety management practices

S/No	Contractors' health and safety practices	Mean Score	StDes	Rank
1	Desire to improve staff morale and productivity	4.2143	0.7236	1st
2	Use of more directly employed labour	4.1190	0.8057	2nd
3	Jobsite inspection	4.0238	1.5138	3rd
4	Adequate work space and neat environment	4.0000	0.9019	4th
5	Formal safety inspection per month	3.8810	1.2667	5th
6	Job hazard analysis	3.8333	1.5697	6th
7	Safety pre-task planning	3.8095	1.9341	7th
8	Fencing of sites	3.8095	0.9706	8th
9	Effective identification and hazard elimination and control	3.7857	1.4548	9th
10	Minimization of cost of ill health and injury	3.7857	0.6136	10th
11	Workers involvement	3.7619	0.9707	11th
12	Accountability/responsibility and safety budget	3.5854	1.7313	12th
13	Safety meetings	3.5000	1.1441	13th
14	Use of posters and other signs to give safety education	3.2619	1.3834	14th
15	Average length of employment Safety reward	2.1667	1.1633	15th

Table 1 gives a summary of the results of the ranking of the health and safety regulations capable of guiding the activities of construction on sites.

Table 2 revealed that the health and safety regulation capable of guiding construction activities on sites implemented the most is fire service regulations 1988 with a mean score of 3.98. The health and safety regulation capable of guiding construction activities implemented the least is the Workmen's compensation act with a mean score of 3.52.

It can be deduced from the assessment of the level of implementation of the construction companies with each of the Health and Safety Regulations that the construction companies attach the most significant importance to the fire service regulations 1988 than other Health and Safety Regulations.

**Table 2: Level of Implementation of health and safety regulations**

S/No	Requirement/Regulations	Mean Score	StdDev	Rank
1	Fire service regulations 1988	3.9762	0.8488	1 <sup>st</sup>
2	Factory's Act 1990	3.7381	0.7384	2 <sup>nd</sup>
3	National environmental standards and regulations enforcement agency (NESERA) Act 2007	3.6905	0.7636	3 <sup>rd</sup>
4	Labour, Safety and welfare law 2012	3.6905	0.7258	4 <sup>th</sup>
5	Public health Act 1990	3.6190	0.7514	5 <sup>th</sup>
6	Workmen's compensation Act	3.5238	0.7273	6 <sup>th</sup>

### **Relationship between Health and Safety Management Practices and Safety Performance on Construction Sites**

Five analyses were carried out using the Spearman's Rank Correlation Analysis in order to determine the relationship between the health and safety practices and safety performance of contractors. The results of these analyses are summarized in Table 3.0.

It was observed from the first analysis that there exists a weak, positive and non-significant relationship between the level of implementing H&S practices and cost of insuring workers. The correlation coefficient (R value) observed was 12% indicating weak degree of association between the variables. The positive correlation observed between the variables indicates a tendency that an increase in the level of implementing H&S practices will lead to an increase in the cost of insuring workers against accidents and vice versa. This also implies that there is the need for contractors to insure workers against accidents on sites. The probability (P) value of 0.459 observed was greater than 0.05. This led to the acceptance of the null hypothesis in this case.

The second analysis showed a weak, negative and non-significant relationship between the level of implementing H&S practices and the amount of compensation aid to victims. The R value observed was -14% indicating weak degree of association between the variables. The negative correlation observed between the variables indicates a tendency that an increase in the level of implementing H&S practices will lead to a decrease in the amount of compensation paid to victims and vice versa. This also implies that there is the need for contractors to improve their level of implementing H&S practices in order to reduce or have cost savings in the cost of paying compensation when accidents occur due to poor implementation of H&S practices. The P value of 0.387 observed was greater than 0.05. This also led to the acceptance of the null hypothesis in this case.

It was also noticed from the third analysis that there exists a weak, negative and non-significant relationship between the level of implementing H&S practices and number of accidents recorded. The correlation R value observed was -11% indicating weak degree of association between the variables. The negative correlation observed between the variables indicates a tendency that an increase in the level of implementing H&S practices will lead to a decrease in the number of accidents recorded on sites and vice versa. This also implies that there is the need for contractors to improve their level of implementing H&S practices in order to reduce the rate of accidents on sites because the number of recorded accidents was due to poor implementation of H&S practices. The P value of 0.490 observed was greater than 0.05. This also led to the acceptance of the null hypothesis in this case.

The fourth analysis showed a weak, negative and non-significant relationship between the cost of insuring workers and the number of accidents recorded on sites. The R value observed was -15% indicating weak degree of association between the variables. The negative correlation observed between the variables indicates a tendency that an increase in the cost of insuring workers against accidents on sites will lead to a decrease in the number of accidents recorded on sites and vice versa. This also implies that there is the need for contractors to improve practice of insuring workers on sites in order to reduce the rate of accidents which usually occur as a result of poor implementation of H&S practices. The P value of 0.361 observed was greater than 0.05. The null hypothesis was therefore accepted.

A weak, negative and non-significant relationship was also observed between the numbers of accidents recorded on sites and the amount of compensation paid to victims in the fifth analysis. The R value observed was  $-3\%$  indicating weak degree of association between the variables. The negative correlation observed between the variables indicates a tendency that an increase in the number of accidents recorded on sites will lead to a decrease in the amount of compensation paid to victims and vice versa. This also implies that there is the need for compensation to be paid to accident victims to be set aside in order to motivate contractors to improve in their level of implementing H&S practices to reduce the rate of accidents which will reduce the amount of compensation to be paid as a result of poor implementation of H&S practices. The P value of 0.854 observed was greater than 0.05. The null hypothesis was also accepted in this case.

**Table 3: Relationship between health and safety management practices and safety performance on construction sites**

Analysis No.	Variables		Observations		Inferences		
	X <sub>1</sub>	X <sub>2</sub>	R (%)	P <sub>value</sub>	Strength of Relationship	Remark	Action on H <sub>0</sub>
1	Level of Implementing H&S Practices	Cost of Insuring Workers	11.70	0.459	Weak	NS	Accept H <sub>0</sub>
2	Level of Implementing H&S Practices	Amount of Compensation Paid to Victims	14.00	0.387	Weak	NS	Accept H <sub>0</sub>
3	Level of Implementing H&S Practices	Number of Accidents Recorded	11.00	0.490	Weak	NS	Accept H <sub>0</sub>
4	Cost of Insuring Workers	Number of Accidents Recorded	15.00	0.361	Weak	NS	Accept H <sub>0</sub>
5	Number of Accidents Recorded	Amount of Compensation Paid to Victims	-3.00	0.854	Weak	NS	Accept H <sub>0</sub>

KEY: NS – Not Significant

## CONCLUSION AND RECOMMENDATIONS

The following conclusions were made from the research findings of the analysis carried out in order to offer solution to the identified problem of the research, which was the inadequate measures of health and safety management practices and regulations guiding construction activities on the safety performance of building contractors.

- i. Improving safety performance of construction lies in the ability of contractors to change their behaviours to health and safety management practices such as provision of personal protective equipment for site workers, use of safety gadgets, posters, safety reward, safety pre task planning, jobsite inspection, job hazard analysis, safety meetings, responsibility/accountability of safety budget, adequate work space and neat environment, effective identification and hazard control.
- ii. Noncompliance to health and safety management practices actually affects the project performance in terms of time, cost, quality, environment and productivity delivery. It is also established that the decision made by contractors to implement health and safety regulatory requirements is influenced by the perceived cost of saving accidents.
- iii. The level of implementation of health and safety management practices therefore increases with the increase in the value of contractor's safety performance.
- iv. The research established that all the health and safety management practices were not significantly related to safety performance of construction contractors.

although it was indicated that a likelihood in the rise of financial implication of insuring workers against accident on construction sites will lead to a growth in the level of implementation of health and safety management practices of contractors as well as increase in the level of implementing H&S practices will lead to a decrease in the amount of compensation paid to accident victims and reduction in the rate of the number of accident recorded on construction sites. In the light of this relationship between health and safety management practices and contractors safety performance indicated that construction safety can be improved through positive behavioural change of contractors towards health and safety management practices on construction sites.

## RECOMMENDATIONS

The following comprises the recommendations made by the study based on the findings of the study which have been detailed in preceding sections.

- i. In order to enhance the role of management in health and safety the existing legislation should be amended to put more emphasis on role of management. Provisions should be made to make it a statutory duty for every contractor to have a safety management program on site. Contractors should be compelled to draw up safety responsibilities and authority structure which should be available in every site to inform all parties as to their responsibilities as far as health and safety is concerned.
- ii. There exist needs to urgently adopt the measures that will improve the level of awareness of contractors' health and safety management practice through safety meetings, education of workers on the importance of safety performance of contractors on site.
- iii. The regulatory bodies within the construction industry should work out measures to enhance the rate of adoption of health and safety regulations guiding construction activities. This was based on a mean score of 3.9762 for the fire service regulation workers need to be insured and all other regulations need to be implemented on construction sites for better performance.
- iv. For the health and safety management practices and safety performance of contractors on sites to be effective, the following conditions should be met:
  - i. Companies to insure workers against accidents on sites.
  - ii. Improve their level of implementing H&S practices in order reduce or have cost savings in the cost of paying compensation when accidents occur due to poor implementation of H&S practices.
  - iii. Improve their level of implementing health and safety regulations on construction activities.
  - iv. Compensation to be paid to accident victims to be set aside in order to motivate contractors.

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