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# EVALUATION OF THE EFFECTIVENESS OF HEALTH AND SAFETY TRAINING PRACTICES IN MEDIUM SIZED CONSTRUCTION FIRMS IN ABUJA

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***Abstract**:*
*Health and Safety (H&S) training is one of the most widely adopted practices to improve workplace safety. Existing H&S literature focuses on training of workers in large sized construction firms leaving out the medium sized construction firms. This study therefore evaluated the effectiveness of H&S training practices of medium sized construction firms in Abuja, with a view to proposing strategies for reducing accidents on construction sites. The population for the study constitutes 25 construction firms registered with the Federation of Construction Industry (FOCI) operating within Abuja metropolis. Data were collected using structured questionnaire. Analysis of data was carried out using Relative Importance Index (RII) and Mean Item Score (MIS). The study identified 12 important H&S Training practices (average RII = 0.813) which are averagely complied with (average MIS = 4.067). 7 important Regulations identified have significant impact on H&S performance of construction firms (average MIS = 4.08). 15 effective strategies were identified for reducing the rate of accidents, injuries and fatalities on construction sites (average MIS = 3.84). It was concluded that the level of compliance to H&S training practices among medium sized construction firms in Abuja, Nigeria is not effective. It was thus recommended that medium sized construction firms should implement the suggested strategies to the latter in order to create a conducive atmosphere for both management and workers to be able to implement the H&S regulation and training practices for enhanced H&S performance.*

***Keywords:*** *Construction, Effectiveness, Health, Safety, Training.*

## INTRODUCTION

Health and Safety (H&S) training is one of the most widely adopted practices to improve workplace safety. Every year, construction firms invest millions of dollars towards training the workforce on issues such as hazard recognition, risk management, and injury prevention (Al-Emran *et al.*, 2016). H&S is an inevitable aspect of construction due to its nature of being made up of the conglomerations of people from diverse backgrounds and disciplines with each individual`s output determining the level of success to be recorded at each construction stage (Dodo, 2014). The importance of providing safe workplace has been reiterated by various related studies because of the intrinsic hazard and risk factors that undoubtedly underlie every work situation and their negative impact on a company's overall performance (Olutuase, 2014). The construction industry has been identified with the highest occurrence rate of accidents compared to any other industry (Williams *et. al*., 2018). In the recent past, death tolls, permanent disability, partial disability and some other severe environmental threat had increasingly been on the rise through collapse of buildings and other major operational accidents (Williams *et. al*., 2018). In addition, contractors often replace their workers and since it is an open environment, workers are prone to diseases.

One in six fatal accidents at work occurs in a construction site (Gracia, Ramos, Peiró, Caballer, & Sora, 2011). Although an analysis of the patterns and causation of accidents provides the basic information for safety planning. It is not sufficient for predicting when and where they will occur. Such prediction needs coordination with other branches of project management (Yi and Langford, 2006). The fact that a construction job or work environment is considered as highly risky and hazardous does not mean that its susceptibility to accident is not controllable – this largely depends on "work situation" which is humanly controllable. Several research articles have focused on evaluating and developing effective safety training interventions (Burke *et al*., 2011; Weidman *et al*., 2015, David and Saviley, 2015; Mostafa *et al*., 2016). Ironically, research in construction safety continues to show alarming deficits in safety knowledge among construction workers (Baldwin, Hart, Gutteridge, & Ford, 1994; Cromwell and Kolb 2004; Haslam *et al*., 2005) while few studies

have focused on understanding why training efforts fail in construction (Goldenhar et al., 2001; Zhou, Fang, & Wang, 2008; Demirkesen and Arditi 2015).

Most safety training programs within construction use conventional classroom techniques that do not sufficiently engage workers (Haslam, 2004; Haslam *et al*., 2005; Wilkins 2011). More recently, Mostafa *et al*. (2016) argued that engaging safety training methods that facilitate dialogue, feedback, and action can result in higher learning gains. In similar thought, Shittu *et al*. (2016) and Shittu (2016) H&S Education and Training is the practice with the highest likelihood of improving the safety performance of construction firms out of the five core and modern H&S practices identified (Education and Training, Communication, H&S Planning, Workers' Consultation and Participation and Company's Commitment). Existing H&S literature focuses on the training of workers in large sized construction firms in the developed nations. This leaves out issues of H&S training of workers in the medium sized construction firms which makes a sizeable proportion of construction firms in Nigeria as reported by Shittu *et al.* (2016). The result of this is the problem of poor safety performance in the form of higher rate of accident, fatalities and injuries to workers on construction sites.

However, there is a dearth of research in construction literature in the context of medium construction firms that are typically smaller than the large construction firms and yet they collectively perform a large portion of the construction volume and train a large number of workers on safety issues. It is thus imperative to fill this gap by evaluating the effectiveness of H&S training practices of medium sized construction firms in Abuja, with a view to proposing strategies for reducing accidents on construction sites. In order to achieve this aim, the following objectives were pursued:

i. To identify the regulations capable of enhancing the effectiveness of H&S training practices of medium sized construction firms.
ii. To identify the components of the H&S training practices capable of enhancing safety awareness among construction workers.
iii. To examine the level of compliance of firms to the provision and implementation of the identified components of H&S training practices capable of enhancing safety awareness among construction workers.

iv. To determine the impact of the identified H&S Regulations and training practices on the safety performance of construction firms.
v. To propose strategies for reducing the rate of accidents, injuries and fatalities on construction sites.

**Regulations capable of enhancing effectiveness of H&S training practices of construction firms**

According to Chudley and Greeno (2006), Famakin and Fawehinmi (2007), construction regulations are statutory instruments setting out the minimum legal requirements for construction works and relate primarily to the health, safety and welfare of the workforce which must be taken into account when planning construction operations and during the actual construction period. Smallwood and Haupt (2006) reported that the Construction Regulations promulgated in the Republic of South Africa require a range of interventions by clients and designers. Smallwood and Haupt (2006) added that in order to have a safe and smooth construction environment and process, legal requirements must be met, the client must ensure that appropriate resources and organisation are in place, the health and safety reports must routinely inform the project board and the client must lead from the front, embedding the policies through the organisation. The components of effective H&S management system, according to Alberta (2006) are management leadership and organisational commitment through H&S Education and Training; roles and responsibilities; management commitment; employee participation; hazard identification and assessment process; determine controls; hazard control; enforcement of controls and emergency response plan. In addition, Mohammed (2010) reported that construction regulations must incorporate a provision that the contractor who plans to perform any construction shall, before carrying the work, notify in writing the competent authority for construction planning, particularly if the construction work includes use of explosives, dismantling of fixed plant, excavation work. In view of these, the various regulations capable of enhancing the effectiveness of H&S training practices are summarised in Table 1.

*Table 1: H&S Regulations Capable of Enhancing the Effectiveness of H&S Training Practices*

| S/No | H&S Regulations | Source(s) |
|---|---|---|
| 1 | H&S Provision in Condition of Contract | Famakin and Fawehinmi (2007), Shittu *et al.* (2015); Shittu *et al.* (2016); Shittu (2016) |
| 2 | H&S Provision in Workmen Compensation Act | Shittu *et al.* (2015); Shittu *et al.* (2016); Shittu (2016) |
| 3 | H&S Provision in Factories Act 1990 | Shittu *et al.* (2015); Shittu *et al.* (2016); Shittu (2016) |
| 4 | H&S Provision in Public Health Act 1990 | Shittu *et al.* (2015); Shittu *et al.* (2016); Shittu (2016) |
| 5 | NESREA Act 2007 | Shittu *et al.* (2015); Shittu *et al.* (2016); Shittu (2016) |
| 6 | National Building Code 2006 | Shittu *et al.* (2015); Shittu (2016) |
| 7 | H&S Provision in Labour, Safety & Welfare Bill 2012 | Shittu *et al.* (2015); Shittu *et al.* (2016); Shittu (2016) |

*Source: Researcher's Literature Compilation (2019)*

**Components of H&S training practices capable of enhancing safety awareness among construction workers**

The activities of the construction industry have raised serious H&S concerns amongst governments, H&S stakeholders, H&S professionals and researchers over the past few decades (Kheni, 2008). In addition, Agumba and Haupt (2014) reported that H&S performance measurement can be broadly classified in to two: lagging indicators and leading indicators or positive performance indicators. Unfortunately, the construction industry continues to greatly depend on the traditional lagging indicators such as accident and workers compensation statistics. With the use of leading indicators, a more thorough and constant surveillance is required than when lagging indicators are used. Changes can be made and interventions introduced early to redress the weakness before accidents occur as a result of the adoption of leading H&S indicators in construction. Hence, the use of leading indicators instead of lagging indicators is increasingly advocated (Gambatese, Behm, & Hinze, 2005). It was therefore established by Agumba and Haupt (2014) that for H&S performance to improve, the corporate H&S culture should comprise H&S commitment, H&S, sub-contractors involvement, H&S accountability and disincentives and above all H&S training. Past researches have shown that certain training practices can lead to improved H&S performance and therefore constitute good H&S practices. The findings of these researches as summarised from the review of literature in this study are presented in Table 2.

*Table 2: Summary of Researches on H&S Training Practices*

| S/No. | H&S Training Practices | Source(s) |
|---|---|---|
| 1 | Safety inductions | Kheni (2008); Shittu *et. al.* (2015) |
| 2 | Safety training and orientations | Kheni (2008); Agwu (2012(a)); Shittu *et. al.* (2015) |
| 3 | Alcohol- and substance-abuse programme | Kheni (2008); Shittu *et. al.* (2015) |
| 4 | Training and retraining of employees on safe work procedure | Kheni (2008); Agwu (2012(b)); Shittu *et. al.* (2015) |
| 5 | Safety policies and procedures | Agumba and Haupt (2014) |
| 6 | Fire protection programme | Kheni (2008); Agwu (2012(b)); Shittu *et. al.* (2015) |

| | | |
|---|---|---|
| **7** | Detailed safety programmes | Kheni (2008); Agwu (2012(b)); Shittu *et. al.* (2015) |
| **8** | Safety meetings | Kheni (2008); Agwu (2012(b)); Shittu *et. al.* (2015) |
| **9** | Communicating safety value to corporate stakeholders and Two-way safety communication | Agwu (2012(a)); Shittu *et. al.* (2015) |
| **10** | Focusing of monthly safety meetings on employees' attitudinal change towards safety | Kheni (2008); Shittu *et. al.* (2015) |
| **11** | Use of posters and other signs to give safety education | Shittu *et. al.* (2015); Shittu *et al.* (2016) |
| **12** | Use of external assistance with respect to health and safety issues | Shittu *et. al.* (2015); Shittu *et al.* (2016) |

*Source: Researcher's Literature Compilation (2019)*

**Strategies for reducing the rate of accidents, injuries and fatalities on construction sites**

H&S has been identified as a parameter which should be used along with the traditional parameters: cost, quality and time, to measure the success of projects. The reasons for considering safety and health are human factor, legislation and financial issues (Adan, 2004). According to Grace *et al.* (2014), the following H&S Measures are proactive strategies for reducing the rate of accidents, injuries and fatalities on construction sites: Site Layout and Planning; Personal Protective Equipment (PPE); First aid Kits and Accident Reporting; H&S Warning Signs; and Safety Policy. Peter *et al.* (2016) shows that there was a lack of commitment from the government, the insurance company, the labour ministry, the owners, consultants, and the contractors to improving safety performance on the construction sites. Although calls have been made to the stakeholders in the industry to improve their H&S performance, the number of fatalities and injuries arising from construction activities across the country as at today is highly worrisome. Peter *et al.,* (2016) suggested a shift in thinking where the focus is on those actions that can lead to good safety performance, for a better approach is to focus on proactive efforts dealing with the factors responsible for such accidents and injuries and how to control them.

## RESEARCH METHODOLOGY

This research employed the use of the quantitative approach. Data were collected using structured questionnaire. Analysis of data was carried out using the descriptive method of analysis. The population for the study constitutes the number of construction firms registered with the Federation of Construction Industry (FOCI) operating within Abuja metropolis. The register of FOCI has 25 construction firms registered with Abuja's business address. This constitutes the population size for the study. Data collected were be analysed using Relative Importance Index (RII) and Mean Item Score (MIS). The response of the respondents, on the RII and MIS analyses, will be ranked and analysed based on the cut-off points presented in Table 3.

*Table 3: Cut- off points to responses*

| ***Scale*** | ***Cut-off points RII*** | ***Cut-off points MIS*** | | ***Remarks/ Decision*** | | |
|---|---|---|---|---|---|---|
| | | | | *Compliance* | *Significance* | *Effectiveness* |
| **5** | 8.81 – 1.00 | 4.50 - 5.00 | | Total compliance | Very Significant | Very Effective |
| **4** | 0.61 – 0.80 | 3.50 - 4.49 | | Average compliance | Significant | Effective |
| **3** | 0.41 – 0.60 | 2.50 - 3.49 | | Partial compliance | Less Significant | Less Effective |
| **2** | 0.21 – 0.40 | 1.50 - 2.49 | | Least compliance | Least Significant | Least Effective |
| **1** | 0.01 – 0.20 | 1.00 - 1.49 | | Non compliance | Not Significant | Not Effective |

*Source: Adapted and modified from Morenikeji, (2006); Agumba and Haupt, (2014); Shittu et al., (2016)*

The study of Agumba and Haupt (2014) identified core H&S practices of small and medium sized construction firms in South African construction industry, while Shittu *et al.* (2016) identified 5 core H&S practices of small and medium sized construction firms in Nigerian construction industry. These studies used a bench mark of above 3.00 for good or important H&S practices which is far above average on a 5- point scale. The choice of this was based on the fact that

H&S is a very sensitive issue where error margin should be the barest minimum. This justifies the adoption of similar cut-off point for this study.

## RESULTS AND DISCUSSIONS

### Level of compliance to the provision and implementation of the components of H&S training practices capable of enhancing safety awareness among construction workers

The study identified 12 important H&S Training practices (average RII = 0.813). The result of the MIS on the level of compliance to these training practices is presented in Table 4.

*Table 4: MIS Ranking on Compliance to H&S Training Practices*

| S/NO | COMPONENTS OF H&S TRAINING | MIS | RII | RANK | DECISION |
|---|---|---|---|---|---|
| 1 | Safety policies and procedures | 4.280 | 0.856 | 1st | Average Compliance |
| 2 | Safety meetings | 4.280 | 0.856 | 1st | |
| 3 | Communicating safety value to corporate stakeholders and Two-way safety communication | 4.240 | 0.848 | 3rd | Average Compliance |
| 4 | Safety inductions | 4.200 | 0.840 | 4th | Average Compliance |
| 5 | Training and retraining of employees on safe work procedure | 4.160 | 0.832 | 5th | Average Compliance |
| 6 | Fire protection programme | 4.120 | 0.824 | 6th | Average Compliance |
| 7 | Detailed safety programmes | 4.080 | 0.816 | 7th | Average Compliance |
| 8 | Focusing of monthly safety meetings on employees' attitudinal change towards safety | 4.040 | 0.808 | 8th | Average Compliance |
| 9 | Use of posters and other signs to give safety education | 3.960 | 0.792 | 9th | Average Compliance |
| 10 | Use of external assistance with respect to health and safety issues | 3.960 | 0.792 | 9th | Average Compliance |

| | | | | | |
|---|---|---|---|---|---|
| 11 | Alcohol- and substance-abuse programme | 3.880 | 0.776 | 11th | Average Compliance |
| 12 | Safety training and orientations | 3.600 | 0.720 | 12th | Average Compliance |
| | *Average* | *4.067* | *0.813* | | Average Compliance |

*Source: Researchers' Analysis of Data (2019)*

Table 4 shows that all the identified H&S training practices identified are averagely complied with by the construction firms. These range from "safety training and orientation" (MIS = 3.60) to "Safety policies and procedures/safety meetings" (MIS = 4.28). The average MIS is 4.067. This implies that the construction firms should improve their level of compliance. The finding of this study here agrees with that of Agumba and Haupt (2014) and Shittu et al. (2016) where it was established that for H&S performance to improve, the corporate H&S culture should comprise H&S commitment, H&S, sub-contractors involvement, H&S accountability and disincentives and above all H&S training.

**Impact of H&S Regulations and training practices on safety performance of construction firms**

The study identified 7 important Regulations for enhancing the H&S performance of construction firms. These are H&S Provision in Labour, Safety & Welfare Bill 2012; National Building Code 2006; H&S Provision in Workmen Compensation Act; NESREA Act 2007; H&S Provision in Public Health Act 1990; H&S Provision in Condition of Contract; and H&S Provision in Factories Act 1990 with RII ranging from 0.768 – 0.888. The MIS results on the impact of these Regulations on the performance of construction firms is summarised in Table 5.

*Table 5: Impact of H&S Regulations on H&S Performance of Construction Firms*

| S/NO | IMPACT OF H&S REGULATION ON SAFETY PERFORMANCE | MIS | RANK | DECISION |
|---|---|---|---|---|
| **1** | Increased labour turnover | 4.280 | 1st | Significant |

| | | | | |
|---|---|---|---|---|
| **2** | Operational inefficiency and ultimately decreasing performance become noticeable | 4.120 | 2nd | Significant |
| **3** | High costs in the areas of hospital bills | 4.080 | 3rd | Significant |
| **4** | Salaries for hospitalised workers and compensations | 4.040 | 4th | Significant |
| **5** | Absenteeism | 4.000 | 5th | Significant |
| **6** | Strained management-labour relationship | 3.960 | 6th | Significant |
| | *Average* | *4.080* | | Significant |

*Source: Researchers' Analysis of Data (2019)*

It was shown from Table 5 that the identified H&S Regulations have significant impact on the H&S performance of construction firms (average MIS = 4.08). The most significant impact of H&S Regulation on H&S performance of firms is "Increased labour turnover" with MIS of 4.28 while the least significant is "Strained management-labour relationship" with MIS of 3.96. The MIS results on the impact of H&S training practices the performance of construction firms is summarised in Table 6.

*Table 6: Impact of H&S Training Practices the Performance of Construction Firms*

| S/NO | IMPACT OF H&S TRAINING PRACTICES ON SAFETY PERFORMANCE | MIS | RANK | DECISION |
|---|---|---|---|---|
| 1 | Shortage of knowledge and training. | 3.440 | 1st | Less Significant |
| 2 | Lack of supervision | 3.160 | 2nd | Less Significant |
| 3 | Biological agents | 3.040 | 3rd | Less Significant |
| 4 | Awareness about the safe implementation of assigned work | 3.000 | 4th | Less Significant |
| 5 | Ergonomic hazards | 3.000 | 4th | Less Significant |

| | | | | |
|---|---|---|---|---|
| **6** | Large financial losses | 2.960 | 6th | Less Significant |
| **7** | Lack of knowledge and pattern of illness | 2.920 | 7th | Less Significant |
| **8** | Apathy and total carelessness | 2.840 | 8th | Less Significant |
| **9** | Mechanical | 2.800 | 9th | Less Significant |
| **10** | Exposure to harmful chemicals | 2.720 | 10th | Less Significant |
| **11** | Physical | 2.680 | 11th | Less Significant |
| | *Average* | *2.960* | | Less Significant |

*Source: Researchers' Analysis of Data (2019)*

Table 6 revealed that the H&S training practices identified have less significant impact on the safety performance of medium sized construction firms. These impacts range between "Shortage of knowledge and training" and "Physical impact" (MIS = 3.44 and 2.68 respectively). This agrees with findings from literature (Famakin and Fawehinmi, 2007; Shittu *et al.*, 2015; Shittu *et al*., 2016; Shittu, 2016) which state that small and medium sized construction firms have peculiar H&S challenges.

**Strategies for reducing the rate of accidents, injuries and fatalities on construction sites**

The MIS result of the 15 identified strategies for reducing the rate of accidents, injuries and fatalities on construction sites is presented in Table 7.

*Table 7: Strategies for reducing the rate of accidents, injuries and fatalities on construction sites*

| S/NO | STRATEGIES FOR REDUCING ACCIDENT RATES | MIS | RANK | DECISION |
|---|---|---|---|---|
| **1** | Supervision | 4.200 | 1st | Effective |
| **2** | Health and Safety Warning Signs | 4.080 | 2nd | Effective |
| **3** | Risk Management | 4.080 | 2nd | Effective |

| | | | | |
|---|---|---|---|---|
| **4** | Financial Provision for H&S | 4.040 | 4th | Effective |
| **5** | Effective Communication | 4.040 | 4th | Effective |
| **6** | Partnering | 4.040 | 4th | Effective |
| **7** | Safety incentives | 4.000 | 7th | Effective |
| **8** | Proper Equipment | 3.960 | 8th | Effective |
| **9** | Safety record keeping and follow-ups | 3.920 | 9th | Effective |
| **10** | Changes in the permanent design | 3.880 | 10th | Effective |
| **11** | Personal Protective Equipment (PPE) | 3.840 | 11th | Effective |
| **12** | First aid Kits and Accident Reporting | 3.760 | 12th | Effective |
| **13** | Hazard Identification and Risk Assessments (HIRAs) | 3.600 | 13th | Effective |
| **14** | Site Layout and Planning | 3.560 | 14th | Effective |
| **15** | Safety Policy | 3.400 | 15th | Less Effective |
| | *Average* | *3.893* | | Effective |

*Source: Researchers' Analysis of Data (2019)*

It was shown from Table 7 that the strategies identified for reducing the rate of accidents, injuries and fatalities on construction sites are effective (average MIS = 3.893). The most effective strategy is "Supervision" (MIS = 4.20) while the least effective one is "safety policy" (MIS = 3.40). This agrees with the study of Grace *et al.* (2014) that these H&S measures are proactive strategies for reducing the rate of accidents, injuries and fatalities on construction sites.

## CONCLUSION AND RECOMMENDATIONS

In view of the research findings it can be concluded that H&S training practices are not completely complied with by medium sized construction firms in Nigeria. The H&S Regulations has significant impact on safety performance of construction firms, while H&S training practices have less significant impact on safety performance of construction firms. The strategies for reducing the rate of accidents, injuries and fatalities on construction sites are effective. It is therefore clear that the level of compliance to H&S training practices among medium sized construction firms in Abuja, Nigeria is not effective.

In view of the conclusion of the study, the following recommendations are made:

i. Medium sized construction firms should adopt the relevant H&S provisions in the identified H&S Regulations especially "H&S Provision in Labour, Safety & Welfare Bill 2012" and "National Building Code 2006" in order to formulate their H&S policies in order to increase the level of compliance with H&S training practices,

ii. Medium sized construction firms should implement the suggested strategies to the latter in order to create a conducive atmosphere for both management and workers to be able to implement the H&S regulation and training practices for enhanced H&S performance.

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