



Assessment of Adherence to Health and Safety Regulations on Construction Sites: A Case of Edo State

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ABSTRACT

The study assesses the Health and Safety Management Practice of Construction Projects in Edo State. That was achieved through the identification of Health and Safety concepts in the Nigerian Construction Industry, assessment of the current level of Health and Safety Management practice of Construction Projects in Edo State, and establishment of the measures to enhancing the efficiency of Health and Safety Management Practice of Construction Projects in Edo State. Secondary data were obtained through the review of relevant literature on the subject area and primary data were obtained through a questionnaire survey. Out of the 81 questionnaires administered to contractors, clients, and consultants operating in the construction projects within Edo State, 72 valid questionnaires were returned representing an 82.9% valid response rate. The data collected were analyzed using a descriptive-analytical tool with the aid of Statistical Package for Social Science (SPSS). The results obtained reveal that the current level of Health and Safety management practice of construction projects in Edo State is average. Furthermore, the results determined the measures for enhancing Health and Safety management practice in order of suitability to include: management commitment, risk analysis in the design stage, contractor compliance with safety regulation, training strategy, personal selection, providing safety equipment & tools, reward policy, taking responsibility to report any accident, identify hazards, assessing and evaluating risks, deciding precautions and provisions of Reliable inspections among others. The study concludes that the key players of the Nigerian construction industry should employ the foregoing measures with a view to effectively enhance Health and Safety practices. If the Health and Safety measures determined in this study are used, they will improve Health and Safety management practice in the construction industry. Lastly, subsequent research work in this subject area should determine more Health and Safety Measures. And, also develop Health and Safety framework using the Health and Safety measures determined in this study.

Key words: Health and safety management, Construction projects, Edo State, Construction industries, Regulation codes

1. INTRODUCTION

Throughout the world, the construction industry stands out among all other industries as the main contributor to severe and fatal-work related accidents. In the United Kingdom, for example, the industry accounts for one-third of all work-related fatalities and, five construction workers are killed every two weeks. Emerging economies and less developed countries are no exception to high fatality rates. Construction workers are five times more likely to suffer a permanent disability than those in other industries [1,2,3]. Health and Safety Executive [4,5] asserts that over the years a great deal of effort has gone into reducing the number of people who were killed or injured as a result of construction work. Initiatives from all sides of the industry have produced a long-term reduction in the number of injuries and fatalities, but recently their effects have diminished and the number of deaths has increased [6,7,8]. The situation in developing countries like Nigeria is worse than what prevails in developed countries because of the lack of statutory regulations on health and safety.

According to [10, 11, 12], safety legislation alone cannot change this situation. What is needed is a change in the inbred attitudes of all involved with construction operation, manual workers, management, designers, and client. This change

can be helped by implementing legislation but it also requires higher levels of awareness of safety problems and how they can be reduced. Although several health and safety standards exist, the extent to which construction firms adhere to these standards differs. It is important to understand the extent to which they comply with the standards.

According to [13, 14], accidents in the construction industry represent a substantial ongoing cost to employers, workers, and society. The costs of accidents incurred by contractors on account of the accident are divided into three (3) sections:

- i. The cost of construction health and safety measures, that is expenses invested directly by contractors in safety measures to prevent accidents.
- ii. Direct costs: this defines as those actual costs that can be directly attributable to injuries and fatalities. Is a cost caused by accidents arising from the occurrence of accidents despite the fact that safety measure was in place? It refers to expenditure on insurance, damage to building and equipment or vehicles, cost of health or expenditure on medical care, cost of investigation, legal cost, death, permanently associated with accidents.
- iii. Indirect costs: it refers to costs that may not be covered by insurance and are the less tangible costs that result from accidents. They are classified by HSE as those costs incurred by the diversion of time to deal with the consequences of an accident, which also can affect productivity and these include, cleaning up, hire consulting experts, time lost, sick pay, overtime working, and temporary labour.

With all effort of researchers to tackle the problems of health and safety, it is observed that accident still happen on construction site. It is also observed that no one has made an effort to undertake research on the extent to which health and safety regulations are adhered to on construction site. Thus it is highly desirable to find out whether there are health and safety regulations, to find out the extent to which those health and safety regulation and being adhered to, if there are possible problems militating against the adherence to health and safety on construction site and possibly propose a measure to improve the adherence to health and safety regulation in construction sites.

2. RESEARCH METHODOLOGY

Various methods adopted/used in Achieving the aim and objectives of this research work and it also goes an overview of what these methods are, and how they are employed to achieve the set objectives. It also has to do with the research design, research population, sampling frame, sample size, sampling techniques, data collection instrument, method of data collection, and method of data analysis. Below are the components of the methodology of this research. The descriptive survey research design was used in this research. According to [14] the descriptive survey research tries to identify variables that exist in a given situation and try to describe the relationship among the variables as well as identify the factors that exist among such variables.

2.1. Research population

Every research study focuses on a specific geographical location, where the research will be carried out. The research study will be carried out in Edo State which is a South-South geopolitical zone in Nigeria. The population of the study will comprise. In view of the research topic and aim, data were collected on construction sites from engineers, quantity surveyors, builders, skilled and unskilled workers.

2.2. Sampling frame

The adequacy of the sample is addressed by how well it represents the whole population of participants from which the sample is drawn. The population for this research/study shall include a build environment with a design team who fully take part in designing the project in Edo State.

Table -1 Sampling frame

Respondents	Population
Engineers	15
Quantity surveyor	11
Builders	17
Skilled workers	27
Unskilled workers	32

Field study, 2019

2.3. Sample Size

There are several approaches to determining the sample size. For the purpose of this study, applying formulae to calculate a sample size will be adopted. There are several formulas for determining sample size for populations that are large, [15] developed an equation to yield a representative sample for the population.

$$n = \frac{N}{1 + N * e^{\infty 2}} \quad (1)$$

Where;

N: population size

n: sample size

e : significance level, for eg. (0.05)

2.4. Sampling techniques

The process of sampling or selection of a part of the population, from which the characteristic of the large population can be inferred, has long been the legitimate and expedition's method of research in [16]. Sampling techniques distinguish between probability and non-probability sampling. For the purpose of this research, simple random sampling techniques were used.

2.5. Data collection instrument

The research instrument that was used for this study or research is the standardized structural questionnaire that will be used to collect primary data for the study. The research questionnaire consists of sections. Section "A" sought information on respondent's demographic data while section "B" identifies Health and safety regulations, barriers, and measures to enhance adherence to health and safety regulations. For the purpose of this research study, the questionnaire was administered and retrieved for purpose of this research in Edo State by the researcher himself with the assistance of two colleagues in the Northern and Southern parts of Edo State.

2.6. Data analysis

This study adopted frequency, percentages, relative importance index, and mean item score in analyzing the data collected through the research instrument. Some of the results will be presented using simple statistical instruments like tables. The Statistical Package for Social Sciences (SPSS) software was used to analyze the collected data. Statistical metrics such as percentage (%), frequency (f), and relative importance index (RII) were computed as shown in equations 2-4:

$$P (\%) = \frac{n*100}{N} \quad (2)$$

Where, P = Percentage

n = Value of the item

N = total value of the item

$$F = 1/T \quad (3)$$

Where F = frequency (rate of occurrence)

T = Time (period)

$$RII = \frac{\sum W}{A*N} \quad (4)$$

3. RESULTS

3.1. Data presentation and analysis

The data collected to assess the adherence to health and safety regulations on construction sites in Nigeria were analyzed and presented in this chapter. Because of the objectives of this study, a total of 81 questionnaires well-structured questionnaires were administered to personnel of physical planning departments and contractors directly engaged in construction projects in the institution under study. The collected questionnaires were carefully coded and the data entered into the statistical package for social science (SPSS V.20). Having done this, ninety (72) questionnaires were retrieved from the total number of 81 questionnaires administered. Based on [17, 18, 19] assertion, the result of a survey could be considered significant if the response rate is not lower than 30-40%. Based on this, the percentage of the returned questionnaires is adequate for the analysis.

3.1.1. Respondent's age

From Table 2, most of the respondents (66) 91.7% out of the total population of the study indicated are Male, while (6) 8.3% of the respondent are Female in the construction site which is good enough to provide the study with informed information.

Table -2 Sex of Respondent

Respondent	Frequency	Percent
Female	6	8.3
Male	66	91.7
Total	72	100.0

3.1.2. Academic qualification

It can be seen from Table 3: That majority of the respondents involved in this survey holds HND making up 36.50% of the total respondents, respondents of Bachelor's degree (B.Sc/B.Tech) make up 19.26% of the respondents, respondents with PGD makeup 9.12% of the respondents, respondents with Master degree (M.Sc/M.Tech) make up 5.6% of the respondents and Ph.D. constitutes 3.4% of the total respondents surveyed.

3.1.3. Construction Projects

From Table 4 it is obvious that from the above result, among the 72 questionnaires that were successfully returned, 12 (16.7%) of the respondents had 1-5 years number of construction projects handled, 1(1.4%) of the respondents had 6-10years had several construction projects handled, 15 (20.8%) of the respondents had 11-15 years had many construction projects handled, 23 (31.9%) of the respondents had 16-20 years had several construction projects handled, and 21 (29.2%) of the respondents had 21 years and above had many construction projects handled. From the above summary, most of the respondents 92.9% out of the total population of the study indicated that they have been involved (actively) in the construction sector in Nigeria long enough to provide the study with informed information as they fall under the range of 6-30 yrs.

Table -3 Academic Qualification

Respondent	Frequency	Percent	Cumulative Percent
Ph.D	3	4.2	4.2
M.Sc/M.Tech	5	6.9	11.1
PGD	9	12.5	23.6
B.Sc/B.Tech	19	26.4	50.0
HND	36	50.0	100.0
Total	72	100.0	

Table -4 Identified health and safety regulation on construction sites

Identified Standards	RII	Rank
provide and maintain equipment, machines, materials or things that are properly equipped with safety devices	0.822	1
fire protection and prevention	0.817	2
co-operate with all parties involved in construction	0.814	3
keep tools and personal protective equipment in good condition	0.806	4
provide welfare facilities from the start of the construction phase, including sanitary conveniences, washing facilities, drinking water, changing rooms and secure storage	0.800	5
emergency routes and exist remain clear of obstruction	0.789	6
explosives used or to be used on the site are stored, transported, used and disposed	0.781	7
use of health and safety file	0.772	8
accident prevention by signs and tags	0.761	9
provide first aid and medical attention	0.761	10
provide persons at work with disabilities, in particular as regards doors, passageways, staircases, showers, washbasins, lavatories and work-stations used or occupied directly by those persons	0.750	11

provide personal protective equipment and clothing for workers	0.736	12
appoint competent staff	0.733	13
provide pregnant women and nursing mothers at work on the site with appropriate facilities	0.722	14
provide health and safety training for workers and supervisors	0.708	15

From Table 4, it was observed that the respondents health and safety regulation were relatively high especially provide and maintain equipment, machines, materials or things that are properly equipped with safety devices was ranked highest with RII of 0.822, fire protection and prevention was ranked second with RII of 0.817, co-operate with all parties involved in construction was ranked third with RII of 0.814, keep tools and personal protective equipment in good condition was ranked fourth with RII of 0.806, provide welfare facilities from the start of the construction phase, including sanitary conveniences, washing facilities, drinking water, changing rooms and secure storage was ranked fifth with RII score of 0.800 emergency routes and exist remain clear of obstruction was ranked sixth with RII of 0.789, explosives used or to be used on the site are stored, transported, used and disposed was ranked seventh with RII score of 0.781, use of health and safety file was ranked eighth with RII score of 0.772, accident prevention by signs and tags was ranked ninth with RII score of 0.761 provide first aid and medical attention was ranked tenth with RII score of 0.761, provide persons at work with disabilities, in particular as regards doors, passageways, staircases, showers, washbasins, lavatories and work-stations used or occupied directly by those persons was ranked eleventh with RII score of 0.750, provide personal protective equipment and clothing for workers was ranked twelfth with RII score of 0.736, appoint competent staff was ranked thirteenth with RII score of 0.733, provide pregnant women and nursing mothers at work on the site with appropriate facilities was ranked fourteenth with RII score of 0.722, and provide health and safety training for workers and supervisors was ranked fifteenth with RII score of 0.708. From the above summary, health and safety regulation like providing health and safety training for workers and supervisors should be improved upon by contractors. The finding agrees with [20, 21].

From the above Table 4 the opinion of respondents was sought as regards identifying health and safety regulations on construction sites. This was to find out their understanding of health and safety regulations on construction sites. The table revealed that most of the respondents have a low understanding of identifying health and safety regulations on construction sites.

3.1.4. Level of adherence to health and safety regulation in construction site

From Table 5, the overall result shows that respondents tend to agree with the level of adherence/compliance with health and safety regulations on construction sites. This is clearly shown by the mean scores, as shown in table 4.5 above where four of the identified standards fall within high level of existence (i.e a mean score of 3.5 – 5.0), and six of the regulations fall within the moderate level of existence (i.e a mean score of 2.5 – 3.49). The mean score indicates that Possession of basic safety training, education and Safety brief before commencement of any day work on site was ranked first with mean values of 3.9861, Construction equipment handled with utmost care was ranked second with mean values of 3.9726, Observation of standing safety rules and regulations on site was ranked third with mean value of 3.7222, Prompt and adequate communication of safety issues to all concerned was ranked fourth with mean value of 3.5417, Compulsory use of personal protective equipment (PPE) on site was ranked fifth with a mean value of 3.4861, Strict monitoring of safety policy and proper keeping of safety records was ranked sixth with a mean value of 3.4028, Availability of health and safety plan before commencement of construction project was ranked seventh with a mean value of 3.4028, Using safeguard in high level was ranked eighth with a mean value of 3.4028, The finding agrees with [21, 22]. Reliable and clean work condition was ranked ninth with a mean value of 3.3750, while Working environment always cleared and kept free from all objects that can cause harm or injury to the workers have the least mean score of 3.2639.

Table -5 Level of Compliance/Adherence to Health and Safety Regulation in Construction Site

Level of Compliance	Mean	Rank	Level of Existence
Possession of basic safety training, education and Safety brief before commencement of any day work on site	3.9861	1	High
Construction equipment handled with utmost care	3.9726	2	High
Observation of standing safety rules and regulations on site	3.7222	3	High

Prompt and adequate communication of safety issues to all concerned	3.5417	4	High
Compulsory use of personal protective equipment (PPE) on site	3.4861	5	Moderate
Strict monitoring of safety policy and proper keeping of safety records	3.4028	6	Moderate
Availability of health and safety plan before commencement of construction project	3.4028	7	Moderate
Using safeguard in high level	3.4028	8	Moderate
Reliable and clean work condition	3.3750	9	Moderate
Working environment always cleared and kept free from all objects that can cause harm or injury to the workers	3.2639	10	Moderate

3.1.5. Problems militating against adherence to health and safety regulation in construction sites

Table 6 shows an overall result that respondents tend to agree with the existence of most barriers to the adherence to health and safety regulation on construction sites. This is clearly shown by the mean scores, as shown in table 4.7 above where seven of the barriers fall within a high level of existence (i.e a mean score of 3.5 – 5.0), and three of the barriers fall within the moderate level of existence (i.e a mean score of 2.5 – 3.49). The mean score indicates that lack of personal protective equipment implementation was ranked first with a mean value of 3.8611, inadequate personal protective equipment was ranked second with a mean score of 3.8194, inadequate enforcement mechanism was ranked third with a mean value of 3.7778, lack of monitoring was ranked fourth with a mean value of 3.7361, unawareness of health and safety matters among the workers was ranked fifth with a mean value of 3.7222, lack of adequate funds was ranked sixth with a mean value of 3.6667, absence of safety and health committees was ranked seventh with a mean value of 3.5556, inadequate welfare facilities were ranked eighth with a mean value of 3.4861, poor maintenance of personal protective equipment was ranked ninth with a mean value of 3.4722, while lack of top management support in the management of health and safety in construction sites have the least with a mean value of 3.4722. The finding agrees with [23 24].

3.1.6. Measures to ensure adherence to safety regulation in construction sites

Conversely, the result in Table 7 showed the measures to ensure adherence to health and safety regulation in construction site were relatively high especially provision of personal protective equipment (PPE) was ranked highest with RII of 0.794, formation of safety committees was ranked second with RII of 0.767, inspections by the government was ranked third with RII of 0.767, training and education of workers was ranked fourth with RII of 0.767, appointing competent staff was ranked fifth with RII score of 0.742 provision of welfare facilities from the start of the construction phase, including sanitary conveniences, washing facilities, drinking water, changing rooms and secure storage was ranked sixth with RII of 0.742, provide first aid and medical attention was ranked seventh with RII score of 0.712, proper personal protective equipment implementation was ranked eighth with RII score of 0.703, proper reliable and clean work condition was ranked ninth with RII score of 0.706, and strict monitoring of safety policy and proper keeping of safety records was ranked tenth with RII score of 0.691.

Table -7 Identified Measures to Ensure Compliance/Adherence to Health and Safety Regulation in Construction Sites

Identified Measures	RII	Rank
Provision of personal protective equipment (PPE)	0.794	1
Formation of safety committees	0.767	2
Inspections by the government	0.767	3
Training and education of workers	0.767	4
Appointing competent staff	0.742	5
Provision of welfare facilities from the start of the construction phase, including sanitary conveniences, washing facilities, drinking water, changing rooms and secure storage	0.742	6
Provide first aid and medical attention	0.712	7
Proper personal protective equipment implementation	0.703	8
Proper reliable and clean work condition	0.706	9
Strict monitoring of safety policy and proper keeping of safety records	0.691	10

4. DISCUSSION

Health and Safety are two major factors that have to be employed and properly implemented in any construction site. Accidents and various hazards do occur in various construction sites and this may be due to a lack of adherence to health and safety standards. The result of the study revealed that various companies consulted are aware of the standards but do not adhere to the “always” but “often”. The study was carried out using Sample questionnaires. A total number of 81 questionnaires was distributed to various construction firms within the study area. A total number of 75 was retrieved and 3 participants filled in some wrong information, thus 72 valid questionnaires were used to analyze the data. Among the category of the companies, that the questionnaires were distributed to, 6 % fall under 0-5years of establishment, 20% for both companies within 5-10years and 10-15years of establishment, 14% were for companies within the range of 15-20years of establishment, 8% were for companies within the range of 20-25years and 33% were for companies above 25years of the establishment. Thus the higher percentage of results obtained were from companies that are above 25years of existence, making the result more reliable.

5. CONCLUSION

From the research findings, it was observed that most of the companies in the study area use the British standard of health and safety regulation. It was also discovered that most companies put into practice this standard on construction sites often. From the analysis of data collected, the calculated mean is mostly centered at 4 and the standard deviation is usually clustered around the estimated mean. Showing that 60.8% of companies make use of health and safety standards. If 60.8% of these companies adhere to health and safety standards always, there will be a reduction in accidents and risk of life drastically. Finally, adherence to health and safety standards always, will not only reduce the rate of exposure to risks and hazards on construction sites but also eliminate them where possible.

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