



Workplace Health and Construction Safety in the Era of Fourth Industrial Revolution

Olanrewaju Sharafadeen Babatunde Owolabi^{1,2}, Oyebiyi Simeon Abiodun², and Olanrewaju Oluwatoyin Eunice³

¹School of Housing Building and Planning, Universiti Sains Malaysia.

²Department of Building Technology, The Federal Polytechnic, Ado Ekiti, Nigeria.

³Department of Maintenance and Services, The Federal Polytechnic, Ado Ekiti, Nigeria.

Citation: Olanrewaju, S.B.O.; Oyebiyi, S.A.; & Olanrewaju, O.E. (2023). *Workplace Health and Construction Safety in The Era of Fourth Industrial Revolution*

ABSTRACT: Workplace health and construction safety in the era of fourth industrial revolution refer to any safety process that is connected to the construction sector or construction sites. This study looked at the deployment of safe plant and equipment, safe working environments, and safety training as some of the most commonly seen aspects that influence the performance of construction safety and occupational health at the project level. The classification of documents was done in accordance with construction safety and occupational health, which consists of legislation, instruction and training, risk assessment, risk mitigation, and accident investigation. Construction safety aims to prevent a construction site or the industry from posing an immediate threat to the general public near a construction site or to the personnel there. It also ensures that the final result of construction meets the necessary safety requirements. A well-designed questionnaire that was randomly distributed to the population in the southwestern states of Nigeria was used to collect the study's data. Being one of the most hazardous jobs, construction safety is a major worry in the workplace. Good government policies that are more effective and efficient are crucial for the building industry. The respondents advised that government policy, communication, staff training, and organizational structure should be improved for a better flow of operations in order to realize effective functioning. Regarding the report on this work, a conclusion and recommendation are provided.

Keywords: industrial revolution, safety training, construction safety, and occupational health

Received 11 Jan., 2023; Revised 25 Jan., 2023; Accepted 27 Jan., 2023 © The author(s) 2023.

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I. Introduction

Due to the rising number of construction accidents and the effects these have on workers, organizations, society, and countries, workplace health and safety has become a very relevant problem for shareholders to take care of their human and infrastructural resources. Construction sites are dangerous places with many risks and dangers that could cause a worker to become ill, get harmed, or even pass away there. These risks include those posed by potentially dangerous substances like dust, chemicals, and others, as well as those brought on by tools, falls from heights, injuries sustained while performing manual labour, being struck by moving construction equipment, and a wide range of other risks [1].

Safety is the quality of not having to worry about getting hurt, in danger, or losing something. It's also the capacity to have a plan or a mechanism in place to prevent injury or avoid risk. In order to protect people's health and wellbeing as well as the wellbeing of the community, a safe environment is one in which risks and conditions that could cause physical, psychological, or material harm are managed. It is essential for daily life and is needed by both individuals and communities in order to achieve their goals.

Aspects of occupational safety and health include creating, promoting, and sustaining work settings, policies, and programmes that protect employees' mental, physical, and emotional health as well as maintaining a work environment that is mainly free from real or potential risks. The construction industry has been a significant contributor to high fatality rates due to a high number of accidents, although significantly contributing to the country's economic prosperity [2]. Construction workers who were actively engaged in

construction activities had a higher risk of dying than workers in other industries, according to accident statistics [3].

Construction safety encompasses any safety measures related to the construction sector or construction sites. Construction safety seeks to prevent an immediate threat to the general public in the vicinity of a construction site or to the personnel there from a construction site or the industry as a whole. Building safety is a big source of concern because it is one of the riskiest professions, and it also tries to ensure that the finished construction product conforms with necessary safety requirements. According to the Bureau of Labour Statistics (BLS), working on a construction site is the fourth-most dangerous employment overall, with the second-highest rate of fatal injuries and construction industry may be the riskiest land-based job after manufacturing industries.

The Occupational Safety and Health Administration (OSHA) is in charge of providing construction health and safety laws and regulations, and the classification of documents was done in accordance with the cycle of occupational safety and health, which consists of regulation, education and training, risk assessment, risk mitigation, and accident analysis. Accidents are caused by a variety of causes, including the particulars of the construction company, human behaviour, poor site conditions, unsafe work practices, equipment, and procedures that are impacted by inadequate safety management [4]. These factors could lead to accidents, which would further interrupt work and slow down production [5]. As a result, it is imperative that every employer offer training and thorough safety programmes [4], this may continuously enhance safety performance to lower potential hazards in construction projects [6].

II. Literature review

The primary causes of accidents and incidents in the construction sector are technical errors and staff ignorance. All site visitors must adhere to the personnel factors' directions, and experts take technical measures to reduce mishaps [7]. The performance of safety on construction sites can be affected by seven elements, which were found in this paper. Historical, economic, psychological, technical, procedural, organizational, and workplace variables were all examined.

Asgard & Orgensen (2019), [8] evaluated the initial stages of building project management and how they affected the safety environment, finding that the three biggest threats to health and safety throughout the early stages of construction projects were a lack of expertise, a lack of prioritizing, and a lack of consequences. In order for educational institutions, construction clients, and public agencies to all do their part to make things better, they also proposed methods to reduce accidents. Mohammadi et al. (2018), [9] provided a thorough explanation of accidents, their causes, and prevention strategies. Safety and health refer to the extent to which the general circumstances support the completion of a project without substantial fatalities or injuries. The primary aspect considered while evaluating safety is the number of accidents that occur during the construction period.

Construction work is commonly acknowledged as one of the most hazardous and dangerous activities in the entire world because so many people are murdered and hurt every year. According to Okedare & Olanrewaju (2018), [1] among the factors that affect the health and safety performance on construction sites are administrative and management commitment, the role of government and professional bodies, the nature of the project, the historical, social, and psychological climate, the application of health and safety factors in organizations, the project's location being accessible safely, poor planning and coordination, and poor communication between sites. The elements that influence construction site accidents are described by [10] in this study, the safety-affecting elements are separated into three groups based on where they are found in the building site and its environs. To regularly evaluate and advance its health and safety performance, [11] recommended the need for a comprehensive and user-friendly solution. In this study, seven key components were chosen based on norms and guidelines, and literature reviews revealed factors influencing each component.

At the organizational and project levels, the relative weights of each element and their corresponding components were computed. [12] looked at the state of safety management in the construction industry. Additionally, risky actions on construction sites and elements impacting safety there are also covered, a poor understanding of safety, a lack of training, a bad unwillingness to contribute resources for safety, and careless operations are the key issues affecting construction safety and occupational health performance.

The analysis makes recommendations for enhancing a construction project's safety performance. [13] investigated how different historical, economic, psychological, procedural, organizational, technical, and environmental issues related to safety at the locations. The psychological factors are determined by an individual's safety behaviour, the technical and procedural factors are determined by training and equipment handling procedures, the organizational and environmental factors are determined by safety policy, and the historical factors are determined by an individual's background and characteristics. The economic factors are determined by monetary values and since they reflect the quality of completed projects and, more importantly,

the protection of life for people who work in the sector, construction safety and occupational health performance must be enhanced [13–16].

III. Methodology

For the aim of attaining the goals of this workplace health and construction safety in the fourth industrial revolution's era, ninety (90) questionnaires were distributed, and construction sites will be randomly selected. Both primary and secondary sources were used to collect data including surveys, interviews, books, journal papers, and online resources.

Data analysis was conducted using social statistics tools, including the mean and standard deviation (SPSS). The relative significance index (RSI) was one of the statistical tools used in this study to recognize the elements influencing construction safety, and occupational health in the fourth industrial revolution era. The factors under study were ranked using the relative significance index ranking (RSI). In their construction research, authors like [17,18, 19, 20, 21] and others had applied these techniques.

For the purpose of quantifying qualitative variables, the Likert scale, which asks respondents to rate items on a scale between 1 and 5, was established for use in social sciences and management research. It gathered information about construction safety and occupational health in the fourth industrial revolution era from building construction specialists. On a scale from 1 to 5, the replies to the questionnaire's items were recorded. "Very High" scores were 5, "High" scores were 4, "Average" scores were 3, "Low" scores were 2, and "Very Low" scores were 1.

IV. Results

Tables were used to exhibit the data in order to make it clearer and easier to interpret. Statistics from both descriptive and inferential sources were used in the analysis.

A. Respondents Profile

Table 1: Sex

Sex	Frequency	Percentage
Male	46	76.67
Female	14	23.33
Total	60	100.00

Men and women who responded was displayed in Table 1. It revealed that 92% (76.67%) of respondents are men and 8% (23.33%) are women. The outcome demonstrates how genders are represented in the research area's construction industry.

Table 2: Length of service

Years	Midpoint (x)	Frequency (f)	Fx	Percentage
1-5	6	20	120	10.11
6-10	8	17	136	11.46
11-15	13	16	208	17.52
16-20	18	18	324	27.30
above 21	21	19	399	33.61
Total		90	1187	100.0

Mean = $\sum fx / \sum f = 1187/90 = 13.19$

The respondents' estimated average year of experience, which is thirteen years, is shown in Table 2. (13yrs). With an average working experience of thirteen years, respondents are assessed as having sufficient experience to give reliable data for the study.

Table 3: Professional qualification

Educational Qualification	Frequency	Percentage (%)
NIOB	38	42.23
NIQS	16	17.77
NIA	14	15.56
NSE	12	13.33
Others	10	11.11
Total	90	100

The respondents' educational backgrounds are displayed in Table 3 for comparison. The percentage of people who are registered with a professional body is 42.23 percent for NIOB, 17.77 percent for NIQS, 15.56

percent for NIA, 13.33 percent for NSE, and 11.1 percent for other professional groups. The outcome demonstrates that every respondent has professional bodies they are registered with in Nigeria and has received the necessary training to provide accurate data for the survey.

Table 4: Factors affecting construction safety and occupational health in the era of fourth industrial revolution.

S/N	Factors	1	2	3	4	5	Total	RSI	Rank
1.	Poor safety awareness	10	16	17	17	30	90	0.691	1
2.	Lack of training	16	15	18	21	20	90	0.631	6
3.	Poor reluctance of input resources of safety	11	20	15	34	10	90	0.627	8
4.	Historic, human, and psychological climate	15	23	26	19	7	90	0.556	14
5.	Administrative and Management commitment	12	20	15	15	28	90	0.660	2
6.	Role of Government and Professional Bodies	20	13	19	20	18	90	0.607	9
7.	Nature of project	11	28	16	26	9	90	0.587	11
8.	Project location is safe to reach	20	23	24	15	8	90	0.529	15
9.	Lack of prioritization	20	11	12	17	30	90	0.658	3
10.	Reckless operations	11	20	18	21	20	90	0.642	4
11.	Utilizing health and safety considerations	21	10	15	34	10	90	0.604	10
12.	Lack of competency and knowledge	25	13	16	19	17	90	0.578	3
13.	Lack of consequences	22	10	15	15	28	90	0.638	5
14.	Poor planning and co-ordination	10	23	19	20	18	90	0.629	7
15.	Poor communication between sites	11	28	16	26	9	90	0.584	12

Relative Significance Index (RSI) shows the level of factors affecting construction safety and occupational health in the fourth industrial revolution era was displayed in Table 4 above. With an RSI value of 0.69, poor safety awareness emerged in top place (i.e., 69 percent significant), followed by a lack of administrative and managerial commitment, a lack of knowledge and expertise, with a RSI score of 0.658, and an RSI rating of 0.66. Although the project's location is accessible, its RSI score of 0.529 placed it last. The outcome also demonstrated that each component is significant, with the least significant factor having a significant level of 0.529 (52.9%).

V. Conclusion

According to accident statistics Abas et al. (2015), [3], compared to workers in other industries, construction workers who were actively engaged in construction operations had a higher mortality rate. The public has to be educated by professional organizations about the consequences of negligence or ignorance about the usage of safety gear and equipment.

VI Recommendation

To reduce the likelihood of accidents on the job and in the office, construction officers or managers and their team should take a proactive approach. This will improve the physical and functional well-being and wellness of the employees and enable them to provide effective and high-quality services. The following suggestions were made to advance occupational safety and health in construction during the fourth industrial revolution.

- i. There should be adequate and enough safety knowledge of the use of the newly introduced tools and equipment.
- ii. Employers and employees should receive training and retraining.
- iii. Examining the workplace, employment, and employees' health and safety is crucial.
- iv. There should be proper planning and site coordination to prevent recklessness.
- v. Proper and adequate communication must be enhanced between the workmen and the safety officers.
- vi. Government should equally make it as a matter of policy for promulgate legislation on safety and occupational health,
- vii. There should be a construction safety and occupational health policy guiding safety and of construction workers.

To decrease the likelihood of accidents on the job site and in the office, construction officers or managers and their team should take a proactive approach. It is important to understand that top administrative management and construction safety and occupational health officers collaborate to ensure there are enough funds available on construction sites for first aid, medications, and payments for accident victims as well as to ensure that these funds are used wisely. According to Mahmoudi (2014), [11], a thorough and straightforward instrument is required to regularly evaluate and advance its health and safety performance.

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