

Factors Influencing the Safety and Health Performance of Construction Site Workers in Johor Bahru, Johor

Muhammad Afiq Mohd Sayid Nasir¹, Syed Burhanuddin Hilmi Syed Mohamad^{1*}

¹Department of Civil Engineering, Faculty of Civil Engineering and Built Environment,
Universiti Tun Hussein Onn Malaysia, Batu Pahat, Johor, 86400, MALAYSIA

*Corresponding Author Designation

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Abstract: In this era of globalization, the construction industry has been recognized as one of the most hazardous industries and workers in this industry are more at risk of accidents that can injure, disfigure, or even death. The main purpose of this study is to determine the factors that influence the safety and health performance of construction site workers and assess the level of compliance with existing safety and health work systems or procedures at the construction site targeted for the construction firms in Johor Bahru that are registered as Grade 1-7 and construction industry professionals. The research method adopted in the present study was the quantitative method involving the deliver and collect questionnaire using Likert scale and through the data analyzed by using Average Index (AI) for gaining precise results. This research revealed that having safety meetings implement can improve the safety and health of construction site workers and the execution of emergency planning and preparation was essential due to the most compliance factors. This research will benefit construction site workers and contractors involved in the industry of construction by providing good information for them to highlight and providing workers and individuals participating in the building process with safety practices and comply safety rules and laws while on the construction site.

Keywords: Construction Site Workers, Occupational Safety and Health,

1. Introduction

In this era of globalization, the construction industry is a sector that has a huge impact on the economic and social sectors of the country. Although this construction industry has many positive effects on the country, it is one of the most dangerous industries [1] and it is never free from safety issues and hazards [2]. Construction workers involved in construction are more exposed at risk of

*Corresponding author: burhan@uthm.edu.my

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accidents that can injure, disfigure, or even death than workers in other industries. Not to forget that construction workers are also vulnerable to health problems, especially during the Covid-19 pandemic season. Recently, there have been many deaths at Malaysian construction sites involving construction site workers hovering on social media and newspapers. Therefore, it becomes a question mark why these accidents happen so often. What are the factors that cause accidents at this construction site and whether the employer complies with the laws and regulations at the existing construction site.

This research aims to determine the factors that influence the safety and health performance of construction site workers and assess the level of compliance with existing safety and health work systems or procedures at the construction site. This research was conducted in Johor Bahru, Johor, and was especially restricted to contractors and construction industry professionals. This study will benefit construction site workers and contractors involved in the industry of construction. Workers and individuals involved in the construction process should also pay more attention to enhancing safety performance on the construction site to reduce the risk of injuries and ensure the safety and health of all workers on the construction site.

2. Factors Influencing Safety and Health Performance

Several factors influencing safety performance in construction sites according to previous studies by conducting similar studies and related to this study.

2.1 Project Nature

The nature of a project consists of three main factors which are the complexity of the project design, the behavior of the project owner, and the work environment [3]. The safety performance of a project can be determined by the decisions taken by the designer [4]. Project owner behavior also plays an important role in safety performance on the construction site and there are several steps for the owner to achieve improved safety efficiency [5]. For the work environment, some work types, such as proximity to heights, scaffolding, installation of steel, and dealing with hazardous substances such as epoxy, asbestos, and explosives, can be believed by construction workers to be riskier than others [6].

2.2 Emergency Planning and Preparation

The importance of effective emergency planning and preparation in limiting the negative implications of a construction site disaster cannot be overstated [2].

2.3 Accident Prevention

The common accident prevention is the implementation of signs, signals, and barricades, preventing a fire, and the use of personal protective equipment (PPE). The contractor should take reasonable steps to ensure that employees are familiar with all signs that they should know to prevent danger on construction sites [3]. The contractor must take into account the dangers that can be faced on the construction site by providing for fraud that protects machinery and equipment, storing flammable and flammable materials, housekeeping, training of employees, and final exchange inspections [3]. The use of personal protective equipment (PPE) is important to minimize the occurrence of accidents and worse, deaths [7].

2.4 Historic, Human & Psychological Climate

Contractors with an adequate history of involvement in safety, efficiency is more likely to work safely than contractors with a bad safety record [8]. To ensure the safety of the workers, it is becoming more complicated and complex, and therefore it has become more necessary to monitor and manage human behavior on construction sites [9]. The psychological environment directly impacts the safety output of individual employees by involves the interaction of the employees with or the attitude towards the boss, fellow crew members, and the hiring company [3].

2.5 Welfare Facilities

According to DOSH, for employees, welfare facilities are important and are needed by law. Welfare services, such as toilets, bathing, rest and changing facilities, and a clean place to eat and drink during work breaks, are important for employee well-being [10].

2.6 Administrative and Top Management Commitment

Construction industry organizations need to enhance their safety culture and give a maximum commitment to safety performance at construction sites and they are aware of the safety culture's impact on safety performance., especially through the ability of members of the organization to implement and continue to improve the safety management system effectively [11].

2.7 Safety Inspection

Companies carrying out safety inspections have fewer injuries than businesses that do not carry out inspections [3]. Construction safety inspections are an efficient and reliable way of detecting unsafe conditions at the construction site because continuous monitoring and observations are needed to keep ahead of safety problems.

2.8 Safety Meeting

Daily safety meetings are required to provide both parties with safety details [3]. The top management has a weak safety management mentality as it is shielded from their occasional meetings to safety meetings [12].

2.9 Role of Government and Engineering Societies

The government must play an important role in safety management in the construction industry by issuing labor safety laws and regulations, enacting new labor laws, performing periodic inspections of workplaces by qualified safety engineers, and sending a citation or fine to contractors for hazardous conditions or hazards connected with projects [3].

2.10 Safety Educating and Training

One important factor for consideration in improving safety performance is safety training for construction workers [3]. Organizing training programs for people's education and improving safety efficiency, the industry should be more involved [12].

2.11 Disposal of Hazardous Materials and Waste

The production of construction waste in Malaysia is becoming a pressing issue [13]. The contractor must pay full attention to the risk identification plan, the waste management plan, and the disposal site when dealing with hazardous materials and waste [3].

2.12 Economic Investment

Safety is always seen as a concern that everyone supports, but when it comes to investing money in safety, many people do not feel the value of safety in the project's success [3]. Safety is considered a waste of money by most contractors because they may be unaware of the efficacy of safety management programs in lowering costs and raising efficiency [14].

2.13 The Setting of OSH Objectives and Target

OSH must be adhered to and implemented with relentless commitment and effort to achieve targets to reduce accidents at construction sites and it is very important for a construction company to setting Occupational Safety and Health objectives and targets [15].

2.14 Consultation and Participation of Construction Workers

To perfect success in an OSH is to ensure there are clear lines of communication, consultation, and employee participation with the efficient allocation of time and resources [16]. To achieve systematic

workplace risk management in the construction industry, employee representation and consultation is a fundamental element of the regulatory strategy [17].

2.15 Monitoring, Measurement, and Analyzing of OSH Performance

To ensure that planned activities are carried out as expected, an organization can check, review, inspect, and observe them [16]. Managers will be able to respond more quickly to earlier signs of irregularities in the activity of OSH if procedures for tracking KPIs are implemented as part of their OSH [18].

2.16 Incident Notification and Investigation

Notifications are very important and must be made immediately [19]. Notifications need to pay attention to by all employees and other people in construction safety to increase safety performance by the site condition and also all the notification should be according to safety and health performance standard [8].

3. Methods

The present study adopted the online questionnaire survey method.

2.1 Data Collection

For data collection, the researcher using secondary data sources which are journals, articles, and books to identify the factors influencing the safety and health performance of workers on construction sites. Several factors that can influence safety and health performance in a construction site were identified and were used to develop primary data which is using a questionnaire for the purpose to support and achieve Objective 1 and Objective 2.

2.2 Questionnaire

This study used an online questionnaire. The questionnaire consisted of close-ended questions with two type of five-point of Likert scale which is agreement and frequency. Agreement five-point Likert scale (e.g., 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree) and frequency five-point Likert scale (e.g. 1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, and 5 = very frequently). This questionnaire consists of 3 part which is Part A (respondent's background), Part B (rank the factors that influence the safety and health performance of construction site workers), and Part C (know the level of compliance with existing safety and health work systems or procedures at the construction site).

2.3 Data Analysis

The collected data from the questionnaire will be computed into Statistical Package for the Social Science (SPSS) and Microsoft Excel program by using descriptive statistics such as means and standard deviation. The data for the results of the study will be generated by using the Average Index (AI) that is computes the strength of indices of agreement and frequency. According to (Hamid, Singh & Arzmi, 2014) [20]:

$$\text{Average Index (AI)} = \frac{\sum ai xi}{\sum xi}$$

Whereas:

ai = Constant which represent the weight for i

xi = Variable that represent the frequency of respondents to the I (i=1,2,3,4,5).

4. Results and Discussion

The data was analyzed using Average Index Analysis which is SPSS and Microsoft Excels tools. The finding was analyzed according to the objectives of the study and the outcomes of the analysis were presented in the form of a graph and table. There are 30 people of respondents.

4.1 General / Background Information

The highest number of respondents is from G7 company which is 12 respondents, followed by respondents from G1 and G5 company for 5 respondents each. Next, the respondents from G6 and G4 are only 3 respondents each, followed by the least 2 respondents who work in G3. However, there are no respondents from respondents of G2 company.

Most of the respondents were hold from a different position from the options such as site supervisor (6 respondents), site engineer (2 respondents), production supervisor (1 respondent), project engineer (1 respondent), and civil servants (1 respondent), followed with site safety officer/supervisor (9 respondents) Next is the safety and health officer (7 respondents) and followed with the project manager (2 respondents). Meanwhile, the number of respondents of the site safety manager is (1 respondent) only.

The highest respondents working experience are below 3 years which is 13 respondents, followed by 3-5 years' experience with 8 respondents. Next, the experience with 6-10 years is only 7 respondents. The lowest is 2 respondents had more than 10 years of working experience.

4.2 Factor Influencing Safety and Health Performance among Construction Site Workers

16 factors were ranked, and the 10 most significant factors were determined as the most influencing safety and health performance factors among construction site workers as in Table 1. From the data obtained, it would be seen that item 7, which is the implementation of safety meeting scored the highest value (AI=4.67) among all factors of safety and health performance for construction workers. The second ranking goes to the finding of this study indicated the implementation of safety inspection and also factor monitoring, measurement, and analyzing of OSH performance, both resulted in 4.63 in an average index.

4 factors share fourth place which is the implementation of accident prevention (fire, signs, signal and barricades, and Personal Protective Equipment), implementation of safety education and training, economic investment towards workers' safety, and setting of OSH objectives and targets. For incident notification and investigation showed the average index is 4.57 as eighth place. The next place is 4.53 on the average index which is the commitment of administrative and top management.

For tenth place, 2 factors share this place. The 2 factors are consultation and participation of construction workers and execution of emergency planning and preparation. Both of these factors 4.5 on the average index.

Table 1: Respondents' scores for each factor safety and health performance

No	Factor	Average Index	Ai Ranking	Mean	Standard Deviation
1	Project nature (complexity of project design, behavior of project owner and work environment)	4.47	12	4.57	0.73
2	Execution of emergency planning and preparation	4.5	10	4.63	0.57
3	Historic (safety experience), human behavior and psychological climate (interaction/attitude between workers and management)	4.07	16	4.50	0.74
4	Implementation of welfare facilities	4.43	13	4.60	0.63
5	Commitment of administrative and top management	4.53	9	4.60	0.63

6	Implementation of safety inspection	4.63	2	4.17	0.56
7	Implementation of safety meeting	4.67	1	4.60	0.56
8	Commitment of government and engineering societies	4.23	14	4.60	0.73
9	Implementation of accident prevention (fire, signs, signal and barricades, and Personal Protective Equipment)	4.60	4	4.23	0.68
10	Implementation of safety education and training	4.60	4	4.67	0.56
11	Disposal of hazardous materials and waste	4.17	15	4.63	0.79
12	Economic investment towards workers safety	4.60	4	4.53	0.56
13	Setting of OSH objectives and target	4.60	4	4.43	0.62
14	Consultation and participation of construction workers	4.50	10	4.07	0.63
15	Monitoring, measurement and analyzing of OSH performance	4.63	2	4.50	0.62
16	Incident notification and investigation	4.57	8	4.47	0.57

The majority of respondents agreed with the implementation of safety meetings are the factors of safety and health of construction site workers as stated by safety meeting will be made employee adhere to safety rules and safely perform their task because the employer is concerned about construction workers safety. A well-planned safety meeting is a great way to boost construction workers' morale.

Next, a setting of OSH objectives and target, economic investment towards workers safety, implementation of safety education and training, and implementation of accident prevention (fire, signs, signal and barricades, and personal protective equipment) shows the same mean score with four of the factors are presented as an important factor of safety and health performance indicator. Meanwhile, the factor historic (safety experience), human behavior, and psychological climate are the lowest of the mean score for the factor influencing safety and health performance among construction site workers.

For standard deviation, it can conclude the factor implementation of safety inspection has the lowest value of standard deviation (0.58) which represents the responses not to spread around the mean. Meanwhile, for factor disposal of hazardous materials and waste got the highest (0.79) standard deviation value, and its shows that the responses were polarized.

4.3 Compliance of Organizations

15 factors were ranked, and the 10 most significant factors were determined the most comply safety and health performance factors among construction site workers from respondents company. From the data obtained in Table 2, it would be seen that factors execution of emergency planning and preparation scored the highest value of AI (4.67) among all the factors influencing the safety and health performance of construction site workers. Next, for the second place is factor monitoring, measurement, and analysis of OSH performance with an average index of 4.57. Three factors share third place which is the commitment of administrative and top management, setting of OSH objectives and targets, and incident notification and investigation with an average index value of 4.53. Next, the finding of this study indicated the factor prioritize economic investment towards workers safety also important based on respondent that was ranked 6th with an average index of 4.5.

3 factors share seventh place with an average index of 4.47. The factors are historic (organizations safety experience), human behavior and good psychological climate (interaction/ attitude between workers and management), implementation of safety meeting, and implementation of accident prevention (fire, signs, signal, barricades, and Personal Protective Equipment). For tenth place, two factors share this place with an average index of 4.43 which is the implementation of safety inspection, and consultation and participation of construction workers. Both of these factors are very important.

Table 2: Respondents' scores for compliance of company each factor safety and health performance

No	Factor	Average Index	Ai Ranking	Mean	Standard Deviation
1	Project nature (complexity of project design, behavior of project owner and work environment)	4.03	14	4.03	0.81
2	Execution of emergency planning and preparation	4.67	1	4.67	0.55
3	Historic (safety experience), human behavior and psychological climate (interaction/attitude between workers and management)	3.83	15	4.47	0.68
4	Implementation of welfare facilities	4.47	7	3.83	0.79
5	Commitment of administrative and top management	4.53	3	4.53	0.57
6	Implementation of safety inspection	4.43	10	4.43	0.63
7	Implementation of safety meeting	4.47	7	4.47	0.63
8	Implementation of accident prevention (fire, signs, signal and barricades, and Personal Protective Equipment)	4.47	7	4.47	0.63
9	Implementation of safety education and training	4.37	12	4.37	0.62
10	Disposal of hazardous materials and waste	4.30	13	4.30	0.70
11	Economic investment towards workers safety	4.50	6	4.50	0.57
12	Setting of OSH objectives and target	4.53	3	4.53	0.68
13	Consultation and participation of construction workers	4.43	10	4.43	0.68
14	Monitoring, measurement and analyzing of OSH performance	4.57	2	4.57	0.63
15	Incident notification and investigation	4.53	3	4.43	0.63

The majority of the respondents from the company frequently and very frequently comply with existing safety and health work systems or procedures at the construction site. The most frequent factor of the safety and health performance of construction site workers is monitoring, measurement, and analysis of OSH performance with a 4.67 mean score. The least frequent factor that complies by the company is setting of OSH objectives and target with a 3.83 mean score.

For standard deviation, it can conclude that factor execution of emergency planning and preparation has the lowest value of standard deviation (0.55) which represents the responses not to spread around the mean. Meanwhile, for the factoring project, nature got the highest (0.81) standard deviation value, and its shows that the responses were polarized.

5. Conclusion

In the present study, sixteen factors that influence the safety and health performance of construction sites were highlighted. An online questionnaire survey was conducted with construction firms and construction industry professionals in Johor Bahru, Johor. The descriptive analysis was carried out by examining the average index, mean and standard deviation. The findings of the present study indicate that the implementation of safety meetings was essential due to the most effective influencing factors towards the safety and health performance of construction site workers in Johor Bahru. For compliance of the company, most of the respondents claimed that the execution of emergency planning and preparation was essential due to the most compliance factors towards the safety and health performance of construction site workers in Johor Bahru by the respondent's company. Hence, the present study proposes that all construction firms should comply with all factors to avoid an accident that affects

construction site workers performance. As the present study only covered construction firms in Johor Bahru, the future research should extend the coverage to the entire Johor.

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