



Overview Of Factors Influencing The Use Of Personal Protective Equipment Impact On Construction Projects

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Abstract:

Personal protective equipment contributes greatly to the overall safety of construction workers. Various studies have found that many workers on construction sites often do not wear PPE, which compromises their overall safety and leads to various types of injuries. This study examines the factors that affect PPE use on construction sites, including PPE availability, maintenance, and PPE usage training. The review included about 35 papers that were published within the last 25 years. According to the survey's findings, most workers are aware of the need for personal protective equipment (PPE) and desire to be shielded from mishaps, illnesses, and injuries.

Keywords: personal protective equipment, construction worker safety, occupational health and safety, poor safety management.

1.0 Introduction:

Personal protective equipment (PPE) is required in some workplaces to protect workers from a variety of risks during construction activities. PPE is equipment that protects users from safety hazards while working. To ensure worker safety, construction sites require that equipment be used as intended. All construction sites require safety engineers. Workers who are in charge of wearing personal protective equipment (PPE) on construction sites must generally attend all PPE training, comprehend the importance of wearing the right PPE at work, heed and obey instructions, keep the PPE they are assigned in good working order, report any unsafe conditions they come across, and follow all warnings and cautions. Personal protection equipment (PPE) is not always desirable for workers on construction sites. PPE is essential for preserving human life on construction projects. Typically, personal protective equipment (PPE) consists of head, eye, face, respiratory, hand, and skin protection, as well as basic protective gear. Poor PPE, improper use, ignorance of PPE, and inadequate safety training are usually the root causes of most safety issues in the construction sector. The article examines the prevalent elements influencing protective equipment in the construction industry employing a literature study.

2.0 Literature Review

"Ibrahim [1] showed that construction workers have a high incidence of occupational accidents and a low rate of PPE use. Chay [2] points out that improper use of personal protective equipment is the most important factor. Hallowell [3] points out that safety training, proper use of PPE, safety inspection, and observation will improve safety performance in the long run. Solomon [4] revealed that the main cause of accidents in developing sites is the improper use of safety equipment, which is a key factor leading to accidents and damage in construction sites.

To foster a positive safety culture inside the construction business and improve construction workers' perceptions of safety, health, and the environment, Hassan [5] identified the vital precaution variables. To improve safety results on building sites, Hashim et al. [6] discussed raising knowledge of the use of safety equipment.

According to Uran [7], workers have a moderate level of awareness and expertise on how to use safety equipment. The main reasons behind India's high incidence of serious accidents in comparison to other countries, were covered by Praveenkumar and Vishnuvardhan [8]. A strong safety record that is on par with global standards can be attained with careful planning, efficient execution, ongoing training, and focused safety management. Four aspects of construction site safety were examined by Ahmad et al. [9], including safety promotion, PPE programs, safety training, and safety policies.

"Effectiveness of Safety Education Methods in Malaysian Construction Industry" was covered by Alfred Goh Pui Tekka [10], who further recommended advanced work practices for workers' safety and understanding of a safe environment. Using factor analysis, Chengjie Xu [11] investigated safety considerations in civil engineering. Of the 40 primary components that were summarized, they identified seven common factors related to the construction environment included poor site layout, design considerations, material and equipment considerations, personal equipment problems, safety investment considerations, and construction



technology issues. Lastly, safety management will be appropriately applied to construction projects, and its quality will be continuously enhanced. According to Langford et al. [12], several elements affect work behavior. The existence of a robust safety management system demonstrates management's commitment to improving safety, given the impact that others have on the productivity of employees. This implies that it is necessary to provide a thorough safety architecture that gives each employee power.

Security methods are more crucial than security strategies and training, as demonstrated by Benny and Jayshree [13]. To ensure a safe environment, a safety manager or engineer should always be present on the job site. An obligatory security team should be established by the management. To ensure safety, all workers should wear safety gear. In every construction site, proper measures and improvements should be taken to avoid many possible accidents. Dhriya and Thangaraj [14] have gained practical expertise in procedure improvement for worker health management and safety management. This study advances knowledge of the crucial elements influencing building security safety and the creation of innovative substitutes for safety-related problems.

Purohit [15] demonstrates that the most crucial element in risk control is safety accessories. However, there was not enough PPE on the construction site. Based on the factors affecting risk management, this study shows that the legal system plays an important role in assessing, communicating, and managing risks. Regulations provide for some hazards, such as falls from heights and control mechanisms. Jazaieri and Dadi [16] have done groundbreaking research on various security-related techniques and other related measurement methods. They offer background research on how safety management systems were developed. Using the available safety management methods described above can be advantageous for professionals.

Khan et al. [17] raised attention to numerous safety concerns about mechanical damage and ignorance of safety when it comes to power tool grounding. Additionally, the study offers some suggestions regarding construction site safety. Kadir et al. [18] addressed accidents' primary causes and implemented all safety measures, such as regular inspections and monitoring by managers and safety officers, safety features, and training programs to teach workers how to use safety measures, to ensure a safe and accident-free construction site. Managers of facilities, tools, and equipment should make sure that safety regulations are followed and test staff members for alcohol and drug use as well as for future use.

According to Agwu [19], the six chosen construction companies' full adoption of safety management was facilitated by their outstanding organizational performance, which included fewer accidents and better safety procedures. According to Jocau and Tonton [20], there is a significant likelihood that the criteria employed in construction safety management will be used, and it is quite likely that these factors will be used on an international scale. According to Kaltam [21], migrant labor, an unstructured workforce, and inadequate accident reporting and recording procedures were the main causes. The extent of these accident safety precautions was examined by Oleoluwa and Ondaunkanmi [22], who also made an effort to implement reasonably priced safety measures in small and medium-sized enterprises. Orji Solomon [23] showed that accident-related safety devices have a greater impact on safety than electrical accidents.

According to Jasani [24], a large number of workers lack enough awareness of the risks related to their jobs and how to prevent them. According to Rusli et al. [25], the flyover highway section (MYC) expansion project is expanding well overall, but first aid and personal protective equipment (PPE) indicators have the biggest impact on improving OSH implementation. According to Ganesh and Rajesh [26], factors that impact the safety condition include a lack of space, inappropriate use of safety features, disregard for safety regulations, and insufficient equipment."

3.0 Methodology

This article identifies key factors from a systematic literature review. An analysis of prior research on the use of safety equipment served as the basis for the study. Through the literature search, 33 key factors were identified. These factors were further evaluated by observing workplace safety issues. The study focuses on the variables with high influence related to ignorance about safety accessories in the workplace.

4.0 Results and Discussion

"This chapter discusses the factors in the following overview Table 1. Thirty-three factors were identified from the overview in Table 1. All the factors ranked by their frequencies in previous studies from the literature review are given below.

4.1An Overview of the Personal Equipment Issues from the Last Nineteen Years

Understanding the particular emphasis on PPE issues during the past 20 years can help to design an overview table. Table 1 highlights the numerous aspects that influence workers' adoption of safety



accessories as well as the varied approaches that have been employed in PPE-related challenges during the last 20 years.”

**“Table 1** An overview table—PPE problems from the past eighteen years

Author's name and years	Methods	Identification of Factors
Ahmad et al. [9]	Questionnaire survey	Safety policy, safety training, and promotion
Alice [27]	Literature review	Unavailability of PPE, insufficient PPE usage,
Hallowell [3]	Meta-analysis	Insufficient training & insufficient PPE usage,
A.V Praveenkumar and Vishnuvardhan [8]	Literature review	Insufficient training, safety response from management
Alfred Goh Pui Tecka [10]	Literature survey	Insufficient knowledge & unawareness of safety
Chengjie Xu et al. [11]	Questionnaire survey	Risky work
Choi [2]	Factor analysis	Failure to wear PPE
Hassan [5]	Questionnaire survey	Poor safety policy & culture
Langford et al. [12]	questionnaire survey	Poor records of health
Benny and Jaishree [13]	Questionnaire survey	Insufficient PPE usage, site accident or incident investigation, emergency procedure, insufficient training
Dhrisya, and Thangaraj [14]	Literature review	Construction accidents, site accidents, and unsafe climate
Purohit [15]	Protection analysis	Insufficient PPE usage and fall from height. Insufficient training
Ibrahim [1]	Questionnaire survey	Insufficient PPE usage and safety training
Jazayeri, and Dadi [16]	Questionnaire survey	Insufficient PPE usage, insufficient training, safety monitoring, and workers, unlike PPE
Hashim et al. [6]	Experimental research	PPE indicators and insufficient safety kits
Kadiri et al. [18]	Questionnaire survey	Unawareness of safety, worker technical level is low, insufficient training, and workers unlike PPE.
Agwu [19]	Questionnaire survey	Poor safety supervision
Jokkaw and Tongthong [20]	Questionnaire survey	Insufficient training, unsafe acts, and unsafe working conditions
Kartam [21]	Interview	Risky works
Ulang [7]	Questionnaire survey	Insufficient training, workers are unlike PPE and poor working conditions.
Oreoluwa and ondaunkanmi [22]	Questionnaire survey	Insufficient PPE usage, insufficient knowledge, and unawareness of safety

(continued)



Table 1 (continued)

Author's name and years	Methods	Identification of Factors
Solomon [4]	Questionnaire survey	Not following the regulations of safety
Orji Solomon [23]	Questionnaire survey	Insufficient training & lack of first-aid training
Jasani [24]	Questionnaire survey	Not focusing precautions
Rusli et al. [25]	Questionnaire survey	Insufficient PPE usage & insufficient training
Ganesh, and Rajesh [26]	Questionnaire survey	Insufficient PPE usage
Kumar, and Bansal [28]	Literature survey	Insufficient maintenance of PPE
Tadesse, and Israel [29]	Questionnaire survey	Not focusing precautions
Durdyev [30]	Questionnaire survey	Unawareness of safety, insufficient maintenance of PPE, and insufficient PPE usage
Raghunath [17]	Questionnaire survey	Insufficient training & lack of first-aid training
Meena [31]	Literature survey	Insufficient maintenance of PPE
Vitharana et al. [32]	Questionnaire survey	Not following the regulations of safety
Huang and Hinze [33]	Questionnaire survey	Insufficient training & lack of PPE
YoungcheolKang [34]	Questionnaire survey	Not focusing the fall protection"

Table 1 provides an overview of the many elements and approaches that contribute to PPE-related difficulties in the workplace. Thirty-three major factors were discovered in Table 1. Additionally, the crucial elements fall into six main groups.

4.2 "Critical Factors Affecting the PPE at Workplaces"

The majority of mishaps in the current construction industry are largely caused by problems with safety equipment. Understand the elements that will aid in comprehending the general PPE-related important elements of safety. The factors have been grouped and ranked in Table 2. Through Table 1, 33 factors were identified through a review of literature related to PPE in construction sectors. These factors are furthermore grouped into six categories such as human errors, site accidents, safety management, risk factors, environmental factors, and other types of factors.

Group factors	Factors	Number of occurrences
Human error	Insufficient PPE usage	10
	Unawareness of safety	4
	Workers unlike PPE	4
	Insufficient PPE	3
	maintenance	2
	Lack of PPE	1
	Unavailability of PPE	1
	Worker technical level is low	1
	Poor attitude of workers	
Site Accident	Not focusing precaution	2
	Emergency response	2
	Emergency response	1
	Insufficient safety kits	1
	Emergency procedure	1
	Lack of emergency measure	1
	Site Accident	
Safety management	Insufficient training	11



Risk factor	Insufficient inspection	2
	Not following the regulation of safety	2
	Poor site management	1
	Poor environment conditions	1
	Poor safety conscientiousness	1
	Poor safety monitoring	1
	Risky works	2
	Unsafe act	1
Environment factor	Unsafe working condition	1
	Unsafe material	1
	lack of attention from ladders	1
	Unsafe climate	2
Other type factors	Policy & culture	2
	Poor working condition	1
	Poor health conditions of workers	1
	Safety issues	1"

Table 2 Ranking Critical

The five-factor categories with the classification format are displayed in detail in Table 2. Human error factors are the initial group factor in this case. In this part, inadequate PPE use is placed first. Site accidents are the second group factor, and among these accident site factors, the lack of focus on precaution is ranked first. Safety management factors are the third group factor. The most important of these concerns is inadequate training. Environment variables are the fifth group factor, while risk factors are the fourth group factor, with the risky works factor ranking highest in this group. The unsafe climate was considered the highest among these factors. Another sort of factor is the name given to the sixth group factor. Among these, the workers' bad health was the most important reason.

This section contains several significant factors. From the standpoint of the data collected in these sections, it is clear that low PPE usage, inadequate training, improper use of safety accessories, low safety kits, accidents on construction sites, workers not wearing PPE, and insufficient safety measures are some of the factors that numerous researchers have regularly brought up in earlier studies. Construction sites' worker safety conditions are influenced by these several aspects.

4.3“Top Five Critical Factors Impacting PPE

The utilization of personal protective equipment (PPE) at construction sites is influenced by five key criteria. The usage of personal protective equipment in construction sites is influenced by five key criteria, as listed in Table 3. Among them, inadequate training was cited most often (11) in the prior survey, followed by inadequate PPE maintenance, workers disliked PPE, ignorance of safety considerations, and insufficient PPE usage. These are the main variables that have affected the use of PPE in building sites in recent years.”

**“Table 3** Top five critical factors impacting the use of PPE Years

Top five critical factors	2013	2014	2015	2016	2017	2018	2019	2020	Total
Insufficient training	*	3	1	2	3	1	1	*	11
Insufficient PPE usage	*	*	1	*	5	2	1	1	10
Unawareness of safety	*	1	1	*	1	1	*	*	4
Workers unlike PPE	*	2	*	*	1	*	*	1	4
Insufficient PPE maintenance	2	*	*	*	1	*	*	*	3

5.0 Conclusion

The study looks into several variables that particularly influence personal equipment use at construction sites. 34 studies over the previous two decades were assessed. The study looked into five key issues that influence PPE use in construction projects, including bad PPE maintenance, lack of safety awareness, poor PPE use, inadequate training, and a shortage of PPE equipment for workers. The study suggests that a strategy that makes use of cutting-edge workplace monitoring technologies could reduce workplace mishaps and issues that arise in the construction sector.

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