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WELCOME SPEECH FROM THE CHAIRMAN

RISM 17th International Surveying Conference for Undergraduates (ISCU 2025)

بسم الله الرحمن الرحيم السلام

عليكم ورحمة الله وبركاته

Greetings to all,

It is with great pleasure that I welcome you to the 17th RISM International Surveying Conference for Undergraduates (ISCU 2025), themed “*Embracing Construction Revolution 4.0: Transforming Malaysia’s Built Environment.*” On behalf of the Royal Institution of Surveyors Malaysia (RISM), I also wish to express our sincere appreciation to Universiti Teknologi MARA (UiTM), Perak Campus, for graciously hosting this significant event.

As we navigate the era of the Fourth Industrial Revolution (IR4.0)—or in our context, Construction Revolution 4.0 (CR4.0)—we are witnessing transformative advancements across the global construction sector. Technologies such as Building Information Modelling (BIM), the Internet of Things (IoT), artificial intelligence (AI), robotics, big data analytics, and cloud computing are redefining the way we build, manage, and interact with our built environment. For Malaysia, embracing CR4.0 is a strategic imperative to achieve our socio-economic and environmental goals.

This conference serves as a vital platform to unite surveying undergraduates from various disciplines, fostering critical dialogue on industry challenges, enhancing professional networking, and preparing a new generation of talent for the rapidly evolving construction landscape. It is also an opportunity for employers to engage with and inspire our future professionals.

I would like to extend my heartfelt thanks to all industry speakers, paper presenters, judges, and participants for their time, contributions, and support in making ISCU 2025 a success. I also commend the organising committee for curating a meaningful and dynamic conference experience.

May the knowledge gained, connections formed, and ideas exchanged during this event inspire all participants to lead and innovate in their future endeavours.

Wishing everyone a productive and memorable conference.

Prof. Ts Sr Dr. Adi Irfan Bin Che Ani'

Chairman, Universities' Partnering Committee

RISM Session 2024/2025

May 2025

WELCOME SPEECH FROM CO-CHAIRMAN

RISM 17th International Surveying Conference for Undergraduates (ISCU 2025)

Bismillahirrahmanirrahim.

السلام عليكم ورحمة الله وبركاته and greetings to all.

It is my great pleasure to welcome everyone to the 17th International Surveyor Conference for Undergraduates (ISCU 2025), proudly hosted by Universiti Teknologi MARA (UiTM) Perak Branch in collaboration with the Royal Institution of Surveyors Malaysia (RISM). This event is a meaningful platform for students in the built environment to share ideas, showcase innovations, and build professional networks. We are honoured by your presence and enthusiastic participation, with 135 accepted papers and 78 poster presentations this year.

UiTM Perak, home to the College of Built Environment, has long been a hub for academic excellence in architecture, planning, and surveying. Our commitment remains strong in nurturing competent graduates who meet industry demands and contribute to nation-building.

While you're here, we invite you to experience the heritage and culture of Perak Tengah from the architectural richness of Rumah Kutai to the historical towns of Pasir Salak, Bota, and Kampung Gajah.

To all presenters and winners, congratulations on your achievements. Let your work today be a catalyst for future success and academic growth. We hope this conference will inspire you to explore new ideas, foster collaboration, and make lasting memories.

My deepest thanks to the Royal Institution of Surveyors Malaysia (RISM) and the organising committee for making this event a success.

We hope your experience here will be rewarding and unforgettable.

Thank you. Selamat datang dan selamat berjaya.

Associates Professor Dr. Nur Hisham Ibrahim, *PMP*
Co-Chairman, Universities' Partnering Committee
RISM Session 2024/2025
May 2025

WELCOME SPEECH FROM THE PROJECT DIRECTOR

RISM 17th International Surveying Conference for Undergraduates 2025

Alhamdulillah, all praise to Allah S.W.T. for His guidance and blessings in making the RISM 17th International Surveying Conference for Undergraduates (ISCU) 2025 a reality.

It is with great honour and gratitude that I welcome all participants, guests, academicians, and industry professionals to this prestigious event, proudly organized under the Royal Institution of Surveyors Malaysia (RISM). This 17th edition of ISCU stands as a proud testament to our collective dedication toward academic excellence, professional collaboration, and youth empowerment in the field of surveying.

I extend my heartfelt appreciation to RISM for its unwavering support, to the hardworking ISCU 2025 Organising Committee, and to all 16 partnering universities across Malaysia for their commitment and contributions. Your efforts have shaped this conference into a dynamic platform for knowledge exchange, innovation, and professional growth.

To the academicians and practitioners present, your insights are invaluable in bridging the gap between academic theory and real-world practice. To our undergraduate participants, your passion, curiosity, and commitment are the very foundation of our future. May this conference not only deepen your academic journey but also ignite a spirit of leadership, integrity, and sustainable thinking.

Let this gathering serve as more than an academic milestone. May it foster lifelong networks, inspire transformative ideas, and chart new directions in our shared professional journey.

Wishing everyone a rewarding and inspiring conference experience.

Sr Dr. Nurul Fadzila Zahari

Project Director

RISM 17th ISCU 2025

A REVIEW: FACTORS AND SOLUTIONS FOR PPE NON-COMPLIANCE AT CONSTRUCTION SITES

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ABSTRACT

The significance of personal protective equipment (PPE) cannot be denied, as it plays a crucial role in safeguarding workers from potential hazards at construction sites. Nevertheless, using PPE on construction sites in Malaysia is frequently overlooked and regarded as a minor issue by workers. The lack of compliance presents heightened risks of injury for workers and compromises the overall safety of the workplace. This research aims to investigate the various elements that affect the utilization of personal protective equipment within construction sites in Perak Tengah, Malaysia, and methods to overcome the issues. The approach employed to gather data in this study is from a comprehensive literature review, including journals, scholarly papers, websites, books, and articles. The findings of this study showed the main factors of failure in PPE use are inadequate fit and comfort concerns, insufficient training, failure to comply, degradation and neglect, limited supply of PPE, environmental influence, scarcity of management commitment, and defects in the design and manufacturing of PPE. The predicted findings are projected to provide a significant contribution to enhanced occupational safety and injury mitigation, adherence to legal and safety standards, mitigation of financial losses, enhanced productivity and efficiency, increased market capability and positive public image, and safety for future generations and the environment.

Keywords: Personal Protective Equipment, Construction safety, Compliance, Occupational Hazards, Management Commitment

I. INTRODUCTION

Personal Protective Equipment (PPE) has a significant role in reducing risks of workplace for the construction workers since the construction field is very risky. The construction industry has the largest numbers of accidents and fatalities at the workplace, therefore the tackling of safety measures. The construction industry is widely considered as one of the most dangerous because of the many factors including temporary employment, constantly changing work environment and decentralised projects, high number of fatal and nonfatal occupational injuries as well as work at heights, outdoor assignments and complex construction sites (Li et al., 2015). On an international platform, the likelihood to die in construction as well as the risks of developing injuries are 3 and 2 times higher than that in other industrial domains, respectively (Sousa et al., 2014). The purpose of this study is to identify and analyse the major elements that contribute to PPE failure on construction sites using a Systematic Literature Review (SLR) technique. The SLR technique employs a systematic and organised approach to analysing current literature, ensuring that the conclusions are founded on a thorough and impartial examination of accessible research to identify common themes and gaps in existing knowledge of PPE failures.

II. LITERATURE REVIEW

A. PPE Failure Impact Statistics in Construction Industry

The construction industry is among the most hazardous sectors worldwide due to its dynamic and high-risk nature. The risk of fatality in the construction industry is approximately three times higher than in other industries. To mitigate workplace accidents, workers are required to wear PPE. Data from the Malaysia Social Security Organisation (SOCSO) indicate that 2,822 cases of occupational injuries were recorded, with a fatal injury rate of

9.2 per 100,000 workers. 1,116 construction-related incidents were reported between 2011 and 2016, with fatality rates ranging from 37.85% to 51.5% (The Department of Occupational Safety and Health (DOSH), 2016).

A lack of PPE awareness is a common issue in infrastructure projects. Industries are held accountable for workplace accidents, with the construction sector exhibiting significantly higher fatal work injury rates than other industries. Fatal work injuries in construction were recorded at 1,061, with a fatal injury rate of 9.7 per 100,000 workers. Comparatively, the transportation and warehousing sector reported 913 fatalities, while agriculture, forestry, fishing, and hunting recorded 573 fatalities (U.S. Bureau of Labor Statistics, 2019).

Falling from a height due to carelessness or inadequate PPE is the leading cause of fatality on construction sites, resulting in an estimated 29 deaths annually (Syed Ammad et al., 2021). Additional causes of construction site accidents include being struck by moving objects or vehicles. The fewest reported accidents involved contamination by moving objects. Prioritizing safety is crucial in high-risk environments, and PPE selection should be based on workplace hazards. Head protection, such as helmets, is among the most essential PPE items, safeguarding against impacts, penetration, and falling debris.

Unsafe activities were categorized into five primary causes such as safety equipment, safety management, employee safety attitudes, safety training, and other variables (Vitharana et al., 2019).

A study analyzed 100 construction incidents, attributing 70% of accidents to worker behavior, 49% to workplace issues, 56% to inadequate equipment (including PPE), 27% to unsuitable materials, and 84% to deficiencies in risk management (Haslam et al., 2005). Their study primarily adopted an ergonomic perspective. A list of 30 factors contributing to construction accidents in Kuwait was compiled based on government accident reports, though the study lacked specific insights into accident mechanisms (Al-Tabtabai et al., 2002).

64.3% of workers experienced at least one accident in the past year. (Abbas RA et al., 2019). Studies in Egypt reported work-related accident rates of 73.2% and 46.2% in the construction sector. Accident prevalence varied across different countries, with rates recorded at 38.7% in Gondar, Ethiopia; 84.7% in Addis Ababa, Ethiopia; 22.6% in Malaysia; and 31% in Iran (Lette A et al. 2020)

B. Importance of PPE

Personal Protective Equipment (PPE) is critical in the construction business for protecting workers from a variety of dangers, including physical, chemical, and biological threats. The necessity of personal protective equipment (PPE) on construction sites cannot be emphasized enough since it is crucial in avoiding injuries and deaths. According to Farooqui et al. (2009), continuous usage of PPE greatly minimizes the number of accidents on construction sites. However, compliance remains an issue owing to variables including discomfort, poor fit, and the belief that PPE reduces productivity.

Elavarasan et al. (2021) emphasize the need for adequate PPE training and instruction for compliance. Workers who appreciate the necessity of personal protective equipment and have received proper training are more likely to utilise it on a regular basis. Furthermore, frequent maintenance and prompt replacement of PPE are critical to ensuring its efficacy. PPE may decay over time, diminishing its protective properties (Rafindadi et al., 2022).

Another important element impacting PPE use is an organization's commitment to safety. When management prioritizes safety and enforces PPE rules, employees are more likely to comply (Rafindadi et al., 2022). Furthermore, integrating PPE programs for hazard identification, selection, maintenance, and training may improve overall safety performance on construction sites (Farooqui et al., 2009).

Colares et al. (2019) underline the need of ongoing development in PPE design to address concerns of comfort and use. Innovations in PPE technology have the potential to improve compliance and safeguard workers. Finally, regulatory authorities' involvement in enforcing PPE regulations and performing frequent inspections is critical for ensuring high safety standards in the construction sector (Colares et al., 2019).

III. METHODOLOGY

The paper's objective is to clarify the significant factors contributing to the failure of personal protective equipment in construction sites. It is achieved through a narrative review that addresses the research question. Enables the systematic integration and compilation of scholarly information. In order to eradicate irrelevant sources in accordance with established exclusion criteria, this method necessitates the implementation of a straightforward protocol, such as a specific set of keywords. This review encompasses articles that were published between 2016 and 2022. The beneficial impact can be further enhanced by nurturing collaboration, promoting research, and supporting legislative support to address significant failures of personal protective equipment on construction sites.

IV. FINDINGS AND DISCUSSION

When it comes to personal protective equipment (PPE), there are a lot of different approaches that need to be considered in terms of quality, comfort, and regulations. Table 1.0 presents a comprehensive overview of the literature research that addresses Method to overcome the failure factors of Personal Protective Equipment (PPE) on Construction Sites.

Table 1.0 Factors contributing to PPE non-compliance in construction sites

Factors contributing to PPE non-compliance in construction sites	Authors
The Discomfort of Personal Equipment, Organizational Weaknesses, and Perceived Unimportant PPE.	Radwa Sehsah, R., El-Gilany, A. H., & Ibrahim, A. M. (2020)
Supervisory factors influencing PPE compliance	Rafindadi, A. D., Napiah, M., Othman, I., Alarifi, H., Musa, U., & Muhammad, M. (2022)
Factors in perceptions and working conditions as drivers of PPE compliance.	Guan, L. R., Xian, G. J., Rajendran, S. D., & Wahab, S. N. (2019).

An empirical investigation of the connection between PPE use and accident incidence among construction workers was carried out by Radwa Sehsah et al. (2020). According to their research, 78.2% of workers said that wearing personal protective equipment (PPE) was physically painful, especially during hot weather, making discomfort the most often stated excuse for not utilising it. Furthermore, 73% of respondents acknowledged that they did not know how to utilise personal protective equipment (PPE), indicating that safety training was lacking. These results highlight organisational flaws including inadequate training provision and lax enforcement of safety procedures, as well as individual-level problems like ignorance and physical discomfort. According to Sehsah et al., safety education, PPE accessibility, and regulatory enforcement are all crucial for improving PPE compliance.

Rafindadi et al.'s (2022) study expands on the supervisory and organisational aspects of PPE non-compliance. Through an examination of site supervisors' viewpoints, the authors determined that inadequate site supervision and an absence of organised safety enforcement were the main obstacles to regular PPE use. According to statistical research, there was a significant inverse relationship between PPE compliance and inadequate supervision. Additionally, the study found that temporary and casual workers were much less likely to use personal protective equipment (PPE) than their permanent counterparts. This could be because they had less access to training and were less integrated into the organization's safety culture. Another significant problem was risk perception; many employees were complacent and disregarded personal protective equipment (PPE) because they did not understand the risks associated with their jobs.

Using a case study from Malaysia, Guan et al. (2019) examined how employees' attitudes and actions impact their use of personal protective equipment. Their results support previous research that found discomfort and inadequate training to be obstacles to compliance. Their study did, however, provide a novel perspective into how employee experience contributes to non-compliance. Because they were overconfident in their skills and believed that their familiarity with the duties reduced the need for protective gear, experienced workers were more prone to disregard PPE standards. The researchers also noted that the lack of appropriate PPE, time constraints, and task difficulty all served to further inhibit appropriate use. According to his conclusion, improving worker involvement, using behavioural change tactics, and tailoring PPE to local environmental and job-specific variables are all necessary to increase PPE adoption.

Table 2.0 Method to overcome the failure factors of Personal Protective Equipment (PPE) on Construction Sites on studied literature review

Method to overcome the failure factors of Personal Protective Equipment (PPE) on Construction Sites on studied literature review	Authors	Contextual Scope
Safety Training and Education	Radwa Sehsah, Abdel-Hady El-Gilany, Ateya Megahed Ibrahim (2020)	Those with inadequate safety knowledge and illiterate workers should have access to special training courses.
	Aminu Darda'u Rafindadi, Madzlan Napiah, Idris Othman, Hamzh Alarifi, Usman Musa, Musa Muhammad (2021)	

On-site Safety Supervision and Enforcement	Aminu Darda'u Rafindadi, Madzlan Napiah, Idris Othman, Hamzh Alarifi, Usman Musa, Musa Muhammad (2021)	Supervisors should aggressively check for adherence to Personal Protective Equipment
	Muizz O. Sanni-Anibire, Abubakar S. Mahmoud, Mohammad A. Hassanain, Babatunde A. Salami (2020)	
Improvement In PPE Comfort and Fit	Lu Rong Guan, Goh Jun Xian, Salini Devi Rajendran, Siti Norida Wahab (2022)	Different sized safety equipment should be supplied by companies to guarantee appropriate fit for every employee
	Radwa Sehsah, Abdel-Hady El-Gilany, Ateya Megahed Ibrahim (2020)	
Provision of Quality PPE and Regular Maintenance	Rafael Amilton Leite Colares, David Barbosa de Alencar, Jorge de Almeida Brito Junior, Jhonathan Carvalho da Cruz, Camily Murrieta Vasconcelos Oliveira Bezerra (2019)	Employers should provide high-quality PPE compliant with industry safety criteria
	Aminu Darda'u Rafindadi, Madzlan Napiah, Idris Othman, Hamzh Alarifi, Usman Musa, Musa Muhammad (2021)	

A. Safety Training and Education

According to Radwa Sehsah et al., (2020), it highlights in maintaining PPE compliance the need of safety training and instruction. Their research emphasises how many employees neglect to utilise PPE correctly because they are ignorant of its correct application and advantages. They propose consistent training courses catered to different degrees of literacy to improve knowledge and inspire ethical use. Findings from Aminu Darda'u Rafindadi et al. (2021) claim that frequent safety education greatly influences workers' attitudes towards PPE, so increasing their likelihood of regular PPE use. As good teaching tools, they suggest interactive seminars and demonstrations.

B. On-Site Safety Supervision and Enforcement

Additionally, it is necessary to address the issue of PPE non-compliance through the implementation of on-site safety supervision and enforcement measures (Aminu Darda'u Rafindadi et al., 2021). According to their findings, many employees disregard PPE since supervisors aren't keeping an eye on them. To guarantee adherence to PPE standards, they suggest designating a specific safety officer to oversee building sites. Reinforcing a safe environment and reducing workplace accidents requires regular inspections and rapid corrective actions.

C. Improvement in Personal Protective Equipment

Anxiety is a common reason why employees don't wear personal protective equipment. According to Lu Rong Guan et al., (2022), enhancing the comfort and fit of personal protective equipment (PPE) is crucial for encouraging its usage. They are in favour of making PPE that is adaptable to various body types, has good ventilation, and is not too heavy. A lot of construction workers take off their PPE because it's too hot or doesn't fit properly, as pointed out by Sehsah et al. (2020). They recommend working with personal protective equipment (PPE) makers to create ergonomic designs that are comfortable and protective.

D. Provision Of Quality PPE and Regular Maintenance

One of the most important ways to overcome PPE failures is to provide high-quality PPE and to maintain it regularly. According to Rafael Amilton Leite Colares et al. (2019), workers may be disinclined to wear PPE that is of poor quality, which can lead to insufficient protection. Companies should prioritise investing in certified personal protective equipment (PPE) that meets safety regulations. Furthermore, it is essential to evaluate PPE on a regular basis and replace those that are broken or worn out in order to ensure effectiveness. Employers should make sure all employees have access to personal protective equipment (PPE) and keep a sufficient supply on hand, according to Rafindadi et al. (2021).

CONCLUSION

A comprehensive systematic review of the literature shows that studies have been conducted to improve the efficiency of the use of personal protective equipment. Finally, the quality control management of personal protective equipment can be significantly improved by selecting high-quality materials and following the

standards set by the safety authorities. In addition, the construction and safety sector may take steps towards more sustainable solutions that are good for workers if it prioritizes materials with long and high durability, thereby minimizing the accident rate on construction sites and improving the health of workers.

To maximize the potential of this PPE use, future research should focus on developing protective equipment materials that have better comfort properties for workers and have improved durability properties. In addition, guidelines on the use of safety equipment should be emphasized to avoid serious accidents that often occur on construction sites. Finally, government support can include legislation, financial incentives and learning systems that promote the sustainable use of personal protective equipment.

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