Journal of Energy and Safety Technology

JEST

RESEARCH ARTICLE Open Access

INFLUENCING FACTORS OF OCCUPATIONAL INJURY IN THE CONSTRUCTION INDUSTRY: EVALUATING THE EFFECTIVENESS OF NEW OSHA 2022 AMENDMENTS

Tham Ze Kai, Mimi H. Hassim*

Safety and Health Research Group / UTM-MPRC Institute for Oil and Gas,
Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia

**Corresponding author: mimi@cheme.utm.my*

Article History

Received:	Received in revised form:	Accepted:	Published:
August 20, 2025	September 12, 2025	September 12, 2025	December 12, 2025

Abstract

The construction sector is always seen as an extremely dangerous business because of the complexity of the work involved in. In Malaysia, the non-fatal occupational injuries in the construction sector increased by 59.65% in 2022 compared to the previous year. Additionally, with 6.30 deaths per 100,000 workers, the construction industry has the greatest risk of worker fatalities. Due to the construction sector consistently reporting the highest number of fatal accidents among all industries in Malaysia, this study will specifically focus on identifying the underlying factors that influence occupational injuries in this sector. On the other hand, the government implemented the new OSHA amendment in June 2024. It is essential to assess the beneficial impact of the latest amendment act. The effectiveness of risk assessments stands as another critical area of this study. A total of 90 respondents were involved in this study. Questionnaires were distributed to construction workers to obtain data. Subsequently, a set of quantitative analysis was performed in order to analyze the variables. The study employed several statistical analyses, including T-test, Analysis of Variance (ANOVA), Pearson Correlation, Multiple Linear Regression (MLR) and Linear Regression. **Results:** This study identified that economic pressure and safety investment are significant contributory factors of occupational injury. The enforcement of new OSHA amendments and workplace risk assessments contributed to significantly lower numbers of injuries and improved safety performance in the construction industry. The present study has addressed the research gap concerning the key factors contributing to occupational injuries in the Malaysian construction industry and the effectiveness of the new OSHA (2022) amendments.

Keywords: Occupational Safety and Health in Construction, Occupational Injury, OSHA Amendments 2022, Risk Assessment, Safety Compliance.

©2025 Penerbit UTM Press. All rights reserved

DOI: https://doi.org/10.11113/jest.v8.213

1.0 INTRODUCTION

Occupational injury is defined as any physical harm, disease, or deaths caused by a workplace accident (1). Each year, a total of 2.6 million deaths are attributed to work-related diseases, with an extra 330,000 deaths resulting from work accidents, according to the data of International Labour Organization (ILO) in 2023 (1). Genuinely, the construction industry in Malaysia possesses the highest fatality rate, with 6.30 fatalities every 100,000 workers (2). Not only in Malaysia, but also in the United States, where the construction industry has one of the highest fatality rates 9.4 per 100,000 workers, accounted for 21% of overall worker fatalities in 2021 (3).

The Department of Safety and Health (DOSH) Malaysia discovered a large number of sites that disregarded standard operating procedures (SOPs), which often resulted in accidents (4). Despite the established Occupational Safety and Health (OSH) programs, occupational injury rates in Malaysia continue to be high. (5). Beyond that, Malaysia is undergoing rapid development, with numerous data centers, railway systems, and high-rise residential buildings currently under construction. The wide range of complex construction activities may substantially increase the likelihood of workplace accidents if proper safety and health management practices are not implemented. To support the demand for the local construction workforce, there has inevitably been an influx of foreign workers, especially from Bangladesh and Pakistan (6). However, these workers often lack safety awareness, and many researchers found that workers from low-income countries have poor safety awareness (7, 8) In addition, construction projects are now under tighter completion deadlines, driven by growing demand in the market. This will significantly increase the risks of workers, as (9, 10) found that occupational accidents are significantly associated with work pressure. Furthermore, inadequate investment in safety by local construction firms remains a significant concern, as workers' safety is not adequately protected (11). In order to resolve the inherently high accident rate in this industry, the present study specifically focuses on identifying the underlying factors that influence occupational injuries in this sector. The aim of this research is to investigate the impact of economic influences such as heavy workload, increased work pace and safety investments on the workplace injuries.

Other than that, the Malaysian government gazette the Occupational Safety and Health Act (OSHA) 2022 amendment on 1st June 2024, in response to the high incidence. In the latest OSHA amendment, critical clauses have been added to improve workplace safety such as S18a duties of principal, S18b mandates thorough risk assessments, S26a protects employee rights, and S27e requires regular plant inspections. Moreover, the maximum penalties of offending this act have been adjusted, emphasizing the imperative of compliance. These key changes reflect a greater dedication to protecting the safety, health and welfare of workers. Indeed, limited evidence from other countries indicates that new safety regulations have been significant in reducing workplace injuries (12). However, there is a lack of corresponding research in the Malaysian context. Besides, workplace risk assessment in the Malaysian construction industry was found to be inadequate (13). It is crucial to examine whether this situation has improved following the implementation of the new act. Consequently, assessing the effectiveness of the new act and risk assessment are considered within the scope of this study.

The present study will provide empirical evidence of the influencing factor of occupational injuries in the construction industry, and the findings can be a valuable reference to government policy makers on proposing better regulation to manage the OSH performance. Additionally, this study will fill the gap in existing research regarding the impact of the new OSHA amendments and workplace risk assessment, the empirical findings of the study can serve as a foundation for future research on occupational safety in the construction industry, particularly in the context of evolving regulatory frameworks and technological advancements.

There are three objectives for this study, including investigating the key contributing factors leading to occupational injuries in the construction industry, examining the effectiveness of new OSHA amendments 2022 in improving workplace safety and evaluating the impact of risk assessment

DOI: https://doi.org/10.11113/jest.v8.213

practices on workplace safety.

2.0 METHODOLOGY

2.1 STUDY DESIGN

This study employed a correlational research design to examine the relationship between variables. In addition, a quantitative research method was adopted. In this regard, the perception of respondents in survey questionnaires was transformed into numerical data and using statistical software (SPSS or Microsoft Excel) to examine the relationship between variables. The questionnaire was designed to gather respondents' feedback on the influencing factors, assessing how the new OSHA amendments are expected to impact injury rates and the impact of workplace risk assessment. To investigate the influence of the new amendment act and risk assessment, this study analyzes perception scale ratings pre and post implementation. Subsequently, statistical analysis was used to determine the relationship.

The questionnaire was divided under six primary sections. The first section collects the demographic information from the respondent, including gender, age, job role, total duration of employment and academic qualifications. Thereafter, the second section assesses the contributing factors of occupational injury. A total of 12 questions using 4-point likert scale were designed in this section. The third section emphasizes on assessing the effectiveness of the new OSHA amendment via 18 questions with 4-point likert scale. Moreover, the questions were designed to reflect the key provisions of the new OSHA amendment, such as emergency response plan, duty of principal, risk assessment, employee right, occupational health, safety and health coordinator, occupational training and commitment from management. Subsequently, the fourth section aims to evaluate the impact of risk assessment. A total of 10 questions measured on a 4-point Likert scale were developed. In this section, the questions were designed to assess the frequency of risk assessment, thoroughness of assessment, effectiveness of control measures, as well as the level of employee participation, training, and management support. To facilitate comprehensive recommendation of this study, the section five and section six were designed to capture the challenges faced by employees and their suggestions for improvement. Each section contains an open-ended question. The questionnaire of this study is provided in the appendix.

2.2 SAMPLE SIZE AND SAMPLING TECHNIQUE

The current study was performed under a random sampling method. By forming a varied group of respondents from a range of roles, it can obtain more thorough insights regarding the variables affecting occupational injuries and the efficacy of the new act. The study successfully collected 90 responses encompassing different Malaysian states. Among the 90 respondents, 18 were representatives from the client and consultant teams, 24 were from project management, 15 were site supervisors, 32 were general workers and operators and 1 from ‘other’ job role. Collecting responses from a diverse range of job roles enhances the significance and validity of the findings, as it provides a comprehensive industry-wide perspective.

2.3 DATA ANALYSIS

Several methods of data analysis were applied in this study, involving the descriptive statistics, T-Test, Analysis of Variance (ANOVA), Pearson Correlation, Multiple Linear Regression (MLR) and linear regression. For instance, the mean value in descriptive statistics is able to provide a trend of the response while the standard deviation reveals the degree of variation or dispersion from a particular question. On the other hand, the T-Test was applied in this study to determine whether

DOI: https://doi.org/10.11113/jest.v8.213

there is a significant difference between economic pressure on occupational injury, as well as between safety investment and occupational injury. This analysis also compared the injury before and after the implementation of the new amendment act, with the resulting p-value contributing to the hypothesis test of the study's objectives. However, ANOVA test is crucial for assessing significant differences across multiple groups, providing an overall p-value that allows for inferential comparisons, similar to the t-test's role in two-group comparisons. For instance, the study utilized ANOVA to investigate the influence of work speed on accident frequency among different job roles and to determine whether the perceptions were consistent across various employee positions. Additionally, the same analysis was used to analyze how different job roles perceive safety investments in accident prevention, thereby assessing the robustness of safety investments across various companies.

In order to evaluate the strength of the relationship between economic pressure and occupational injury, also safety investment and occupational injury, the Pearson Correlation analysis was adopted in this study. Furthermore, MLR was applied to examine the linear relationship between the measures prescribed by the new OSHA amendment and occupational injuries. The analysis results provided insights into the significance level and strength of the relationship, assisting in the identification of key contributing factors. The same statistical tool was adopted to study the underlying factors that influence the effectiveness of risk assessment. Additionally, the coefficient in the MLR result shows the strength and direction of the independent variable's influence on the dependent variable. Finally, simple linear regression was also performed in this study to examine the effectiveness of risk assessment.

3.0 RESULTS AND DISCUSSION

3.1 RELATIONSHIP BETWEEN INFLUENCING FACTORS AND OCCUPATIONAL INJURIES

The first objective is to investigate the driving factors of occupational injuries. A T-Test analysis was performed for examining the relationship. Table 1 shows the results of the analysis. Current study found that economic pressure is positively correlated with occupational injury in the construction industry. The correlation is 23.97%. The test resulted in a very low two-tailed p-value of $2.166^{\wedge}10^{-9}$, which is far below the threshold of 0.05. This indicates that the relationship between economic pressure in the workplace and occupational injury is statistically significant. In terms of safety investment, it was also found to have a highly positive correlation with occupational injury in this industry. The correlation between safety investment of company and occupational injury is 61.23%, nearly three times of economic pressure. Additionally, the T-test revealed a low two-tailed p-value of 0.0004. Thus, the relationship between safety investment of company and occupational injury is statistically significant at 1% confidence level.

Table 1: Correlation and Significance between Variables and Occupational Injury

Variables		Correlation	T-Test
		%	P-Value (Two-Tail)
Economic Pressure in workplace	Occupational injury	23.97%	$2.166 \text{ X } 10^{-9}$
Safety Investment of company	Occupational injury	61.23%	0.0004

DOI: https://doi.org/10.11113/jest.v8.213

3.2 OPINION AMONG DIFFERENT JOB ROLES

Economic Pressure

To further assess whether the injury factor differs significantly across various job roles in construction sites, a one-way ANOVA analysis was conducted. Table 2 provides the ANOVA results. The 'Other' job role category was excluded from the analysis due to an insufficient sample size (n = 1), which is not adequate to produce reliable or representative results. Since the mean scores obtained across different job roles are very close, the resulting p-value of 0.545 (> 0.05) indicates that there is no statistically significant difference in perceptions among the various job roles. This result is consistent with the current rapid growth and high demand in Malaysia's construction industry, where all job roles on construction sites are subjected to similar levels of pressure and urgency to meet project deadlines.

Table 2: Relationship Between Work Speed and Accident Frequency

When tasks require to be done quickly, how do you think this affects the chances of getting hurt?

Groups	Count	Average	P-value (Between Groups)
Client and Consultant	18	3.667	0.545
Management of Project	24	3.500	
Site supervisor	15	3.733	
General Worker & Operator	32	3.469	

Safety Investment

Another ANOVA analysis was completed on measuring the perception of different job roles on the effectiveness of safety facilities and procedures implemented by organization. Table 3 indicates the results of the analysis. The p-value of 0.026 obtained is smaller than the significance level of 0.05, therefore the analysis suggests that there is statistically significant difference in perceptions among different job roles. The most direct cause of this disparity is likely due to the varying resource availability across companies.

Table 3: Relationship between Safety Investment and Accident Prevention.

The safety facilities and procedures implemented by my organization are effective in preventing injuries.

Groups	Count	Average	P-value Between Groups
Client and Consultant	18	3.444	0.026
Management of Project	24	2.917	
Site supervisor	15	2.667	
General Worker & Operator	32	2.750	

3.3 EFFECTIVENESS OF THE NEW AMENDMENT ACT IN REDUCING WORKPLACE INJURIES

The results of the t-test and correlation analysis are presented in Table 4. However, a statistically significant moderate negative relationship was found between the frequency of injury and the perception that the new OSHA amendments has contributed to reducing workplace injuries. The correlation obtained was -0.213 or 21.3%, and the p-value of 0.003 is statistically significant at the 99% confidence level. Supported by the statistical analysis results, the finding examined that the new

DOI: https://doi.org/10.11113/jest.v8.213

amendment act is achieving success in reducing workplace injuries.

Table 4: Correlation and Significance between Variables

Variables		Correlation	T-Test
		%	P-Value
Frequency of injury	The implementation of new OSHA amendments 2022 has contributed to the reduction of workplace injuries.	-0.213	0.004

3.4 INFLUENCING FACTORS OF THE EFFECTIVENESS OF NEW OSHA AMENDMENTS 2022 IN REDUCING WORKPLACE INJURIES

To further discover the underlying factors that affect the effectiveness of the new OSHA amendments 2022 in reducing workplace injuries, a specific multiple linear regression analysis was conducted. The results are presented in Table 5. The effectiveness of new OSHA amendments 2022 served as the dependent variable, while the independent variables were represented by emergency preparedness, contractor safety management, risk assessment, employee right empowerment, occupational health services, safety coordinator, safety training and management involvement/commitment from management. The present study discovered that risk assessment, employee right, occupational health services, safety training and commitment from management are significantly influencing the efficacy of new OSHA amendments 2022 in minimizing injuries. The rest are contributing minor influence.

Table 5: Regression Analysis of Factors Influencing the Effectiveness of the 2022 OSHA Amendments on Workplace Injury Reduction

	Independent Variable								
	Intercept	Emergency Preparedness	Contractor Safety Management	Risk Assessment	Employee Right Empowerment	Occupational Health Services	Safety Coordinator	Safety Training	Management Commitment
Coefficient	-0.395	0.056	0.077	0.122	0.172	0.157	0.090	0.195	0.355
P-Value	0.423	0.505	0.361	0.1*	0.013**	0.055*	0.190	0.029**	0.002***
R-Square	0.538								
Adjusted R-Square	0.5878								
Observations	90								

***Coefficient is significant at 1% significance level
**Coefficient is significant at 5% significance level
*Coefficient is significant at 10% significance level

3.5 EFFECTIVENESS OF RISK ASSESSMENT IN IMPROVING WORKPLACE SAFETY

With the purpose of determining the effectiveness of risk assessment in minimizing workplace hazards and occupational injuries a regression analysis was specifically performed. Thus, Table 6 provides an intuitive analysis result for the public to review. Based on the analysis, risk assessment was found as a functional tool for improving workplace safety, as validated by the p-value of 9.255 X 10^{-9}. A relatively higher calculated coefficient 0.455 provides additional support for the finding.

Table 6: Regression Analysis of the Relationship between Risk Assessment in Reducing Injuries and its Effectiveness in Improving Workplace Safety

DOI: https://doi.org/10.11113/jest.v8.213

	Independent Variable	
	Intercept	**Risk assessments on the worksite have effectively reduced injuries.**
Coefficient	2.026	0.455
P-Value	8.120×10^{-13}	9.255×10^{-9}
R-Square	0.314	
Adjusted R-Square	0.306	
Observations	90	

3.6 FACTORS INFLUENCE THE EFFECTIVENESS OF RISK ASSESSMENT

In order to explore the underlying factors that contribute to the performance of risk assessment for injury reduction, the present study therefore has included a multiple linear regression model. The analysis results are presented in Table 7. Several factors were selected as the independent variables of the model, which included comprehensiveness of risk assessment, effectiveness of control measures, transparency in presenting risk assessment findings, capability of detecting overlooked hazards and commitment from management. The dependent variable is the effectiveness of risk assessment in reducing workplace injuries. Except for the transparency in presenting risk assessment findings, all independent factors were shown to be significantly correlated to risk assessment's efficacy.

Table 7: Regression Analysis of the Determinants Influence Effectiveness of Risk Assessment in Reducing Workplace Injuries

	Independent Variable					
	Intercept	**Comprehensiveness of risk assessment**	**Effectiveness of control measures**	**Clear Communication of Risk Assessment Results**	**Detection of previously overlooked hazards**	**Management's Commitment**
Coefficient	-0.899	0.223	0.281	0.173	0.368	0.264
P-Value	0.090	0.037**	0.024**	0.140	0.001***	0.028**
R-Square	0.452					
Adjusted R-Square	0.419					
Observations	90.000					

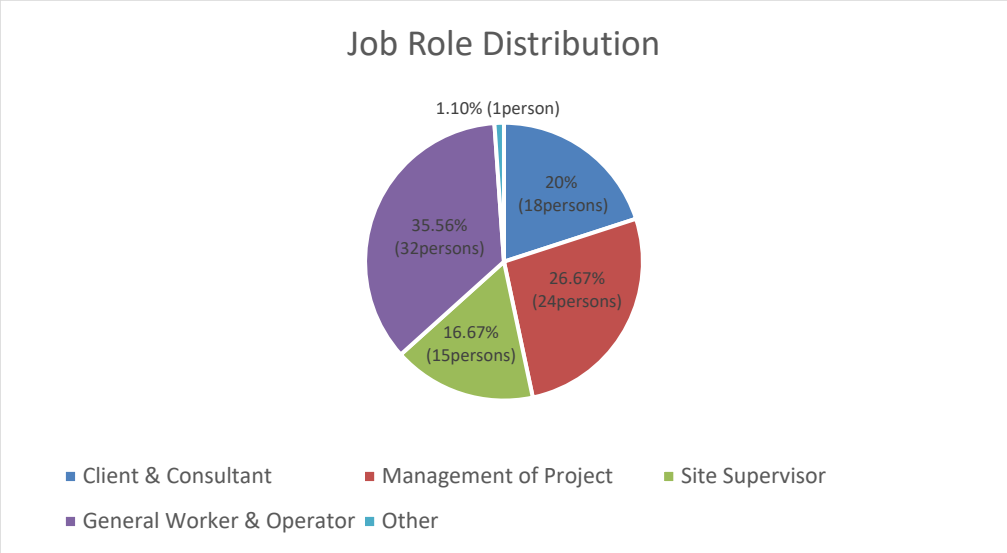
***Coefficient is significant at 1% significance level
**Coefficient is significant at 5% significance level
*Coefficient is significant at 10% significance level

3.7 RESULTS DISCUSSION

Figure 1 illustrates the job role distribution of respondents, providing a clear overview of the demographic profile in this study.

DOI: https://doi.org/10.11113/jest.v8.213

Figure 1: Job Role Distribution of Respondents



The present study concluded that both influencing factors, safety investment and economic pressure significantly affect occupational injury, in line with previous studies conducted (14, 15). The main reason is due to the imbalance between safety and productivity in construction sites. Malaysian construction firms generally face the problem of extremely short construction periods, coupled with the relatively weak safety conditions. This finding also reflects why Malaysia has a higher rate compared to other countries. Another reason that causes the current work pace in the construction industry positively correlates to higher possibility of injury is due to the extensive working hours. In order to ensure the project is completed on time, construction sites will operate 24-hours. Nevertheless, due to cost considerations, not every company has enough employees to divide into different shifts. As a result, construction workers are required to work longer hours under extreme weather. Under tired conditions, human reaction tends to become slower, concentration is also low, and eventually the chance of accidents increases. Current study also discovered a trend of ignoring the necessary safety procedures among employees. This further reflects the safety culture in the construction industry that needs to be strengthened.

On the other hand, the study indicated a significantly positive correlation between safety investment and workplace injury, which might be explained by significant satisfaction with professional training, supply of PPE, workplace safety assessment and risk detection, and a sufficient number of OSH specialists on site. The responses collected from the survey indicated that employees are highly satisfied with the number of PPEs provided. Respondents believe PPE is critical in reducing injury. This also proves that Malaysian employers have a high level of compliance with OSHA 1994 Section 15 general duty of employer.

The new OSHA amendment 2022 has been examined to be extremely effective in minimizing occupational injuries and hazards. Compare this to the broader safety requirements in prior legislation, the new amendment act provides precise directions, such as mandatory safety training in Section 31A, Section 18b mandatory risk assessment, and Section 28 provision of occupational health service. Under the new amendment act, these mandatory measures have strengthened employers' safety awareness, which has directly helped in reducing occupational injury, workplace safety is guaranteed, and the overall safety culture is enhanced. This finding is supported by the empirical study conducted by previous researchers (16), which showed that new safety legislation is effective in significantly decreasing workplace injuries. Another potential reason is because some respondents reported fewer injuries. This could be attributed to their occupation and job role, as consultant engineers may experience fewer injuries compared to frontline workers. Meanwhile, the effectiveness of the new

DOI: https://doi.org/10.11113/jest.v8.213

OSHA amendments 2022 appears to be very significant in their workplaces, further contributing to the larger gap observed. Prior research (17) similarly found that frontline workers are more susceptible to injury. In accordance with the responses obtained, the conclusion of the new OSHA amendments significant in minimizing occupational injury was consistently strong in all construction sites, despite their job positions.

In terms of the control variables of the effectiveness of new OSHA amendments 2022 in reducing workplace injuries, the emergency preparedness was found to be insignificant. It could be attributed by the high perception mean score recorded from both variables, including the question related to the workplace emergency response management and the effectiveness of new OSHA amendments 2022. Therefore, the variance between variables is minimal, leading to the occurrence of insignificant relationships. This finding also reveals a high level of emergency preparedness among construction sites. The study discovered the factor of contractor safety management did not significantly influence the effectiveness of the new amendment act. In construction sites, main contractors often have limited influence on the huge number of subcontracted workers in the construction site. In this regard, employees may not recognize safety enhancements made by the main contractor if subcontractors improperly manage their own team. Apart from that, the relationship between risk assessment and the effectiveness of new OSHA amendments 2022 was found statistically significant positive. Workers feel more confident understanding that risks have been mitigated in advance rather than reactively after something happened. One of the key highlights of the amendments act is regarding the employee right empowerment in the workplace. The present study revealed that the employee right empowerment significantly and positively affects the effectiveness of the new OSHA amendments 2022 in reducing injuries. Employees' direct participation in safety decision-making directly affects the formation of a stronger safety culture, which may lead to this finding. Previous empirical research (18) also observed this finding.

The third objective of this study focused on evaluating the impact of risk assessment practices on workplace safety. The current study has concluded that risk assessment is significant in decreasing injury. The present result corroborates the findings of (19, 20), both of whom concluded that risk assessment plays a substantial role in improving safety performance. Reflecting the industry's high-risk profile, risk assessment and preventive interventions show a greater influence. Employees recognize major accident hazards are possible to be prevented by identifying and addressing the sources using examinations. The present study also included a MLR analysis to investigate the fundamental factors that affect the efficacy of workplace risk assessment. However, the analysis revealed a significant relationship between the effectiveness of risk assessment in reducing workplace injuries and all control variables, with the exception of transparency in communicating risk assessment outcomes. This may imply that employees prefer an effective control measure over clear communication of the findings. Comprehensiveness and control measures associated with risk assessment were examined to significantly contribute to the effectiveness of risk assessment. Without a complete understanding of the hazards, control measures could be misaligned. Eventually leading the risk assessments become ineffective and incurring extra cost. Consistent with the previous study (21), the current findings also found the positive impact of safety control measures in influencing workplace injuries.

On the other hand, the relationship between the ability of recognizing previously undetected hazards and effectiveness of risk assessment in reducing workplace injuries was found to be significantly positive. Construction sites typically involve a variety of engineering works, and the working activities during each stage are varied. Employees believe that risk assessment can identify possible risks of future work that has never been performed in the workplace before, this will also directly contribute to reducing injuries. The finding also demonstrates the high worker involvement among the workplaces. (21) suggested that a high degree of management support is indispensable for achieving an effective risk assessment. Consistent with current study, a statistically significant positive relationship was found between management’s commitment and the effectiveness of risk assessment in reducing workplace injuries. The support from top management is not only important

DOI: https://doi.org/10.11113/jest.v8.213

in determining the effectiveness of risk assessment, but also determining the performance of Occupational Safety and Health Management System in the workplace. In fact, management commitment has the most important impact on the allocation of risk assessment resources. For instance, when the risk assessments require the engagement of third-party professional assessors, the company incurs significant expenses. In addition, some mitigation plans require the consent from top management before implementation, thereby the commitment from management is directly affecting the risk assessment's effectiveness.

To resolve the issue of high-intensity work pace, it is suggested that the client of the construction project should ensure the work arrangement and work sequence is safe and without risk to their health. Such provision is also mandated in the Construction Design Work Design and Management Regulations 2024, which came into effect after the new OSHA amendment. The client should ensure the contractors have sufficient resources and a reasonable timeline to complete the project. Nonetheless, employers should also be responsible for the formation of a strong safety culture in the workplace. Additionally, the government is recommended to provide subsidies or tax reductions for those organizations proactively pursuing safety protection technologies, in order to address the gap of insufficient safety investment in the industry. The government should also revoke the licenses of contractors who maintain poor working conditions and disregard warnings.

It is the employers' duty to upgrade onsite health facilities and maintain robust medical surveillance protocols. A further concern relates to the low perception of safety coordinators. To address this, employers should monitor the performance of safety coordinators and implement compulsory continuous training. However, the study found a tendency of inadequate training provided by employers on risk assessment. Therefore, it is recommended that the government intervenes promptly to address this issue through stricter policy.

4.0 CONCLUSION

The present study provided a thorough review of occupational injuries in the Malaysian construction industry, encompassing potential influencing factors, the effectiveness of new OSHA amendment 2022 and the impact of risk assessment. It serves as an impactful empirical study for the public that contributes meaningful insights into the Malaysian construction industry. Economic pressure and safety investment have been proven to have significant effects on occupational injuries in Malaysia's building construction sector. A fast-paced work environment that potentially triggers injury is affecting all levels of staff on the construction site. In addition, a trend was noticed where safety investment varies depending on the type of company. Bigger organizations, such as developers, main contractors and consulting firms are more likely to prioritize safety spending.

On the other hand, the new OSHA amendments 2022 was proven in significantly reducing workplace injuries**.** Several factors were found significantly influencing the effectiveness of new OSHA amendments 2022 in improving workplace safety, which included risk assessment, employee right empowerment, occupational health services, safety training and management's safety commitment. However, the implementations such as emergency preparedness, contractor safety management and Safety and Health Coordinator were found to be insignificant in influencing the effectiveness of new OSHA amendments 2022. This empirical finding filled a research gap pertaining the impact of new safety regulations on improving workplace safety performance. The risk assessment was found to be significant in workplace injury reduction. Additionally, the performance of risk assessment was significantly associated with the comprehensiveness of risk assessment, effectiveness of control measures, capability of detecting previously overlooked hazards and management's commitment.

ACKKNOWLEDGMENT

The authors would like to express our gratitude to Universiti Teknologi Malaysia (UTM) and the Ministry of Higher Education of Malaysia. This research is funded by a HICOE research grant VOT number R.J130000.7846.4J757.

DATA AVAILABILITY

All data underlying the results has been provided in the article and no additional source data are required.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest regarding the publication of this paper.

ETHICS DECLARATION

This study did not involve human participants, animal subjects, or sensitive data. Consequently, formal ethical approval was not required.

REFERENCES

1. ILO. (2023). Nearly 3 million people die of work-related accidents and diseases. Available from https://www.ilo.org/resource/news/nearly-3-million-people-die-work-related-accidents-and-diseases
2. Tan ZY. Factors in Construction Accidents and The Barriers of Safety Practices: Perspectives of Contractors**.** International Journal of Social Science Research. 2022;4(3):1-13.
3. Finity J. (2024). 36 Construction Safety Statistic for 2023. Available from https://www.procore.com/library/construction-safety-statistics
4. Malay Mail. (2021). DOSH: High-risk projects at construction sites are constantly monitored. Available from https://www.malaymail.com/news/malaysia/2021/03/27/dosh-high-risk-projects-at-construction-sites-are-constantly-monitored/1961449
5. Surienty L. OSH Implementation in SMEs in Malaysia: The Role of Management Practices and Legislation: Volume II: Safety and Health, Slips, Trips and Falls. Proceedings of the 20th Congress of the International Ergonomics Association. 2018:650-671.
6. Hamzah IS, Sarifin MR, Abdul Aziz MS, Azri Abdullah MK. Malaysia As Attraction of International Foreign Workers. Journal of Critical Review. 2020; 7(8):797-804.
7. Rafidah I, Roshani P, Gayani K, Norfaridatul AO. Health and Safety (H&S) Challenges Confronted by Foreign Workers in the Malaysia Construction Industry: A Background Study. The 7th World Construction Symposium 2018: Built Asset Sustainability: Rethinking Design, Construction and Operations. 2018. http://dl.lib.uom.lk/handle/123/20139
8. Mohamed Fiah AF, Norhuda S, Romlah R, Noor SZ. The relationship of effective communication and safety culture in construction industry in Malaysia. International Journal of Law, Government and Communication. 2022;7(29):435-47.
9. Tayebe RP. Safety Motivation and Work Pressure as Predictors of Occupational Accident in the Petrochemical Industry. Health Scope. 2015;4(4). https://doi.org/10.17795/jhealthscope-26492.
10. Shezeen O. The Influence of Safety Climate, Safety Leadership, Workload, and Accident Experiences on Risk Perception: A Study of Korean Manufacturing Workers. Safety and Health at Work. 2018;9(4):427-33.
11. Wong Q, Noraina MS, Muhammad WA. The Impact of Safety and Health Issues On The Construction Workforce Productivity In Malaysia. Journal of Governance and Integrity. 2024;6(1):504-14.
12. Lee SF, Linda F. The impact of OSHA recordkeeping regulation changes on occupational injury and illness trends in the US: a time series analysis. Occupational & Environmental Medicine. 2007; 64(7):454-60.

13. Lee S, Ali A. Implementation of Risk Management in the Malaysian Construction Industry. Journal of Surveying, Construction & Property. 2012;3(1):3.
14. Saleem SM. Analyzing the impact of psychological capital and work pressure on employee job engagement and safety behavior. Front. Public Health. 2022. doi: 10.3389/fpubh.2022.1086843
15. Nnaji C, Karakhan AA. Technologies for safety and health management in construction: Current use, implementation benefits and limitations, and adoption barriers. Journal of Building Engineering. 2020. doi:10.1016/j.jobe.2020.101212
16. Elena F, Antonella B, Osvaldo P, Giuseppe C. Are regulations effective in reducing construction injuries? An analysis of the Italian context. Occupational and Environmental Medicine. 2013;70:611-6.
17. John A. Predisposing factors influencing occupational injury among frontline building construction workers in Ghana. BMC Res Notes. 2019;12. doi:10.1186/s13104-019-4744-8
18. Ramazan K, Arzu TT, Meral E, Ismail TK. (2016). Effects of Occupational Health and Safety Practices on Organizational Commitment, Work Alienation, and Job Performance: Using the PLS-SEM Approach. International Journal of Business and Management. 2016;11(5):146-66.
19. Barbeau E. Assessment of occupational safety and health programs in small businesses. American Journal of Industrial Medicine. 2004;45(4):371–9.
20. Hinze J, Hallowell M, Baud K. Construction-Safety Best Practices and Relationships to Safety Performance. Journal of Construction Engineering and Management. 2013;139(10). doi:10.1061/(asci)co.1943-7862.0000751.
21. Fatini HMT, Zulhafiza Z, Siti ZAK. Safety and Health Practices and Injury Management in Manufacturing Industry. Procedia Economics and Finance. 2015;35:705-12.

DOI: https://doi.org/10.11113/jest.v8.213

APPENDIX

Survey Questionnaire

Faculty of Chemical and Energy Engineering
Master of Science (Safety, Health, and Environment)

Dear respondents,

Thank you for your time and willingness to read this information sheet. My name is THAM ZE KAI. I am a Master of Science (Safety, Health and Environment) student in Universiti Teknologi Malaysia (UTM) with the student ID No: MET231032. As part of my program requirements, I am conducting a research study on the influencing factors of occupational injury in the construction industry: Evaluating the effectiveness of new OSHA 2022 amendments. Your participation in this research study is greatly appreciated. Rest assured that the confidentiality of your information will be strictly upheld. The data collected will be used solely for academic purposes, specifically to enhance our understanding of clinical waste handling practices. Your contribution will be invaluable in advancing knowledge in this field. Thank you for your involvement in this study.

Researcher,

(THAM ZE KAI)

DOI: https://doi.org/10.11113/jest.v8.213

SECTION 1 (Demographic data)
Directions: Please read each statement carefully and tick ( ) your answer.

1. Gender : ☐ Male ☐ Female

2. Age : ☐ 18-25 ☐ 26-35 ☐ 36-45 ☐ > 45

3. Job Role :

Client & Consultant	
Management of Project	
Site Supervisor	
General Worker & Operator	
Others: _____	

4. Please provide the total duration of your employment, being at the construction site?

☐ <1year ☐ <5year ☐ <10year ☐ <15year ☐ <20year

5. Academic qualification :

Master and above	
Degree	
Diploma	
SPM	
PMR	
Others:	

DOI: https://doi.org/10.11113/jest.v8.213

SECTION 2 (Assessment of contributing factors leading to occupational injuries)
For each statement, please indicate your answer using the following scale.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

Directions: Please read each statement carefully and tick( ) your answer.

No	Question	1	2	3	4
1	I feel pressured to complete tasks faster than the recommended pace.				
2	A faster work pace increases the risk of accidents or injuries on my worksite.				
3	Working overtime or extended shifts increase the likelihood of injuries.				
4	I will skip safety protocols or procedures due to time constraints or deadlines.				
5	My worksite maintains a good balance between productivity demands and safety requirements.				
6	When tasks require to be done quickly, how do you think this affects the chances of getting hurt?				
7	I am satisfied with the amount of occupational training provided by my company.				
8	My company does not provide adequate personal protective equipment (PPE).				
9	My organization conducts safety audits or workplace hazard inspections frequently enough to ensure safety.				
10	My organization invests enough in safety measures and technology to prevent injuries.				
11	There are sufficient OSH practitioners to ensure our safety in workplace.				
12	The safety facilities and procedures implemented by my organization are effective in preventing injuries.				

DOI: https://doi.org/10.11113/jest.v8.213

SECTION 3 (Assessment of effectiveness of new OSHA amendment)
For each statement, please indicate your answer using the following scale.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

Directions: Please read each statement carefully and tick( ) your answer.

No	Question	1	2	3	4
1	I am aware that Malaysia has introduced a new OSHA amendment in 2022 aimed at improving workplace safety.				
2	In the past year, workplace injuries on my worksite have been frequent. • **Strongly Disagree**: 1 time or fewer • **Disagree**: 2–3 times • **Agree**: 4–5 times • **Strongly Agree**: More than 5 times				
3	There is a clear plan in place for emergencies (e.g., accidents, fires, or medical emergencies) on my worksite.				
4	I am confident that the emergency plan would protect workers in case of an incident.				
5	The main contractor ensures the safety of all workers, including subcontractors, on my worksite.				
6	Safety responsibilities are clearly communicated and shared between the main contractor and subcontractors.				
7	Potential hazards are identified and addressed before starting work on my site.				
8	The current process of identifying and managing risks is effective in preventing injuries.				
9	I am aware of my right to refuse unsafe work without facing negative consequences.				
10	I feel comfortable reporting unsafe working conditions to my supervisor or manager.				
11	I am satisfied with the health and medical support provided to workers on my site.				
12	The health services available on my worksite help reduce the risk of injuries.				
13	There is a designated safety and health coordinator responsible for safety on my worksite.				

DOI: https://doi.org/10.11113/jest.v8.213

14	The safety coordinator or team is effective in addressing safety concerns and improving working conditions.				
15	I receive regular safety training to help me perform my job safely.				
16	The safety training, I receive is useful in preventing accidents and injuries.				
17	Management actively seeks feedback from employees on how to improve workplace safety.				
18	Overall, do you agree these implementations from new OSHA amendment contribute to reduce your workplace injuries?				

SECTION 4 (Assessing the impact of risk assessment)
For each statement, please indicate your answer using the following scale.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

Directions: Please read each statement carefully and tick( ) your answer.

No	Question	1	2	3	4
1	Risk assessments are conducted regularly on my worksite to identify potential hazards				
2	The risk assessments conducted on my worksite are thorough and cover all potential hazards.				
3	Workers are actively involved in the risk assessment process on my worksite.				
4	The findings from risk assessments are used to implement effective safety measures on my worksite.				
5	The outcomes of risk assessments are clearly communicated to all workers on my worksite.				
6	Risk assessments have helped identify hazards that were previously overlooked on my worksite.				
7	The risk assessments conducted on my worksite have effectively reduced the number of injuries.				
8	I have received adequate training on how to participate in or conduct risk assessments.				
9	Management prioritizes and supports the risk assessment process on my worksite.				
10	Overall, I believe that risk assessments are an effective tool for improving safety and reducing injuries on my worksite				

DOI: https://doi.org/10.11113/jest.v8.213

SECTION 5 (Challenges improving workplace safety)
What challenges have you faced in improving workplace safety, particularly in relation to work pace, safety investments, risk assessments, or the new safety regulations?

SECTION 6 (Suggestion for improvement)
What specific changes or improvements would you recommend to enhance workplace safety.

Thank You