

Critical Factors Affecting the Implementation of Occupational Safety and Health (OSH) Practices in a Maintenance, Repair, and Overhaul (MRO) Service Company

Zulfarisha Allya Kamisdan¹, Rahim Jamian^{2*}, Yusmerryza Mohd Nazri³

¹Dept. of Chemical Engineering Technology, Faculty of Engineering Technology, Universiti Tun Hussein Onn Malaysia Kampus Pagoh, Hab Pendidikan Tinggi Pagoh, 84600 Panchor, Muar, Johor, MALAYSIA

²Dept. of Mechanical Engineering Technology, Faculty of Engineering Technology, Universiti Tun Hussein Onn Malaysia Kampus Pagoh, Hab Pendidikan Tinggi Pagoh, 84600 Panchor, Muar, Johor, MALAYSIA

³Department of Health, Safety, Quality and Environment, MTU Service (Malaysia) Sdn. Bhd, Lot 3708, Kawasan Perindustrian Sri Manjung, 32040 Sri Manjung, Perak, MALAYSIA

*Corresponding Author Designation

DOI: <https://doi.org/10.30880/peat.2023.04.02.099>

Received 12 January 2023; Accepted 11 February 2023; Available online 11 February 2023

Abstract: Accidents, injuries and illnesses in the workplace continue to be significant issues in many industries and business sectors. Accidents often occur due to a lack of attention given to implementing the practices of occupational safety and health (OSH). Nonetheless, few studies have been conducted on the practices of OSH in the maintenance, repair and overhaul (MRO) industry. This study employs quantitative research methods. A survey questionnaire is used to collect quantitative data from 70 respondents. Subsequently, quantitative data has been analyzed through descriptive statistical analysis. The study's findings reveal the importance OSH benefits in terms of reduction of occupational injuries, health issues, hazard risks, and improved workplace environment. In addition, there was a significant relationship between the factors of management, personal, process and risk control, and environment, and OSH practices. Therefore, this study concluded these factors are critical in achieving effective implementation of OSH practice.

Keywords: Critical Factors, Maintenance-Repair-and-Overhaul (MRO), Occupational Safety and Health (OSH) Practices

1. Introduction

Occupational accidents, injuries and illnesses continue to be major issues in many industries and business sectors. According to the statistics provided by the Department of Occupational Safety and Health (DOSH) Malaysia, there were 6686 cases of occupational accidents reported in Malaysia from January to December 2021, where the manufacturing sector was the highest contributor with 4269 cases [1]. In this context, the industry of maintenance, repair and overhaul (MRO) services could be categorized into manufacturing industry because the industry also involved in remanufacturing process that work on marine vessel and automotive diesel engines. MRO services companies constantly have challenges and requires effort to be able to survive and grow. One effort that still needs to be done is to tackle the issue of accidents and injuries in the workplace that often cause a detrimental effect on individuals and companies.

Accidents often occur at workplace due to lack of attention given in implementing the practices of occupational safety and health (OSH). The practices of OSH comprise strategies, policies, activities and procedures that can be implemented by the organizations towards prioritizing safety and health of their employees. Commonly applied OSH practices in the industry are inclusive of work process compliance to OSH act and legislation as well as the implementation of occupational safety and health management system (OSHMS) practice [2]. Effectively implemented OSH practices could contribute to numerous benefits such as safer workplace, and reduction of injuries and work-related diseases in a company [3]. Thus, this study strives to provide empirical evidence on the prospects of OSH practices in terms of benefits, critical factors, and relationship between critical factors and benefits of OSH in a selected MRO services company. This study focuses on the critical factors or issues of management (MI), personal (PI), process and risk control (PRCI), and environment (EI).

2. Methods

The process of this research involves six main stages. The research begins with the review of literature through searching and reviewing relevant articles of previous works, as well as documentation from a MRO services company. The second stage focuses on determining the research gap and research problem, as well as formulation of research objectives. The third stage emphasizes on the development of research instrument. The activity of data collection underlying the fourth stage of this research study. The method of data collection was utilized using survey questionnaire. The next stage is data analysis, which comprises the analysis of respondent demography and descriptive information. The final stage summarizes the outcomes of the research by means of discussion and conclusion, as well as recommendation for further works. Figure 1 depicts the process flow chart of the overall research work.

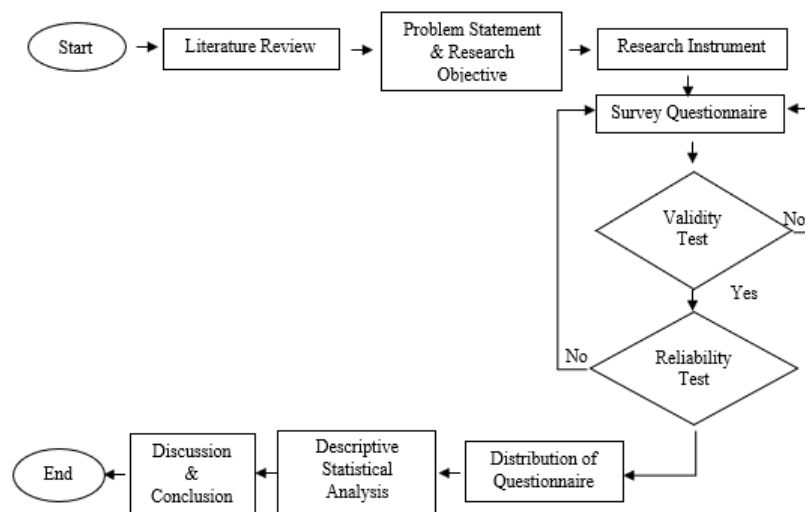


Figure 1: Flowchart of research

3. Results and Discussion

The results and discussion section presents the findings of this study and the results of data analysis. All data and information were obtained through survey questionnaire distribution after the validity and reliability process was carried out. For the purpose of data collection, respondents were expected to answer each question by assigning a point value between 1 and 3 to indicate the degree to which they disagreed, agreed or not sure with the statement being asked. Data from the distributed questionnaire were analyzed descriptively using Statistical Package for the Social Sciences (SPSS) ver. 28.

3.1 Respondent demographic information analysis

Table 1 provides a summary of the demographic profiles of each of the 70 respondents that filled out Part A (Background of Respondents) of the questionnaire from the MRO firm in Manjung, Perak, Malaysia. The information includes demographic details such as gender, age, employment position, educational level, and length of employment, as well as other information. According to the findings, the percentage of male respondents (74.3%) was much larger than the number of female respondents (25.7%). The majority of the people who filled out the survey are workers with ages ranging from 31 to 40 years old (41.4%).

Table 1: Respondents' profile ($n = 70$)

n = 70	Frequencies, f	%
Gender:		
Male	52	74.3
Female	18	25.7
The Age (year):		
Under 20 years old	-	-
21 – 30 years old	20	28.6
31 – 40 years old	29	41.4
41 – 50 years old	14	20.0
51 years old and above	7	10.0
Work position:		
Manager	4	5.7
Engineer	11	15.7
Supervisor	7	10.0
Other	48	68.6
Education level:		
Master	2	2.9
Degree	16	22.9
Diploma	25	35.7
Certificate	27	38.6
SPM	-	-
Other	-	-
Length of employment:		
Under 4 years	13	18.6
5 – 9 years	15	21.4
10 – 14 years	28	40.0
15 years and above	14	20.0
HSE talk or training:		
Yes	46	65.7
No	24	34.3

Moreover, the information on education level revealed that those with certificate holders had the highest percentage of responses (38.6%), which was larger than the percentages of those with other levels of education, such as diploma holders (35.7%), degree holders (22.9%), and master holders (2.9%).

In addition, the findings demonstrated that approximately 40.0% of the respondents had a level of professional experience ranging from 10 to 14 years. Whereas approximately 21.4% of the employee

respondents have been working in the industry for between five to nine years, 20% of the respondents have stayed more than fifteen years in the industry, and only 18% of the respondents have spent less than four years working in the industry. All of the respondents were employees.

The percentage showed that the majority of respondents have already attended the Health, Safety, and Environment (HSE) talk for this year. Approximately 65.7% of respondents participated in the talk and training, while only 34.3% of respondents were unable to attend either the talk or the training that was provided by the company.

3.2 Normality test

Kolmogorov-Smirnov test was carried out in this research to determine whether or not the data are normal. The Kolmogorov-Smirnov test was taken into consideration for the research due to the fact that the total number of respondents for this research was 70 respondents, which is a $N \geq 50$ element. If p is more than 0.05, it indicates that the data are normal. On the other hand, when p is less than 0.05, it indicates that the data are not normal. The value is indicated by the notation "Sig." under the Kolmogorov-Smirnov heading in SPSS, as can be seen in Table 2 below.

Table 2: Test of normality

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
MI	0.213	70	<0.001
PI	0.276	70	<0.001
PRCI	0.203	70	<0.001
EI	0.213	70	<0.001

3.3 Management issues (MI) analysis

Figure 2 shows the mean for the Management issues (MI) item. Descriptive analysis shows that the mean obtained is between 2.26 to 2.63. The mean value at the highest position is MI_3, "The organization consistently aligns its health and safety regulations with other policies to maintain worker dedication and well-being.", showing a mean score of 2.63 for all respondents ($n=70$). Even though the mean scores the highest among the others, however the percentage shows that majority respondent (62.9%) answered not sure. Thus, through this questionnaire, the finding implied the importance of updating and providing adequate safety and health input related to legislation and procedure to promote occupational safety and health programs and awareness to ensure a safe and healthy environment for all employees in the respondents' respective companies.

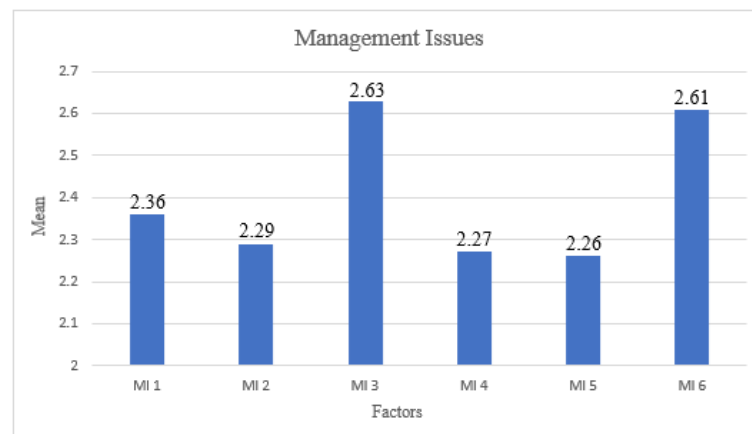


Figure 2: Management issues (MI)

Conversely, the employees' opinions towards PPE supplied received a score of 2.26 points total, making it the group with the lowest mean MI_5, "Management provides workers with Personal Protective Equipment (PPE) appropriate to their work". According to the findings, even the mean shows the lowest result. The percentage shows that the respondent agreed (74.3%) that the management team did encourage the employees enough by providing adequate safety equipment to enhance their productivity in safety-related improvement programmes, issues, and other concerns. Thus, this scenario may help management to ensure their employees comply with safety and health legislation. In other words, the only way to improve employee cooperation in a company is for management to demonstrate a commitment to various improvement efforts.

3.4 Personal issues (PI) analysis

All PI sub-issues in Figure 3 have a mean value greater than 2.0 points. The most significant mean, with a total score of 2.40, related to the meeting concept in PI_1, "Involving employers and employees in safety and health concerns (eg safety and health meetings)". The findings show that the average respondent agreed (60%) that management often holds meetings about the needs of employees in maintaining their occupational safety and health at work. Even though the percentages of agreement and disagreement for PI2, PI3, PI4, PI5, and PI6 varied from the respondents' perspective, the vast majority of respondents answered PI_4, "Workers are provided with enough training whether they join the company, change tasks, or use a new method. (e.g. Forklift Driving Skill, Basic Occupational First Aid [BOFA] Training, Hazard Identification, Risk Assessment & Risk Control [HIRARC])," with the lowest mean score of 2.23 points. Even though the mean of PI_4 shows the lowest mean among the others, the respondent still agreed (77.1%) that they had enough training to perform their task and to enhance their awareness towards safety and health. As a result, the implementation of OSH practices in an MRO company should not be taken for granted. Employees should receive extensive training on safety to foster an environment that places a high value on safety.

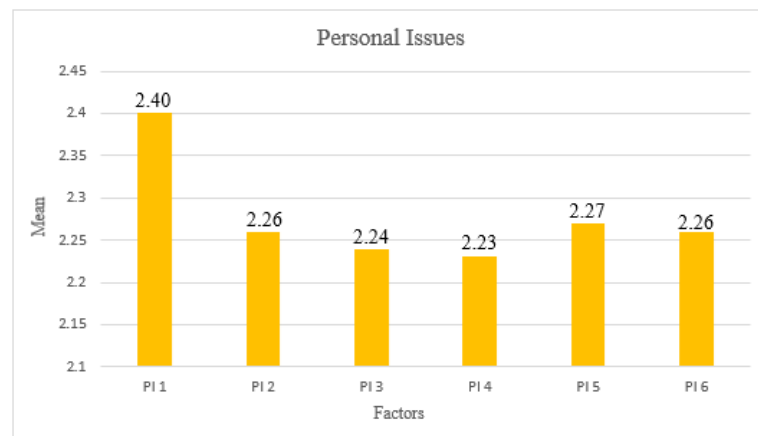


Figure 3: Personal issues (PI)

3.5 Process and risk control issues (PRCI) analysis

The mean scores for process and risk control (PRCI) range in Figure 4 are between 2.16 and 2.63 points. The highest mean, with a score of 2.63 points, was recorded for workers' knowledge of safety guidelines PRCI_6, "There is documented evidence that the equipment supplied complies with the International Organization for Standardization (ISO) and DOSH-SIRIM according to current statutory requirements". Even though it states the highest score, yet most respondents (62.9%) answered this question unsure. Hence, these findings showed that their awareness of safety equipment standards must be supplied to comply with the ISO and DOSH-SIRIM is still weak.

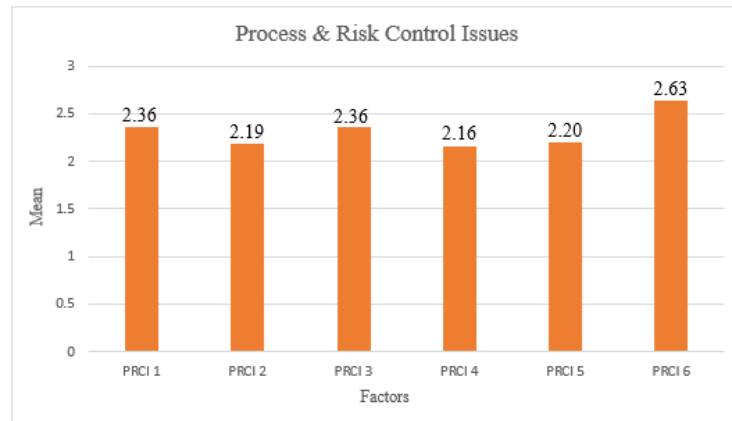


Figure 4: Process and risk control issues (PRCI)

Instead, the lowest mean with a score of 2.16 points has the most respondents agreed (84.3%) on PRCI_4, "Workers have been trained in proper and safe ergonomic procedures. (e.g. guidelines for lifting, using or carrying equipment)". The finding with the highest percentage showed that employees were well-trained with the proper and safe ergonomic procedures. Thus, this scenario may result in the SHC committee playing its role by providing adequate training to gain workers' awareness of the hazards around them. If the worker not well-trained, that's means there are communication breakdowns between management and staff members inside the organization, making it more challenging to adhere to the requirements of occupational safety and health practices. Thus, this scenario played a crucial role in processes and risk control issues that might affect the implementation of OSH practices. Furthermore, the manufacturing process in the MRO industry is very complicated, and it takes a lot of complicated machines and processes to get the job done.

3.6 Environmental issues (EI) analysis

Figure 5 shows the mean for the EI item. Descriptive analysis shows that the mean obtained is between 2.19 to 2.59. Particularly, environmental law for question EI_2, "Schedule Waste Management (SWM) is carried out following environmental, statutory and legislative requirements", has the most incredible mean score value of 2.59 among the others. Yet, the finding showed the percentage of the majority of 58.6% of respondents answered they were not sure about the waste management system being conducted aligning with environmental legislation. Hence, the findings demonstrated that environmental legislation EI_2 is considered the most significant environmental issue (EI) affecting the implementation of OSH practices; consequently, the company should insist that its employees participate in industry-led environmental programmes. Long-term dangers to employees' health are posed by the environmental circumstances of their places of employment.

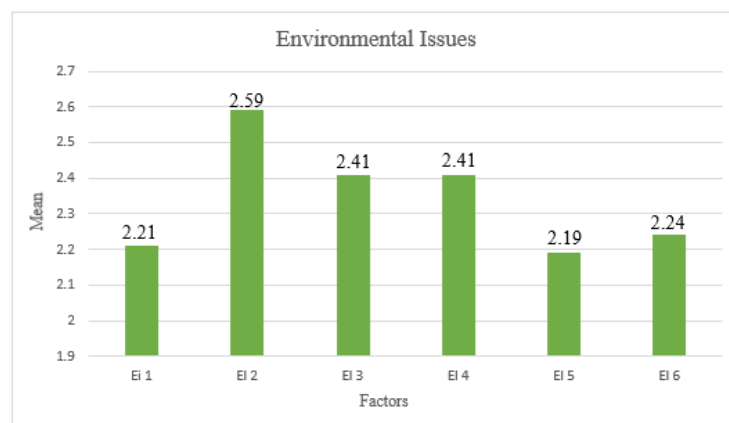


Figure 5: Environmental issues (EI)

On the other hand, even though it was stated as the lowest mean among the others with a value of 2.19 points, EI_5, "Waste disposal bins were labelled and differentiated by colour coding and had a specific location. (e.g. plastic, wood, SW409 & SW410)" was recorded as the highest percentage of 81.4% that agreed their workplace has waste disposal bins that have been labelled and categories specifically with their code.

3.7 Correlation analysis

The Spearman's rho correlation analysis that was performed in this study to measure both the strength of the relationship that existed between the two variables as well as the direction that the relationship went in. According to the findings presented in Table 3, the spearman's rho correlation coefficient shows a value that was considered to be positive. The results indicated that there is a positive connection between the critical factors and OSH practices. Additionally, the value of significance for two-tailed testing was found to be less than 0.05, indicating that the null hypothesis was correct. As a result, there is a significant correlation between four critical factors (MI, PI, PRCI, EI) and the practices of occupational safety and health.

Table 3: correlation analysis result

	Variable	MI	PI	PRCI	EI
Spearman's rho	OSH practices	0.585**	0.356**	0.476**	0.621**
Sig. (2-tailed)		<0.001	0.002	<0.001	<0.001

** Correlation is significant at the 0.01 level (2-tailed).

3.8 Benefits of implementing OSH practices

Employees can have their lives improved by doing an overall study of the benefits of applying effective occupational safety and health practices in a business. According to the findings of a survey with 70 respondents, the vast majority of employees believe that operational safety and health standards can inspire them to work in environments that are both safe and comfortable. According to the findings from previous study, comfortable employees will exhibit more enthusiasm while they are working and will work to improve their performance and commitment while they are working [4]. From this, it can be deduced that the implementation of occupational safety and health practices in organizations plays an essential part in determining whether or not an organization will be successful.

3.9 Critical factors for OSH practices

Research on the management of OSH, the level of protection in an organization can be evaluated by looking at its safety programmes, training, accident investigation, emergency procedures, and personal protective equipment. This was discovered in their study on occupational health and safety management. According to the findings, the perspective of critical factors or issues of management (MI), personal (PI), process and risk control (PRCI), and environment (EI) are fundamental determinants of the implementation of OSH practices is supported. This indicates that the overall findings for the elements that determine the effectiveness of OSH measures in the researched company of MRO suggest that they are at a modest level. This also indicates that the worker's comprehension of occupational safety and endures and confidence in those practices are good. The management of many different businesses has to demonstrate that they are concerned about the need for viable administration to educate their workforce and make them more aware of potential risks. Despite this, the overwhelming majority of respondents had no idea how formal training is conducted in the MRO industry, which makes it challenging to enhance occupational safety and health procedures.

3.10 Relationship between critical factors and benefits of OSH practices

Based on the results and analysis of the study, there is a significant and positive correlation between the important elements and the benefits of implementing OSH methods. This relationship was found to exist between the two variables. This link is substantiated by data analysis derived from the questionnaire that was collected; the p value is lower than 0.05. As a result, the respondents have demonstrated that the incorporation of OSH practices has an influence on the workplace. The safety climate in the organization increased when OSH practices method was introduced, and this research finding is comparable to their findings. In addition to this, OSH procedures have the potential to lessen the likelihood of a person being engaged in an accident at their place of employment by removing or replacing the hazards.

4. Conclusion

In conclusion, the objectives of the research have been achieved. The benefits of implementing OSH practices in a MRO company in Malaysia has been identified. Furthermore, the critical factors affecting the effectiveness of OSH practices in the company have been categorized. Finally, the relationship between the critical factors and benefits of implementing OSH practices has been validated and shows significance value.

Acknowledgement

The authors would also like to thank all members of the Faculty of Engineering Technology, Universiti Tun Hussein Onn Malaysia and staff of MTU Service (Malaysia) Sdn. Bhd. for its support.

References

- [1] DOSH (Department of Safety and Health, Malaysia), "Occupational accident statistics", 2021. [Online]. Available: <http://www.dosh.gov.my>. [Accessed Jun 18, 2022].
- [2] R. M. Yusuf, A. Eliyana, and O. N. Sari, "The influence of occupational safety and health on performance with job satisfaction as intervening variables", *American Journal of Economics*, vol. 6, no. 12, pp. 136-140, 2012.
- [3] D. M. Rojas, B. R. Mora, and A. G. Bolivar, "Implementation of the occupational health and safety management system (OSHMS) in Colombian companies", *Contemporary Engineering Sciences*, vol. 11, no. 19, pp. 4533-4540, 2018.
- [4] K. T. Leung, "Factors affecting the planning and implementation of occupational health & safety management system", Master thesis, The Hong Kong Polytechnic University, 2000.
- [5] K. Kogi, "Work improvement and occupational safety and health management systems: Common features and research needs", *Industrial Health*, vol. 40, no. 2, pp. 121-133, 2002.
- [6] M. Chen, "Process safety knowledge management in the chemical", *American Journal of Chemical Engineering*, vol. 4, no. 5, pp. 131-138, 2016.
- [7] L. K. Khor and L. Surlenty, "Safety capital and safety participation of OSHMS in Malaysian manufacturing companies: The mediation effect of safety", *Perintis EJournal*, vol. 8, November, pp. 10-24, 2018.
- [8] S. Haryati, S. Ebrahim Awadh, M. Sharifah, and M. Y. Azlina, "Study on promote occupational safety and health practices in construction projects", *Journal of Technology Management and Business*, vol. 6, no. 3, pp. 29-39, 2019.
- [9] S. M. Ahmed, J. Kwan, Fox Young Wei Ming, and D. Ho, "Site safety management in Hong Kong", *Journal of Management in Engineering*, vol. 16, pp. 34-42, 2000.

- [10] S. Srinivasan, "The impact of 5S on the safety climate of manufacturing workers", *Manufacturing System*, vol. 1, December, pp. 1-58, 2012.
- [11] M. Murad, R. Jamian, A. M. Leman, K. A. Rhaffor, and M. F. Ismail, "Critical factors for implementation of occupational safety and health management system in Malaysian petrochemical based manufacturing companies", *International Journal of Emerging Trends in Engineering Research*, vol. 8, no. 1.2, pp. 1-6, 2020.