

The Adoption of 5S Practice and its Impact on Safety Management Performance: A Case Study in a University Environment

Kauthar A Rhaffor^{a*}, Nurul Hafieza Azizul^a, Rahim Jamian^a, Jum'azulhisham Abdul Shukor^a

^a Manufacturing Section, Universiti Kuala Lumpur Kampus Cawangan Malaysian Spanish Institute, Kulim Hi-Tech Park, 09000 Kulim Kedah, Malaysia

*Corresponding author: kauthar@unikl.edu.my

ABSTRACT *The practice of 5S has been adopted by many organizations as a method to organize the workplace towards reducing waste and improving productivity. Moreover, the practice also promotes a safe and efficient environment in organisations. As safety performance of the workplace is among the key issues in most industries including universities to become world class organizations, this study seeks to address empirically the impact of 5S practice on safety management performance. In this context, a survey questionnaire is employed and distributed to 60 employees of the selected university to examine the employees' perception on the adoption of 5S practice as well as the impact of 5S practice towards safety management performance. The questionnaires were validated by a pilot test with an acceptable value of Cronbach's alpha. Overall findings highlight there was positive perceptions toward 5S practice among the respondents. The results also revealed that 5S Audit has a very strong positive correlation with safety management performance. Furthermore, 5S Training and Top Management Commitment were (2) factors that strongly correlated to safety management performance. These factors are highly important in contributing toward the success of safety management performance. Additionally, since most of the employees were not exposed with Occupational Safety and Health (OSH), this study reveals moderate negative correlation between compliance to OSH Requirements and safety management performance.*

Keywords – 5S Practice, Occupational Safety and Health (OSH), Safety Management Performance.

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1.0 INTRODUCTION

5S practice is often viewed as an effective method to increase efficiency and productivity. By reducing clutter, 5S also helps to create a safer and healthier workplace. This systematic process of housekeeping has been implemented not only in major industries in Japan, the practice is widely adopted in retail shops and even in their houses. The misperception of 5S practice; it is merely a housekeeping activity whereas it is a part of Visual Factory Management (VFM) and a system to reenergize the workforce. The implementation of 5S is considered as an important support to other manufacturing improvements such as, Just-in-time (JIT) or Lean Production, cellular manufacturing, Total Quality Management (TQM), or Six Sigma initiatives. It is also a great contributor to establishing a safer and better workplace (Grover, 2012).

Safety on the other hand is an integral part of the first three "S" in the 5S practice: Sort, Set in Order, and Shine, and the remaining two "S"; Standardize and Sustain are the methods used to ensure safe and good housekeeping are maintained. Organizations especially in small and medium enterprises (SMEs) believe that managing safety is trivial as they do not see the positive relationship between competitiveness and safety. Lee (2010) stated that in SMEs, safety and health are often viewed as counterproductive to the operation and never treated as a crucial part of the overall management of the organization. However, good occupational safety management can have a positive effect not only on accident rates, but also on competitiveness variables and financial performance (Fernández-Muñiz, Montes-Peón, & Vázquez-Ordáz, 2008).

In this study, 5S practice in the selected university has been implemented since 2014. From 2014 to 2017, the university has successfully obtained Quality Environment (QE/5S) Certification from Malaysia Productivity Corporation (MPC). The implementation involved all employees from all levels and departments. The university is offering programs related to engineering technology which involved hands on practices with handling tools, equipment and machineries. The courses enrolled by students are mostly conducted in the workshop and laboratory which exposed them to various types of hazards along with different level of risks. Therefore, this study aims to analyze staff perceptions towards the adoption of 5S practice in the university and to explore the impact of critical factors in 5S practice towards safety management performance.

2.0 LITERATURE REVIEW

A lot of studies have reported the benefits of 5S practice towards organizations, but most of the studies did not mention on safety performance and worker safety as a goal or an outcome of 5S (Ramesh & Ravi, 2016). Ramesh and Ravi (2016) also stated that it is difficult to analyze the real relationship between worker safety and 5S implementation as improved employee safety is treated as an extra benefit and not the actual reason for 5S implementation. Fig. 1 shows the five pillars of the 5S concept with improved safety as one of its main advantage besides product diversification, higher quality, lower costs, reliable deliveries and high availability rate.



Figure 1 The Five Pillars of 5S Concept (Ramesh & Ravi, 2016)

5S practice was implemented in Boeing as a tool for the safety improvement process (Ansari & Modarress, 1997). In Boeing, 5S practice was pursued as a world-class strategy. Gapp et al. (2008) also emphasizes on the relationship of 5S with workplace safety and health. It is stated that maximizing the level of workplace safety and health is a primary objective of practicing 5S in conjunction with increased productivity. Pasale and Bagi's (2013) study has concluded that 5S practice is an effective management tool which can improve housekeeping, environmental conditions and safety and health standards. The study was conducted to study the 5S strategy for productivity improvement. Productivity can be optimized, and quality is improved by maintaining an orderly workplace.

Good workplace will help to not only prevent defects, it will also prevent accidents. In addition, Harea et al. (2018) have concluded that the 5S method implemented will not only increase an organizations' productivity, it will also create a safer workplace. Randhawa and Ahuja (2017), have conducted a research to evaluate the contribution of 5S implementation in Indian manufacturing industries. The findings have shown that the implementation of 5S benefited the organizations in terms of productivity, quality, safety, employee morale values, effective workspace utilization and cost optimizations.

Johana et al. (2014) conducted a study on the sustainability of 5S implementation in an administration office of a higher education institution. The study proved that the implementation of 5S is an effective way in providing a better workplace for the administration staff of the higher learning institution. With the implementation of 5S, the staff felt more comfortable, safe and organized which eventually improved their work quality.

The advantages provided by 5S practice are also in line with the Occupational Safety and Health Master Plan for Malaysia 2016-2020 (OSHMP 2020, 2016) main strategy which is to establish preventive culture in the workplace. This strategy was developed to transform the workplace in Malaysia into a safe and healthy environment to protect workers as the most important asset. A previous study conducted by Norhafizah et al. (2018) had focused on the effectiveness of the Occupational Safety and Health Master Plan 2015 (OSH-MP 15) in enhancing government leadership and preventive workplace. The study concluded that OSH practitioners and employers involved in the study were well informed with the program proposed by the government. Besides, the overall results also showed that they have been practicing good preventive culture in the workplace. This will be a good sign for the future of OSH Management System (OSHMS) in Malaysia as good OSHMS is proven to improve OSH conditions and support healthy and safe workplaces (Mohammadfam et al., 2017).

3.0 METHOD

3.1 Respondents

A sample size of 30 is held by many to be the minimum number of cases for research involving statistical analysis on their data (Cohen, Manion & Morrison, 2011). For this study, the researchers managed to distribute questionnaires to 60 academic and support staff randomly selected from academics and administration departments including workshops and laboratories area.

3.2 Data Collection and Instrument

Survey approach was employed where self-administered questionnaires were distributed. Survey method using distribution of questionnaire is the most effective technique to gather fast and accurate responses for this study as it helps the researchers obtain large number of responses quite quickly, which allows them to work with a lot of data (Cherry, 2018). The duration of each session was approximately 10 minutes. Researchers were available during the data collection process to answer inquiries by the participants. The survey questions were divided into five (5) sections:

- Section A: Respondent Information
- Section B: Adoption of 5S (Sort, Systematize, Sweep, Standardize, Sustain)
- Section C: Critical Success Factors;
 - i. Top Management Commitment
 - ii. Employee Involvement
 - iii. Compliance with Occupational Safety and Health (OSH) Requirements
 - iv. 5S Training
 - v. 5S Audit
- Section D: Benefits of 5S Practice Towards Safety Performance

These questions were rated using 4-point Likert scale (1: Strongly Disagree; 2: Disagree; 3: Agree; 4: Strongly Agree). The use of middle scale (e.g. 3: Neutral) can cause the respondents to be undecided with the statements given in the questionnaire. Therefore, such a scale is eliminated in this study to avoid a central tendency bias. Central tendency bias (sometimes called central tendency error) is a tendency for a rater to place most items in the middle of a rating scale (Landy & Conte, 2009). The questionnaire was prepared in the English language.

3.3 Validity and Reliability Tests

3.3.1 Content validity

Three (3) academicians were selected to review the content of the questionnaire. The selected academicians are quality management and occupational safety and health field experts. Questions were edited to be appropriate and understandable by the participants.

3.3.2 Face validity

A pilot test was conducted with 30 staff, randomly selected from various departments for face validity and to test the reliability of the questionnaire. They are requested to identify any difficulties in understanding and answering the questions.

3.3.3 Reliability test

A reliability test was conducted to measure the stability and consistency of the measuring instrument. The respondents involved in the pilot test were required to answer all questions. The internal consistency was measured using the value of the Cronbach's alpha (α) for each item in the questionnaire, which is the most widely method used. Table 1 shows the accepted values of alpha (Sekaran, 2000).

Table 1 The Value of Cronbach's Alpha (α) (Sekaran, 2000)

Cronbach's alpha	Internal Consistency
$\alpha \geq .9$	Excellent
$.9 > \alpha \geq .8$	Good
$.8 > \alpha \geq .7$	Acceptable
$.7 > \alpha \geq .6$	Questionable
$.6 > \alpha \geq .5$	Poor
$.5 > \alpha$	Unacceptable

3.4 Statistical Analysis

Descriptive and inferential statistical analysis were used to measure the variables in all sections to study the perception of respondents towards the implementation of 5S practice and its impact to safety management performance in the workplace. For Section A (Respondent Information), the data were analyzed through descriptive statistical method presented in a form of frequency and percentage. The data in other sections are presented in the form of mean.

Inferential statistical analysis was used to describe the relationship or variable variance through several statistical tests and thus generalize the results of the study (Cohen, 1977). In this study, the Spearman correlation test was conducted to identify the correlation between the independent variables (five critical success factors) and the dependent variable (safety management performance). Spearman rank correlation is a non-parametric test that is used to measure the degree of association between two variables. The correlations were tested using Spearman rank correlation where the test does not carry any assumptions about the distribution of the data and is the appropriate correlation analysis when the variables are measured on a scale that is at least ordinal.

Correlation analysis is often used by researchers to identify relationships and to determine the degree of strength of the relationship between the studied variables. The relationship between the studied variables is referred to as correlation, while the correlation strength in an analysis is represented by the correlation coefficient value (r). The stronger the association of the two variables, the closer the Spearman correlation coefficient, r , will be to either +1 or -1 depending on whether the relationship is positive or negative, respectively. For this study, the strength of the correlation is determined according to the size of the correlation coefficient proposed by Davies (1971) as shown in Table 2. The data were analyzed using IBM's SPSS 23.0 Software.

Table 2 Strength of correlation coefficient (Davies, 1971)

Correlation Coefficient Value (r)	Correlation Strength
0.70-1.00	Very strong
0.50-0.69	Strong
0.30-0.49	Moderate
0.10-0.29	Weak
0.01-0.09	Very weak

4.0 RESULTS

4.1 Face validity

The comments from all the respondents were taken into consideration. Most of the comments were positive which proved that the content of the questionnaire can be understood.

4.2 Reliability test

The results for the measurement of the questionnaire's internal consistency for the pilot test is shown in Table 3 below. It shows the value of Cronbach's alpha obtained for each variable involved in sections or subsections. The result shows that the internal consistency for all the variables are above acceptable level.

4.3 Respondent Information

The information of 60 respondents which involved their gender, age, job title, department and years of experience are shown in Table 4 below.

Table 3 Cronbach's Alpha (A) For Pilot Test

Section	Variable	Cronbach's alpha (α)
B	Adoption of 5S	0.888
C	Critical Success Factors	
	Top Management Commitment	0.951
	Employee Involvement	0.836
	Compliance with OSH Requirements	0.951
	5S Training	0.984
D	5S Audit	0.925
	Benefits of 5S Practice	
	Safety Performance	0.966

Table 4 Respondent Information

	Frequency (N=60)	Percentage (%)		Frequency (N=60)	Percentage (%)
Gender			Department		
Male	31	51.07	Academic	34	56.67
Female	29	48.30	Administration	26	43.33
Age			Job Title		
20-29	7	11.70	Lecturer	21	35.00
30-39	29	48.30	Technician	13	21.67
40-49	21	35.00	Executive	4	6.67
50-59	2	3.30	Officer	9	15.00
> 60	1	1.70	Administration Assistant	8	13.33
			Librarian	2	3.33
			Assistant Librarian	3	5.00

4.4 Descriptive Analysis

Table 5 depicts the mean value obtained for each variable. Mean values were obtained to study the perception of respondents towards 5S practice in the selected university, critical factors in its implementation and the effect of 5S practice towards safety performance. The mean scores for all variables were more than 3.00 which indicated that the responses were generally in the positive area except for “Compliance with OSH Requirements”. It shows that most of the responses fall within the second scale to the first scale, which is between the “Agree” scale to “Strongly Agree” scale.

Table 5 Mean Value for Each Variable

Section	Variable	Mean
B	Adoption of 5S	
	Sort	3.37
	Systematize	3.38
	Sweep	3.33
	Standardize	3.40
	Sustain	3.33
C	Critical Success Factors	
	Top Management Commitment	3.23
	Employee Involvement	3.14
	Compliance with OSH Requirements	2.52
	5S Training	3.45
	5S Audit	3.01
D	Benefits of 5S Practice	
	Safety Performance	3.49

4.5 Correlation between Critical Success Factors in 5S Practice towards Safety Management Performance

Table 6 summarizes Spearman’s correlation test results where the strength of the relationship represented by correlation coefficient, *r* between critical success factors in 5S implementation and safety management performance were identified. Based on the results shown in Table 5, all factors have significant relationship with safety management performance, where *p-value* ≤ 0.01 for Top Management Commitment, 5S Training and 5S Audit; and *p-value* ≤ 0.05 for Compliance with OSH Requirements and Employee Involvement. 5S Audit has a very strong positive correlation with safety management performance. Meanwhile, 5S Training and Top Management Commitment have a strong positive correlation with safety management performance. The other two factors; Employee Involvement and Compliance with OSH Requirements have moderate correlation with safety management performance.

Table 6 Correlation between Critical Success Factors and Safety Management Performance

Critical Success Factors	Correlation Coefficient (<i>r</i>)
Top Management Commitment	0.535**
Employee Involvement	0.316*
Compliance with OSH Requirements	-0.318*
5S Training	0.665**
5S Audit	0.705**

Note:
 **Correlation is significant at 0.01 level (2-tailed)
 *Correlation is significant at 0.05 level (2-tailed)

5.0 DISCUSSION

5.1 Descriptive Analysis

The results in Section B (Adoption of 5S) shows that staff were very committed in implementing 5S practice in the workplace. The mean values obtained for each step in 5S (Sort, Systematize, Sweep, Standardize, Sustain) were above 3.00 which indicated that the responses fall between “Agree” and “Strongly Agree”. The implementation of 5S practice in the university has been a part of organizational culture since 2014 where the university successfully obtained the QE/5S certification from 2014 to 2017. Therefore, the staff perceived activities such as sorting unneeded item and cleaning the workstation as their routine. This result shows a positive development in the implementation of 5S in the university as 5S will not only improve the physical environment of the workplace, it will also improve the thinking processes of the workforce (Mohd Nizam et al., 2010).

The respondents’ response in Section C (Critical Success Factors) were also positive. However, the results for ‘Compliance with OSH Requirements’ is rather low with mean value, $\mu = 2.52$. The respondents rated low score for the factor as most of the staff were not aware of OSH requirements. Safety and Health Executives with the support of the top management are putting their efforts to introduce the employees with OSH and the crucial elements in OSH. The first step taken was to establish a Safety and Health Committee that involves employees from various departments. Establishing good safety practice is one of the crucial factors in the implementation of 5S. A few examples of audit criterias related to safety management listed in the 5S checklist are the disposal of obsolete chemical substances or toxicants, the emergency exit labels, and cable management which refers to management of electrical or optical cable in a cabinet or an installation. OSH awareness is also important to ensure staff understand their rights and responsibilities in matters pertaining to safety and health at the workplace.

The result for mean value in Section D ($\mu = 3.49$) portrays that the staff strongly believe 5S practice has positive effects to safety management performance. They believe that 5S practice will create a safer, healthier workstation besides reducing the risks in the workplace. They also believe that awareness on workplace hazards will increase with the implementation of 5S. The results from a previous study conducted by Nahm et al. (2012) showed that 180 production workers in the Midwest of the USA supported the belief that lean management implementation success depends on the conducive mindset for lean management among production workers. Thus, employees’ trust and positive perceptions have a crucial role in lean management implementation success. On the other hand, findings of previous studies also displayed a relationship between employee pessimism and poor safety performance (Oyan, 2000).

5.2 Correlation between Critical Success Factors in 5S Practice towards Safety Management Performance

5S Audit has a very strong positive correlation with safety management performance ($r = 0.705$). 5S Audit is an effective tool to identify room for improvement; which helps the organizations to analyze their strengths and weaknesses. It is categorized as a crucial tool to ensure accurate deployment of 5S in any organization (Ho, 1999b). As mentioned earlier, some of the audit criteria in the 5S Audit Checklist emphasizes on the element related to workplace safety, therefore the influence of 5S Audit towards safety management performance is indisputable.

Previous studies have identified the significant roles of 5S Training to ensure the success of its implementation (Mohd Nizam et al., 2010; Ablanedo-Rosas et al., 2010; Gapp, Fisher & Kobayashi, 2008). A research study conducted by Ghodrati and Zulkifli (2012) concluded that training is the key to 5S success. Without proper training, there will be a lack of capable workers thus it is nearly impossible to implement 5S. 5S Training was identified to have a strong positive correlation with safety management performance ($r = 0.665$). Employees believed that 5S training has not only taught them the basic principles of 5S, the trainings also assisted them to get a clear understanding of the importance of an effective working environment. A conducive workplace will create a safer and healthier work environment with lower risk activities.

Top management commitment is another crucial criterion in the implementation of 5S. The results obtained show a strong positive relationship ($r = 0.535$) between commitment by the top management and safety management performance. The commitment of top-level leaders is always considered as the biggest contributing factor to an organizations’ success (Kheng & Lilis, 2018; Mohammadfam et al., 2017; Liu et al., 2015; Amiruddin et al., 2015). Leadership is placed at the center in a process-based quality management system model for ISO 9000:2015 standard. It shows that the commitment of top management is crucial for any type of improvement effort. To achieve long term success in safety performance, leadership engagement with senior managers are very crucial (Shang et al., 2011). As for 5S implementation, previous research by Ablanedo-Rosas et al. (2010) have concluded that obtaining the commitment from top management will help the workforce to face the challenges.

Employee involvement has a medium positive correlation with safety management performance ($r = 0.316$). Like top management commitment, employee involvement is also considered as one of the biggest success factors for any type of improvement effort (Lilis, 2018; Al Manei et al., 2017; Kheng & Lilis, 2017; Hong et al., 2011). If the leaders successfully gather the staff to work towards achieving 5S objectives, the staff will also work hard to improve the performance of safety management.

The medium negative correlation ($r = -0.318$) obtained between compliance with OSH requirements and safety management performance has proven that the awareness of OSH among the staff in the university is quite low. Negative correlation between the two (2) variables indicated that one (1) variable increases as the other decreases, and vice versa. There is strong evidence that supported 5S practice as an effective technique that can improve housekeeping, environmental performance, as well as safety standards in a systematic way (O'heocha, 2000). Therefore, this situation needs to be investigated further in future studies as compliance with OSH requirements is predicted to have a positive relationship with safety management performance.

6.0 CONCLUSION

5S is proven as an effective method to create a conducive workplace thus improving an organizations' efficiency, effectiveness, productivity and safety. Improving safety and health of the workers is usually not the main aim of 5S implementation in most organizations. However, various studies conducted on 5S implementation have shown the positive relationship between 5S practice and safety management performance. The findings that are presented in this study suggest that staff optimism towards the implementation of 5S in the workplace has established significant positive correlations between 5S practice and safety management performance. Despite the findings, it would be fruitful to pursue further research on identifying the significant relationship between 5S practice and safety management performance in different environments especially in the manufacturing industry where 5S is commonly being practiced. Future studies may also focus on the significant critical factors in 5S as the variables that affect the performance of safety management in organizations.

REFERENCES

- Ablanedo-Rosas, J.H., Alidaee, B., Moreno, J.C., & Urbina, J. (2010). Quality improvement supported by the 5S, an empirical case study of Mexican organizations. *International Journal of Production Research*, 48 (23), 7063-7087.
- AlManei, M., Saloniitis, K., Xu, Y. (2017). *Lean Implementation Frameworks: the challenges for SMEs*. The 50th CIRP Conference on Manufacturing Systems. 750 – 755.
- Amiruddin, A.A., Mohd Esa, B., Muhammad Syaidan, A., Nik Fadhilah, N.H., Norsyahidah, M.Y. (2015). An Initial Study on Accident Rate in the Workplace through Occupational Safety. *International Journal of Business and Social Science*. 6 (2), 249-255.
- Ansari, A. & Modarress, B. (1997). World-class strategies for safety: a Boeing approach. *International Journal of Operations & Production Management*, 17 (4), 389-398.
- Bayo-Moriones, A., Bello-Pintado, A., & Cerio, M-D. (2010). 5S use in manufacturing plants: contextual factors and impact on operating performance. *Internal Journal of Quality & Reliability Management*, 27(2), 217-230.
- Cherry, K. (2018, March 16). Surveys and When to Use One. Retrieved from <https://www.verywellmind.com/what-is-a-survey-2795787>.
- Cohen, J. (1977). *Statistical Power Analysis for Behavioral Sciences*. New York: Academic Press.
- Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education*. London: Routledge.
- Davies, J.A. (1971). *Elementary Survey Analysis*. New Jersey: Prentice Hall.
- Fernández-Muñiz, B., Montes-Peón, J.M., & Vázquez-Ordáz, C.J. (2008). Relation between occupational safety management and firm performance. *Safety Science*, 47, 980-991.
- Gapp, R., Fisher, R., & Kobayashi, K. (2008). Implementing 5S within a Japanese context: an integrated management system. *Management Decision*, 46 (4), 565-579.
- Ghodrati, A. & Zulkifli, N. (2012). A review on 5S implementation in industrial in industrial and business organizations. *IOSR Journal of Business and Management*, 5 (3), 11-13.
- Grover, J. (2012, June 26). 5S Workplaces: When Safety and Lean Meet. Retrieved from <https://www.ehstoday.com/safety/5s-workplaces-when-safety-and-lean-meet>.
- Harea, C. V., Marian, L., Moica, S., & Al-Akel, K. (2018). Case study concerning 5S method impact in an automotive company. *Procedia Manufacturing*, 22, 900-905.
- Ho, S.K.M. (1999b). The 5S auditing. *Managerial Auditing Journal*, 14(6), 294-301.
- Hong, K.T., Lilis, S., Daisy, K. (2011). Safety Management Practices and Safety Behaviour: A Preliminary Investigation in Malaysian Small and Medium Enterprises in Northern Corridor Economic Region (NCER). *Journal of Occupational Safety and Health*. 8 (1), 1-11.
- Johana, Y., Norafiza, M.H., Lizawati, A., Norhaslina, J., Wan Nur Syazwani, W.M., & Nurul Shima, T. (2014). *The sustainability of QE/5S implementation in an administration office of a higher education institution*. 18th International Conference on SIO & TQM. Sarawak, Malaysia.
- Kheng, K.L., Lilis, S. (2018). Safety Capital and Safety Participation of OSHMS in Malaysian Manufacturing Companies: The Mediation Effect of Safety Teamwork. *PERINTIS eJournal*. 8 (1), 10-24.
- Kheng, K.L., Lilis, S. (2017). The Strategic Role of of Safety Advice towards Safety Participation in OSHMS in Malaysian Manufacturing Firms. *Journal of Occupational Safety and Health*. 14 (2), 23-32.
- Landy, F. & Conte, J. (2009). *Work in the 21st Century: An Introduction to Industrial and Organizational Psychology* (3rd ed.). Wiley-Blackwell.
- Lee, L.T. (2010). Improving OSH in the SMI: A Malaysian Experience. Retrieved from www.aposho.org/conference/img/90_Session5.doc.
- Liu, X., Huang, G., Huang, H., Wang, S., Xiao, Y., Chen, W. (2015). Safety climate, safety behavior, and worker injuries in the Chinese manufacturing industry. *Safety Science*. 78, 173-178
- Mohammadfam, I., Kamalinia, M., Momeni, M., Golmohammadi, R., Hamidi, Y., Soltanian, A. (2017). Evaluation of the Quality of Occupational Health and Safety Management Systems Based on Key Performance Indicators in Certified Organizations. *Safety and Health at Work*. 8 (2), 156-161.
- Mohd Nizam, A. R., Nor Kamaliana, K., Rosmaizura, M.Z., Baba, M.D., & Wan Hasrulnizzam, W/M. (2010) Implementation of 5S Practices in the Manufacturing Companies: A Case Study. *American Journal of Applied Sciences*, 7 (8), 1182-1189.
- Nahm, A.Y, Lauver, K.J., & Keyes, J.P. (2012). The role of workers' trust and perceived benefits in lean implementation success. *International Journal of Business Excellence*, 5 (5), 463-484.
- Norhafizah, Y, Shamsul, B.M.T., Guan, N.Y., How, V., Rozanah, A.R., Haroun, Z., Dayana, M.S.N.H. (2018). The Effectiveness of the Occupational Safety and Health Master Plan 2015 (OSH-MP 15) in Enhancing Government Leadership and Preventive Workplace. *Malaysian Journal of Medicine and Health Sciences*, 14(2), 57-66.
- O'heocha, M. (2000). A study of the influence of company culture, communications and employee attitudes on the use of 5Ss for environmental management at Cooke Brothers Ltd. *The TQM Magazine*, 12 (5), 321-330.
- OSHMP 2020 (Occupational Safety and Health Master Plan 2016-2020). Department of Occupational Safety and Health, Ministry of Human Resources, Malaysia. Retrieved from <http://www.dosh.gov.my/index.php/en/list-of-documents/new-resources/2873-occupational-safety-and-health-master-plan-2016-2020/file>
- Oyan, T. (2000). Putting optimism into your safety program. *Occupational Hazards*, 62(91), 66-69.
- Pasale, R.A., & Bagi, J.S. (2013). 5S Strategy for productivity improvement: a case study. *PARIPEX-Indian Journal of Research*, 2(8), 1182-1189.
- Ramesh, N., & Ravi, A. (2016). 5S route for safety management. *International Journal of Business Excellence*, 10 (3), 283-300.
- Randhawa, J.S., & Ahuja, I.S. (2017). Evaluating impact of 5S implementation on business performance. *International Journal of Productivity and Performance Management*, 66 (7), 948-978.
- Sekaran, U. (2000). *Research methods for business: A skill building approach* (3rd ed.). USA: John Wiley & Sons Inc.
- Shang, K-C., Yang, C-S., & Lu, C-S. (2011). The effect of safety management on perceived safety performance in container stevedoring operations. *International Journal of Shipping and Transport Logistics*, 3 (3), 323-341
- Surienty, L. (2018). *OSH Implementation in SMEs in Malaysia: The Role of Management Practices and Legislation*. Proceedings of the 20th Congress of the International Ergonomics Association (IEA 2018), 650-671.