5S Lean Tool, Value Stream Mapping and Warehouse Performance: Conceptual Framework

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***Abstract*— This study propose the conceptual framework the relationship between 5S lean tool, value stream mapping (VSM) and warehouse performance (WP) among Malaysian manufacturing industry. The data collected will be analyzed using two packages statistical software. The Statistical Package for Social Sciences (SPSS) software will be employed to analyze the reliability test and descriptive analysis. The Structural Equation Modeling (SEM) technique will also be employed in future study using AMOS software to investigate the relationship between the developed conceptual frameworks through the path analysis by the SEM approach. Thus, the implication of this study is seen as important and useful in increasing knowledge, propose dimensions, and propose conceptual framework for 5S lean tool and VSM are initiatives to improve WP among Malaysian manufacturing industry. Finally, it can be provided as a guideline and reference for the manufacturing practitioners and academicians**

***Keywords*—** *5S lean tool, value stream mapping, warehouse performance, manufacturing industry, Malaysia*

1. Introduction

The manufacturing industry activities are significantly contributed towards the economy including developing countries and manufacturing industries play a main role in the global economy [1]. The Malaysian manufacturing industry contributes 24.90% to the gross domestic product [2]. This shows that the manufacturing industry is one of the main sectors in accelerating the development of the nation. Besides, the manufacturing activities will lead to the reduction of wastes, costs, energy, and errors in warehousing management [3, 4] Therefore, the implementation of 5S lean tool is important to improve the warehouse management, particularly among Malaysian manufacturing industry.

Additionally, this study also proposed to include Value Stream Mapping (VSM) as the mediating variable. VSM is another concept of lean that are able to visualize the flow of material and information in a process and it is a concept commonly used for industrial improvements [4]. It can be used to identify where value is added to the product and when wastes occur. However, this study should be noted that a few of studies used case studies to discuss the implementation of VSM in different sectors [5]. There is a lack of studies which determine the implementation of VSM in different sectors. Thus, to fill the literature gap of lean in warehouse this study will focus on the relationship of 5S lean tool, VSM and WP among Malaysian manufacturing industry.

Lastly, Warehouse Performance (WP) is measure used to assess the performance among Malaysian manufacturing industry. This construct involve two dimension which are, financial performance and non-financial performance in order to evaluate warehouse operational in term of waste reduction and cost reduction. The objective of this research is to propose the relationship between 5S lean tool, VSM and WP among Malaysian manufacturing industry.

2. Literature Review

The following section will discuss literature review based on the hypothesis of the study:

2.1 Hypothesis 1: The relationship between 5S lean tool and WP

The 5S lean concept are originated from Japan and the original purpose is to make workplace orderly to improve safe, efficiency, and reduce product defect rate [6]. Case study in United States has proven than 5S lean tool are able to discarding the unnecessary inventory and setting in warehouse management [7]. This ensures easier access,

reduces wasteful activities in warehouse in manufacturing industry and can help to improve WP. Study showed that 5S lean tool is rather instant and tangible in management [8]. It is not only help warehouse to organizing work environment and standardizes workflow, but it also assigns clear ownership of specific task or process to each employee. From inception, 5S lean tool is practices that collectively work to reduce waste and costs. Specifically, simultaneous implementation of 5S Lean tool carries greater performance benefits, in terms of WP.

2.2 Hypothesis 2: The relationship between 5S lean tool and VSM

5S lean tool and VSM are closely related to lean approach. Study by [7] highlight that by implication, 5S lean tool can be extended to and sustained by visually managing the results of the performance towards the goal. This suggests that 5S Lean tool affects VSM in assisting the company to identify organizational management. As 5S lean tool are needed to provide the information of warehouse for VSM [9]. The 5S Lean tool can enhance visual management of warehouse [10]. Therefore, 5S lean tool can improve with VSM to lead to better competitive advantage than the direct effect as 5S lean tool are associated with VSM to increase the performance. The adoption of 5S lean tool dimension provides positive on VSM with value stream to remove non-value stream and improve WP. Thus, 5S lean tool is to establish and improve VSM for a positive relationship with WP.

2.3 Hypothesis 3: The relationship between VSM and WP

VSM provides the impact on value stream of warehousing aspects in order to enhance the performance. [11] highlighted that the uniqueness of the application of VSM, improve the performance. For instance, VSM provides benefits to assist companies in accordance with value stream [12]. By adopting VSM and WP, the companies have possibility of increasing value added process and thus improve the quality of management.

Study by [10] highlight that by implication, VSM can be extended to and sustained by visually managing the results of the performance towards the goal. This suggests that VSM in assisting the company to identify organizational management. As VSM are needed to provide the information of WP. VSM can enhance visual management of warehouse. Therefore, VSM and WP can lead to better competitive advantage to increase the performance. The adoption of VSM provides positive with value stream to remove non-value stream and improve WP.

2.4 The relationship between 5S lean tool, VSM and WP

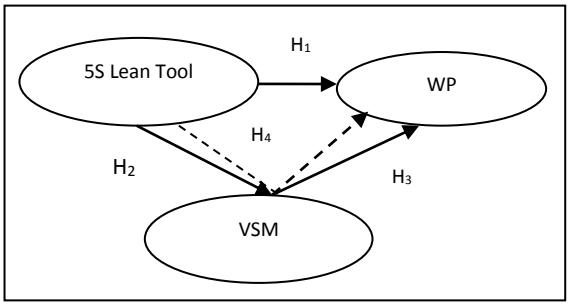
5S lean tool and VSM have improved WP through various strategies, initiatives, and opportunities to the industry [13]. 5S lean tool and VSM can contribute positively towards minimize waste; add value and natural opportunities for the integration of lean [9]. However, there is a lack of studies on the implementation of 5S lean tool, VSM, and WP among Malaysian manufacturing industry. Hence, in order to succeed and sustain 5S lean tool and WP, the industry needs to implement VSM among Malaysian manufacturing industry. Based on this statement, the relationship between 5S lean tool, VSM and WP is proposed by researcher.

3. Methodology

For this phase the research activity is compile the literature and background of study to answer the research questions, propose dimensions and propose conceptual framework for 5S lean tool lean tool and WP. For future research, the full survey will employed questionnaire survey and population focused on Malaysian manufacturing industry. The population comprised 2,700 manufacturing companies from Federation of Malaysian Manufacturers Directory. The data collected will be analyzed using two packages statistical software. The Statistical Package for Social Sciences (SPSS) software will be employed to analyze the descriptive analysis (frequency and percentage), EFA analysis, and reliability test [14, 15, 16]. The Structural Equation Modeling (SEM) technique will also be employed in future study using AMOS software to investigate the relationship between the developed conceptual frameworks through the path analysis by the SEM approach [17, 18, 19, 20, 21].

4. Conceptual Framework

The research model aims to analyze the relationship between 5S lean tool, VSM and WP among Malaysian manufacturing industry. The proposed conceptual framework as presented in Figure 1.



*Notes: VSM= Value Stream Mapping, WP= Warehouse Performance, H_1, H_2, H_3, H_4

Figure 1. The proposed conceptual framework

From the above proposed conceptual framework, this study has two independent variable which is 5S lean tool (Sort (*Seiri*), Set (*Seiton*), Shine (*Seiso*), Standardize (*Seiketsu*), and Sustain (*Shitsuke*)); VSM (current state map and future state map) and one dependent variable of WP (financial performance and non-financial performance).

5. Conclusions

This research studies the relationship between the implementation of 5S lean tool, VSM and WP among Malaysian manufacturing industry and proposes a conceptual framework. The implementation of 5S lean tool and VSM might contribute to the improvement of WP of the manufacturing industry in Malaysia by reducing in waste, improve operational procedure with 5S lean tool and VSM. This study also provides new perspective to the warehouse development of 5S lean tool and VSM initiative in different ways by using continuous improvement and contributed to the development of conceptual framework of 5S lean tool, VSM and WP.

Thus, the implication of this study is seen as important and useful in increasing knowledge, propose dimensions, and propose conceptual framework for 5S lean tool and VSM are initiatives to improve WP among Malaysian manufacturing industry. Finally, it can be provided as a guideline and reference for the manufacturing practitioners and academicians.

Acknowledgments

The researchers would like to acknowledge Research Management and Innovation Centre (RMIC), Universiti Pendidikan Sultan Idris (UPSI) for Research University Grant (RUG).

References

[1] Fuzi, N.M., Habidin, N.F., Janudin, S.E., Ong, S.Y.Y., "*Environmental management accounting practices and environmental performance for Malaysian manufacturing industry*", International Journal of Academic Research in Business and Social Sciences, Vol. 6, No. 11, pp. 135-141, 2016.

[2] Abdul-Rashid, S.H., Sakundarini, N., Ghazilla, R.A.R., Thurasamy, R., "*The impact of sustainable manufacturing practices on sustainability performance: Empirical evidence from Malaysia*," International Journal of Operations & Production Management, Vol. 37, No. 2, pp. 82-204, 2017.

[3] Adebanjo, D., Teh, P., Ahmed, P.K., "*The impact of external pressure and sustainable management practices on manufacturing performance and environmental outcomes*", International Journal of Operations & Production Management, Vol. 36, No. 9, pp. 995-1013, 2016.

[4] Randhawa, J.S., Ahuja, I.S., "*An investigation into manufacturing performance achievements accrued by Indian manufacturing organization through strategic 5S practices*", International Journal of Productivity and Performance Management, Vol. 67, No. 4, pp. 754-787, 2018.

[5] Wessman, I., Bärring, M., "*Analysing the current state of a warehouse"*, Master thesis, Lund University, Italy, 2014.

[6] Shou, W., Wang, J., Wu, P., Wang, X., Chong, H., "*A cross-sector review on the use of value stream mapping*", International Journal of Production Research, Vol. 55, No.13, pp. 3906-3928, 2017.

[7] Aziz, A.R.A., Nishazini, M.B., Fareza, Azizan, N.A., "*Survey to see the impact of 5S implementation among staff of KPJ Seremban specialist hospital Malaysia*", IOSR Journal of Business and Management, Vol. 16, No.3, pp. 82-96, 2014.

[8] Gergova, I., "*Warehouse improvement with lean 5S: A case study of Ulstein Verft AS*," Journal of Business Strategy, Vol. 29, No.1, pp. 40-45, 2010.

[9] Srinivasan, S., Ikuma, L. H., Shakouri, M., Nahmens, I., Harvey, C., "*5S impact on safety climate of manufacturing workers*", Journal of Manufacturing Technology Management, Vol. 27, No. 3, pp. 364-378, 2016.

[10] Pai, P.M., "*An analysis of the integration of lean and safety*", Master thesis, Missouri University of Science and Technology, United States, 2010.

[11] Mustafa, M.S., "*A theoretical model of lean warehousing*", PhD thesis, Politecnico di Torino, Italy, 2015.

[12] Suarez-Barraza, M.F., Miguel-Davila, J., Vasquez-García, F., "*Supply chain value stream mapping: A new tool of operation*

management", International Journal of Quality & Reliability Management, Vol. 33, No. 4, pp. 518-534, 2016.

[13] Kembro, J.H., Danielsson, V., Smajli, G., "*Network video technology: Exploring an innovative approach to improving warehouse operations*", International Journal of Physical Distribution & Logistics Management, Vol. 47, No. 7, pp. 623-645, 2017.

[14] Lei, P., Wu, Q., "*Introduction to structural equation modeling: Issues and practical considerations*", Educational Measurement: Issues and Practice, Vol. 1, No. 1, pp. 33-43, 2007.

[15] Fuzi, N.M., Habidin, N.F., Hibadullah, S.N., Ong, S.Y.Y., "*CSR practices, ISO 26000 and performance among Malaysian automotive suppliers*", Social Responsibility Journal, Vol. 13, No. 1, pp. 203-220, 2017.

[16] Habidin, N.F., Hashim, S., Fuzi, N.M., Salleh, M.I., "*Total productive maintenance, kaizen event, and performance*", International Journal of Quality & Reliability Management, Vol. 35, No. 9, pp. 1853-1867, 2018.

[17] Fuzi, N.M., Habidin, N.F., Desa, A.F.N.C., Zamri, F.I.M., Hibadullah, S.N., "*Corporate social responsibility practices, ISO 26000 efforts and CSR performance in Malaysian automotive industry*", International Journal of Managerial and Financial Accounting, Vol. 5, No. 3, pp. 277-293, 2013.

[18] Habidin, N.F., Fuzi, N.M., Zamri, F.I.M., Hibadullah, S.N., Desa. A.F.N.C., "*ISO 26000 efforts and corporate social responsibility performance in Malaysian automotive industry*", International Journal of Business Excellence, Vol. 7, No. 4, pp. 515-529, 2014.

[19] Koubaa, Y., Tabbane, R.S., Jallouli, R.C., "*On the use of structural equation modeling in marketing image research*", Asia Pacific Journal of Marketing and Logistics, Vol. 26, No. 2, pp. 315-338, 2014.

[20] Habidin, N.F., Yusof, S.M., Fuzi, N.M., "*Lean six sigma, strategic control systems, and organizational performance for automotive suppliers",* International Journal of Lean Six Sigma, Vol. 7, No. 2, pp. 110-135, 2016.

[21] Fuzi, N.M., Habidin, N.F., Ong, S.Y.Y., "*Corporate social responsibility practices in Malaysian automotive suppliers: Confirmatory factor analysis*", International Journal of Business Excellence, Vol. 15, No. 2, pp. 222–238, 2018.