THE STRUCTURAL RELATIONSHIP BETWEEN 5S LEAN TOOL, VALUE STREAM MAPPING, AND WAREHOUSE PERFORMANCE AMONG MALAYSIAN MANUFACTURING INDUSTRY

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ABSTRACT

The objective of this study is to determine the relationship between 5S lean tool and Value Stream Mapping (VSM) towards Warehouse Performance (WP) among Malaysian manufacturing industry. A total of 378 responses were received by using the online survey with response rate of 15.55%. This study used structural equation modeling technique. The results showed the positive and significant direct effect between 5S lean tool and WP ((H1=0.628, p<0.001), 5S lean tool and VSM (H2=0.614, p<0.001), VSM and WP (H3=0.269, p<0.05) and lastly the indirect effect of VSM (0.165) with p (0.022) <0.05) in the relationship between 5S lean tool and WP. Therefore, VSM was partially mediated the relationship between 5S lean tool and WP (direct effect= 0.628, p<0.001, indirect effect=0.165 with p (0.022) <0.05). In conclusion, there are positive and significant effect between 5S lean tool and WP, 5S lean tool and VSM, VSM and WP and mediating effect of VSM occurs between 5S lean tool and WP among Malaysian manufacturing industry. The findings showed that Malaysian manufacturing industry can implement 5S lean tool and VSM, and this lead to enhance their WP. Thus, the findings are important and useful in increasing knowledge to determine 5S lean tool and VSM on WP among Malaysian manufacturing industry. The implication of this study is useful to make important decisions concerning the 5S lean tool, VSM, and WP in the Malaysian manufacturing industry

HUBUNGAN STRUKTUR ANTARA ALAT LEAN 5S, *VALUE STREAM MAPPING* DAN PRESTASI PERGUDANGAN DALAM KALANGAN INDUSTRI PEMBUATAN DI MALAYSIA

ABSTRAK

Objektif kajian ini adalah untuk menentukan hubungan antara alat lean 5S dan *Value Stream Mapping* (VSM) ke atas prestasi pergudangan (WP) dalam kalangan industri pembuatan di Malaysia. Sejumlah 378 responden telah diterima menggunakan soal selidik atas talian dengan kadar maklum balas sebanyak 15.55%. Kajian ini menggunakan teknik struktur persamaan model. Hasil kajian menunjukkan kesan langsung positif dan signifikan antara alat lean 5S dan WP (H1 = 0.628, p <0.001), alat lean 5S dan VSM (H2 = 0.614, p <0.001), VSM dan WP (H3 = 0.269, p <0.05) dan terakhir kesan tidak langsung VSM (0.165) dengan p (0.022) <0.05) dalam hubungan antara alat lean 5S dan WP. Oleh itu, VSM kesan separa pengantara hubungan antara alat lean 5S dan WP (kesan langsung = 0.628, p <0.001, kesan tidak langsung = 0.165 dengan p (0.022) <0.05). Kesimpulannya, terdapat kesan positif dan signifikan antara alat lean 5S dan WP, alat lean 5S dan VSM, VSM dan WP dan kesan pengantara VSM berlaku antara alat lean 5S dan WP di kalangan industri pembuatan Malaysia. Oleh itu, dapatan kajian ini penting dan berguna dalam meningkatkan pengetahuan untuk menentukan alat lean 5S dan VSM ke atas WP dalam kalangan industri pembuatan di Malaysia. Implikasi kajian ini berguna untuk membuat keputusan penting mengenai alat lean 5S, VSM, dan WP dalam industri pembuatan Malaysia.

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LIST OF ABBREVIATIONS

AGFI	Adjusted Goodness-of-fit
AMOS	Analysis of Moment Structures
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CSM	Current State Map
EFA	Exploratory Factor Analysis
FP	Financial Performance
FSM	Future State Map
GFI	Goodness-of-fit
NFP	Non-Financial Performance
RMSEA	Root Mean Square Error of Approximation
SD	Standardize
SEM	Structural Equation Modelling
SH	Shine
SO	Sort
SPSS	Statistical Package for Social Sciences
ST	Straighten
SU	Sustain
TLI	Tucker-Lewis
VSM	Value Stream Mapping
WP	Warehouse Performance

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

This study pays special attention to manufacturing industries in Malaysia because manufacturing industry and its activities contributes significantly towards the economy. Manufacturing industries contributes greatly in terms of producing goods and providing employments opportunities for the nation, provides opportunities for general and specific industrial training and becomes a significant platform for actual case studies by researchers in finding new knowledge, best practices and better technology. Developing countries and manufacturing countries both play important roles in the global economy. The Malaysian manufacturing industry contributes 24.90% to the gross domestic product (Abdul-Rashid, Sakundarini, Ghazilla, & Thurasamy, 2017). This shows that manufacturing industries are among the main sectors that accelerate the development of a nation. The activities of manufacturing

industries have great impact on a nation wealth and well being. Good management and practices in manufacturing activities will help companies to increase its ability in improving product value to customers, improve productivity and quality, reducing cost, improving deliveries, improve safety aspects, increase process flexibility, innovation and moral of the staffs. Manufacturing activities also need to focus on adding values to the products while reducing waste. Careful handling of manufacturing activities will lead to reduction of waste, costs, energy, and errors in warehouse management (Adebanjo, Teh, & Ahmed, 2016; Zahraee, 2016; Randhawa & Ahuja, 2018).

In today's globalization era, companies not only need to survive but thrive in today's very competitive environment. All related costs and expenses involved in producing and delivery the products have to be reviewed carefully and wastes have to be avoided or curtailed. In this study, the author pays attention to the warehouse management because warehouse plays a vital role in the overall supply chain process for products. The author looks deeper into factors that affecting the operations of a warehouse which leads to high performance in term of financial and non-financial aspects. Therefore, the implementation of 5S Lean Tool is important to improve the overall warehouse performance, particularly among manufacturing industries in Malaysia.

In this study, 5S Lean Tool and VSM is proposed for implementation in order to improve the visibility (visualization) in Warehouse daily activities, improve flow of materials, material handling equipment and documentation, improve

workplace organization, and create standardization of the processes while reducing wastes.

The concept of 5S Lean Tool refers to five processes for achievement of standardization, effective organization, and continuous improvement among companies in Malaysian manufacturing industries. It comes from the Japanese words of seiri, seiton, seiso, seiketsu, and shitsuke for sort, strengthen, shine, standardize, and sustain (Young, 2014). Based on the study by Mustafa (2015), 5S Lean Tool are able to eliminate many forms of waste, create and enhance visual management, and can reduce potential for errors in warehouse management. 5S contains five words originating from Japanese which have been translated as sort, set in order, shine, standardize, and sustain. The 5S management method has been recognized as a potential solution for quality improvements in health-care services industry (Kanamori et al, 2015). 5S Lean in the context of manufacturing is therefore the process of creating an environment where quality work is comfortable, clean and safe in the organization which can ensure the compliance to standards and will further foster the process of continuous improvement (San et al, 2018). Thus, 5S Lean Tool is chosen as an adequate tool for warehouse improvement among companies in manufacturing industry in Malaysia.

In particular, this study also proposes to include the Value Stream Mapping (VSM) as the mediating variable. VSM is the other concept of Lean approach that enables users to visualize the flow of material and information in a process and it is a concept commonly used for industrial improvements (Wessman & Barring, 2014). It can be used to identify where value is added to the product and when wastes occur.

Dharmapriya and Kulatunga (2011) also mentioned that VSM can potentially be applied to warehouse management. However, study by Wessman and Bärring (2014) mentioned that it is important to understand waste in order to interpret the VSM. Hence, VSM is chosen as a mediating variable.

Next, Warehouse Performance (WP) is a measure used to determine the performance among companies in Malaysian manufacturing industry. This involves two dimensions which are, financial performance and non-financial performance. They are used to evaluate warehouse operations' effectiveness and efficiencies especially in terms of waste reduction which leads to cost reduction and improving warehouse processing time. This study aims to determine the relationship of 5S Lean Tool, VSM and WP among companies in Malaysian manufacturing industry.

Warehouses are used to keep goods which are stored at various sections. Fast moving goods, moderate moving goods, slow moving goods, seasonal and off seasonal goods, expensive and cheap in value, temperature controlled, non-temperature controlled, and fresh items, all come with various handling activities and conditions, making it vital for operatives to manage its warehouses carefully in order to avoid wastes or non-value added activities. The warehouse is a storage system that supports its functionality efficiency and smooth operation of logistics operations providing materials and supplies in a timely and cost-effective manner. Objectives for warehousing include the following (Warehousing and Distribution Operating Directions 2009; Tostar and Karlsson 2008):

i. Maximize the use of warehouse storage, warehouse equipment and warehouse staff.

ii. Define and maintain Stock Inventory. Maintain Unit (SKU) so that it can provide demand for commodity quantity supplied by the user Maintaining inventory of critical SKUs to zero the second level does not occur.

iii. Reduce the operation of the SKU, maintain access to the SKU, and maintain the planned SKU turn or switch.

iv. Reduce company operating expenses. The cost of logistics contributes to the cost of production. Be nodding to distribution activities, this also applies to warehouses. Therefore, optimizing their performance is an important element of each company's cost structure.

As stated by Lakmal and Wickramarachchi (2011), lack of warehouse management techniques and knowledge will be resulting to huge warehouse related costs as it is difficult to specify any of the areas for special attention in avoiding waste. Other than that, operating warehouses may involve too many decision makers which make warehouse management rather complex to deal with (Manzini, 2012). Therefore, the prevailing situation requests for advanced ways to help in reducing wastes and improve WP. The focus should be on operating in optimal cost, high process speed, high inventory accuracy and less errors. Adequate care should be taken to develop and select the most efficient techniques and apply the most suitable practices.

Warehouse is one of the main components in supply chain. It is believed that warehouse management plays a significant role in the success and failure of a modern

supply chains. This is because warehouse management has significant effect on organization service levels, response times and operational costs (Gergova, 2010; Bozer, 2012). Function as a transformer, warehouse management involves in receiving, storing, cross-docking, and distributing goods to retailers and consumers (Constantino, Dotoli, Falagario, Fanti, & Mangini, 2012). Due to high competition in the industry, the success of a product in the market depends on the total supply chain profitability, total supply chain speed or response time, good design of supply chain network and warehouse constitutes one of its main elements. Warehouse management plays an important part so that products either raw materials or finished goods can be delivered on-time and in full to the distributors, retailers and consumers at a very minimal operational cost. Thus, this study focuses on the application of 5S Lean Tool, VSM, and WP, particularly among Malaysian manufacturing industry.

Lean refers to the elimination of waste. In manufacturing lean refers to the philosophy of continuously eliminate waste in the manufacturing processes (Holloway and Hall, 1997). Management structure and manufacturing technical structure are required to facilitate identifying wastes in manufacturing processes. It includes 'lean thinking' which represents principles and techniques to identify such wastes in admisistrative processes as well (San et al, 2017). San et al (2018) further mentioned that despite implementing lean manufacturing, many industries fail to bring their manufacturing organisations to world class standard due to lack of knowledge to include other best practices. One of these practices is 5S.

1.2 Problem Statement

According to Dotoli, Petruzzelli, and Turchiano (2012), the available literature on production warehouse design does not typically consider the problem of warehouse design in a continuous improvement context. Most of the literature are focusing on contributions to warehouse design decisions, analytical models, benchmarking, case studies, and other surveys. With the increased customer demand, there is a need of improved warehouse operations, however, they are considered to be both costly and time consuming (Bartholdi & Hackman, 2010; Constantino et al., 2012). For this reason, most of the organizations are trying to limit warehouse costs by restraining resources instead of applying new ways in warehouse management which are costlier to them (Manzini, 2012). This has urged researchers to venture into new alternatives of evaluating processes and helping to reduce wastes and warehouse costs and finally increase productivity.

One of the popular concepts that has been widely used for improvements in the manufacturing sector over the last ten years is Lean. It is known as an approach for industrial improvements that originates from the Toyota production system by eliminating the wastes. Based on the study from Habidin (2012), Lean is a multi-dimensional approach which combines several management practices into a smooth system that generates products that meet customer demand by reducing operational costs and limiting wastes. Though this concept has been extensively used in the manufacturing sectors, its application in warehouse management is still lagging behind (Bartholomew, 2008; Wessman & Barring, 2014). Thus, to fill the literature

gap of lean application in warehouses, this study will focus on the relationship of 5S Lean Tool, VSM and WP among companies in Malaysian manufacturing industry.

Dotoli, Epicoco, Falagario, and Constantino (2013) suggest that the Lean principles can be used to manage warehouses more efficiently. In this study, 5S Lean Tool will be employed to determine the relationship of the research framework and WP. One practical example of 5S Lean Tool is the case study of Ulstein Verft AS in United States (Gergova, 2010). The case study implies that the 5S approach has improved the efficiency of warehouse operation. However, the study states some limitations in 5S Lean Tool and suggests that future researchers to include other tools to detect changes for future application.

Hence, in this study VSM is included as a mediating variable. Likewise, the identified gaps in the literature show that there is an opportunity to investigate how VSM is applicable to warehouse management. However, this study is taking note that a few of researches used case studies to discuss the implementation of VSM in different sectors (Shou, Wang, Wu, Wang, & Chong, 2017). There is a lack of research to study and determine the implementation of VSM in different sectors. Mustafa, Cagliano, and Rafele (2013) suggested that a combination of 5S Lean Tool and VSM might be the best approach to help warehouse operation management. This is because the study shows that 5S Lean Tool is efficient in eliminating waste and VSM can be used to visualize the flow of material and information in a process. Hence, this will help managers, operatives and decision makers in identifying wastes in processing steps more clearly and take appropriate actions when needs arise.

Moreover, Joosten, Bongers, and Janssen (2009) imply that standard organizing tools like VSM and 5S are available to create new positive values. Considering the possibility of VSM application; it is therefore included in the analysis to determine the mediating effect between the relationship of 5S Lean Tool and WP. Therefore, the aim of this study is to investigate the mediating effect of VSM towards the relationship between 5S Lean Tool and WP among companies in Malaysian manufacturing industry.

1.3 Research Objectives

The objective of this research is to determine the relationship between 5S lean tool and VSM towards WP among Malaysian manufacturing industry. The objectives of the research are listed below:

1. To determine the relationship between 5S lean tool and WP among Malaysian manufacturing industry;
2. To determine the relationship between 5S lean tool and VSM among Malaysian manufacturing industry;
3. To determine the relationship between VSM and WP among Malaysian manufacturing industry; and
4. To investigate the mediating effect of VSM towards the relationship between 5S lean tool and WP among Malaysian manufacturing industry.

1.4 Research Questions

Four research questions to be addressed during this research are:

1. Is there a relationship between 5S Lean Tool and WP among companies in Malaysian manufacturing industry?

2. Is there a relationship between 5S Lean Tool and VSM among companies in Malaysian manufacturing industry?

3. Is there a relationship between VSM and WP among companies in Malaysian manufacturing industry?

4. Is there a mediating effect of VSM towards the relationship between 5S Lean Tool and WP among companies in Malaysian manufacturing industry?

1.5 Research Hypotheses

H1: There is a positive and significant relationship between 5S lean tool and WP among Malaysian manufacturing industry.

H2: There is a positive and significant relationship between 5S lean tool and VSM among Malaysian manufacturing industry.

H3: There is a positive and significant relationship between VSM and WP among Malaysian manufacturing industry.

H4: There is a mediating effect of VSM towards the relationship between 5S lean tool and WP among Malaysian manufacturing industry.

1.6 Conceptual Framework

To understand the relationship between 5S lean tool, VSM, and WP among Malaysian manufacturing industry, the following hypotheses (H1, H2, H3, and H4) are tested. The contingency theory and resource-based view (RBV) theory have been identified to underpin the proposed theoretical framework for this study The Figure 1.1 shows the research framework of 5S lean tool, VSM, and WP.

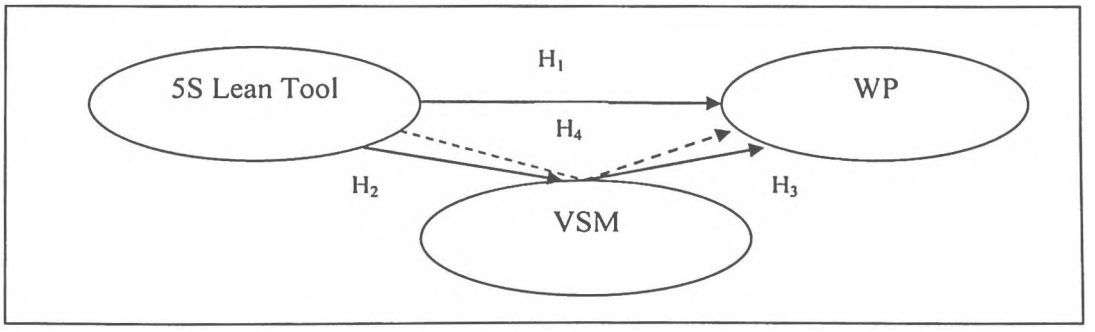

Figure 1.1. Research Framework

1.7 Significance of the Study

Several of the previous studies have been reviewed to explore the relationship between Lean tools (Joosten et al., 2009; Mustafa et al., 2013). This study has

important implications on 5S Lean Tool and how they help to improve WP among companies in Malaysian manufacturing industry. This study examines the contingency theory in terms of the relationship between 5S Lean Tool, VSM, and WP.

Theoretically, the significance of this study based on the empirical research is to determine the relationship between 5S Lean Tool and WP among companies in Malaysian manufacturing industry, to determine the relationship between 5S Lean Tool and VSM among companies in Malaysian manufacturing industry, to determine the relationship between VSM and WP among companies in Malaysian manufacturing industry, and to determine the mediating effect of VSM towards the relationship between 5S Lean Tool and WP among companies in Malaysian manufacturing industry. Thus, this study fills the research gap by providing useful references on the relationship between 5S Lean Tool, VSM, and WP among companies in Malaysian manufacturing industry.

Practically, the implementation of 5S Lean Tool and mediating effect of VSM may become a good business strategy to organizations, particularly among companies in Malaysian manufacturing industry. Manufacturing industry will be more competitive by the ability to reduce waste by Lean practices enrichment. This study also provides new perspectives to the innovation development of Lean initiatives in different ways by using continuous improvement in warehouse research.

Empirically, the result of this study is seen as important and useful in increasing knowledge to develop Lean initiatives as Lean issues are important in improving WP. The findings of this study may indicate the relationship between 5S Lean Tool and VSM towards WP among companies in Malaysian manufacturing

industry. With regard to this, the findings may assist the companies in Malaysian manufacturing industry achieve the objectives effectively and efficiently, paying regards to the relationship between 5S Lean Tool, VSM, and WP. Finally, it can be used as a guideline and reference for the manufacturing practitioners and academicians.

1.8 Scope and Limitation of the Study

In producing more efficient and streamlined research, the scope of this study will be focusing on two main areas as follow:

1. This research focuses on the relationship of 5S lean tool and VSM towards WP among Malaysian manufacturing industry; and
2. Target population and sample of survey respondents are only taken from companies in Malaysian manufacturing industry

1.9 Operational Definition

In this study, some specific definitions are used for a particular purpose. The operational definition of terms in this study are listed below:

1.9.1 5S Lean Tool

5S is one of the Lean tools that has been used to minimize or eliminate wastes. 5S refers to the abbreviation for sort (seiri), straighten (seiton), shine (seiso), standardize (seiketsu) and sustain (shitsuke) (Young, 2014). In the context of warehousing improvement, 5S Lean Tool is a tool that can help warehouse operatives in eliminating the non-value added activities which identified as waste, unnecessary costs and increasing process improvement system which is used to clean workplaces, and increase labor productivity

1.9.1.1 Sort

According to Srinivasan, Ikuma, Shakouri, Nahmens, and Harvey (2016), Sort is related to classifying items, keeping required items, and eliminating unnecessary items. Essential items are separated from non-essential items. Thus, this study identifies that Sort plays an important role in Warehouse in Malaysian manufacturing industry in order to reduce waste and improve Warehouse processes effectiveness and efficiencies.

1.9.1.2 Straighten

Straighten is also known as orderliness, set or set in order (Chinda, Tangkaravakun, & Wesadaphan, 2013). In warehouse, orderliness is very important and materials such as empty pallets, recycle racks and bins, angle bars, pallet plastic wrapping and the packaging materials need to have a proper arrangement. Hence, straighten as one of

the 5S Lean Tool dimension among companies in Malaysian manufacturing industry that been practiced.

1.9.1.3 Shine

Chinda et al. (2013) defined Shine as the cleaning up of the workplace. All trash should be removed all stocks must be kept in clean and out of dusts. The principles of this dimension include inspecting and cleaning the work environment to ensure safety and avoid injury. With regard to this, the Warehouse for companies in Malaysian manufacturing industry can use Shine dimension in 5S Lean Tool to take care of their work environment.

1.9.1.4 Standardize

Standardize refers to the standards by which organization must measure and maintain (Young, 2014). In applying standardize in warehousing, procedures for performing waste elimination tasks should be set up. Employees should be trained on a standard on what need to be cleaned up and until what level of the cleanliness depends on the criticality of the products storage requirements. Employees follow the standard which has been set under the 5S Lean tool practices as it can create a quality workplace with high standard of warehouses particularly for companies in Malaysian manufacturing industry.

1.9.1.5 Sustain

Sustain is having discipline in warehouse and keeping the 5S Lean Tool processes going (Gupta & Jain, 2015). All members of the organization need to perform the 5S in a consistent and organized basis. After the standard has been set, the employees need to maintain the standard and raise the bar from time to time. Several activities in Sustain need to be done in order to maintain the standard such as 5S Lean Tool audit and competition. Malaysian manufacturing companies always be able to sustain the quality of workplace by applying this 5S Lean Tool dimension consistently.

1.9.2 Value Stream Mapping (VSM)

Dotoli et al. (2013) stated that VSM is used to visualize the overall warehouse process and identify the non-value system in value stream. VSM is an activity done by employees to map their own daily processes that has been done and try to determine which process does not add value or so call wastes and which activities are really create value to the final products or services. In performing VSM, the current flow of activities in performing job is established and future proposal are created as well in order to minimize wastes. Time involve during each process also been taken in order to improve the total processing time by eliminating or curtailing the waiting time or idling time hiding in the process. In VSM these activities stated as Current State Map and Future State Map.

1.9.2.1 Current State Map

Vinodh, Selvaraj, Chintha, and Vimal (2015) stated that current state map refers to the baseline view of the existing process from which all improvements are measured. The initial step of current state map is to gather data that reflects the current status in the system, particularly among companies in Malaysian manufacturing industry. In this activity, the employees with the superior guidance, map their own process under their responsibility and chart using symbols and words. Time consumed in each activity is taken in order to identity waiting time and idling time. Time also been taken for each activity in order to identify any process bottleneck. Activities that associated with waste are highlighted for continuous improvement.

1.9.2.2 Future State Map

Future state map is a process mapping done after improving the current state map by identifying, curtailing and eliminating wastes. The concern is on the future state map with identification of the opportunities to design a more efficient and waste-free value stream (Vinodh et al., 2015). These improvements are incorporated, and future state map is constructed and the performance measures are estimated. Relationships between process involved in the warehouse that provide the service is interconnected with each other and the waiting time or idle time been eliminated or curtailed.

1.9.3 Warehouse Performance (WP)

Warehouse performance (WP) is a measure that helps to detect the inefficiencies in warehouse management (Gergova, 2010). Warehouse performance is very important to the organization as warehouse is the intermediaries that connect between manufacturers or suppliers to the production lines and internal or external customers. The goods from warehouse should reach its internal or external customers on-time and in-full as per customers' expectation. Efficient warehousing operations shows that the unnecessary processes is very important to be reduced in order to achieve higher efficiency in the warehouse services.

1.9.3.1 Financial Performance

Financial performance is a key aspect of performance and company growth (Akhtar & Fischer, 2014). This indicates that the term performance is closely related to performance, execution, achievement and fulfilment. Financial performance has broad meaning as it can also refer to the financial level of the warehouse or organization to achieve its stated objectives. Occasionally it is also used to measure the organization's ability to ensure that its policies, operations run smoothly and measure the overall finances of an organization whether it is stable or require improvement. In this study context, financial performance is an important gauge to determine the success of the companies in Malaysian manufacturing industry. Some of the key indicators of financial performance include total revenues earned, total costs incurred, total gross profit, total net profit and return on capital employed.

1.9.3.2 Non-Financial Performance

Non-financial performance is the performance achieved but not in terms of monetary. Hernaus, Bach, and Vuksic (2012) who stated that non-financial performance is significant to the organizations in terms of improving cycle-time, increasing customer satisfaction, employee satisfaction, and product quality. Customer dissatisfaction which comes from poor delivery such as not on time and not in full as per requested and overall it affect the organization and businesses. Job dissatisfaction create high employee turnover rates and unable to keep quality staff in the long run. Dissatisfaction among employees also can lead to goods mishandling, increase errors in transactions, low stocks balance accuracy, wrong product been picked and delivered, staffs intend to work under expectation, damages of goods and tracking system in warehouse increase as well as material handling equipment not been taken care and resulting to high maintenance. Therefore, Non-financial performance is important for a warehouse since it contribute to short term and long term warehouse operations performance.

1.10 Structure of the Thesis

Chapter One provides the background of the study about 5S Lean Tool, VSM, and WP among companies in Malaysian manufacturing industry. This chapter discusses briefly on the problem statement, research objectives, research questions, scope and limitation of the study, significance of the study, research framework, research

hypotheses, and operational definitions. Lastly, it provides the structure of the thesis and summary of this chapter.

Chapter Two provides the framework of contingency theory on the 5S Lean Tool, VSM, and WP. Overview of 5S Lean Tool, benefits of 5S Lean tool, 5S Lean Tool dimensions, overview of VSM, benefits of VSM, VSM dimensions, overview of WP, and WP dimensions formed part of the literature presented in this chapter. Chapter Two considers the development of the hypothesized structural model of this study, which links the relationship 5S Lean Tool, VSM, and WP among companies in Malaysian manufacturing industry. Finally, Chapter two discusses briefly the research hypotheses which are constructed based on the literature review.

Chapter Three includes an overview of the research methodology. This chapter focuses on the research design, survey development, questionnaire development, expert validation, pilot study, population and sampling, data analysis method, statistical analysis, reliability and validity, structural equation modeling, a proposed research model, and lastly a summary of the chapter.

Chapter Four focuses on the analysis and findings. The data collected from the questionnaires are analyzed and discussed with reference to the literature in Chapter two. The purpose of this chapter is to discuss the findings with regards to the hypothesis testing.

Chapter Five comprises discussions, limitations, and recommendations of the research. This chapter summarizes the thesis, the limitations while conducting the research, and finally makes recommendations on how the companies in Malaysian manufacturing industry can use and improve 5S Lean Tool and VSM in order to increase the WP of this industry.

1.11 Summary

This chapter introduces the background of the study, problem statement, research objectives and research questions, scope and limitation of the study, significance of the study, research framework, research hypotheses, operational definition, and structure of the thesis. This research is to determine the relationship between 5S Lean Tool and VSM towards WP among companies in Malaysian manufacturing industry. Furthermore, this study also fills the research gap by adding a reliable and useful source of literature in terms of 5S Lean Tool, VSM, and WP among companies in Malaysian manufacturing industry. In the next chapter, this study discussing the literature review for 5S Lean tool, VSM, and WP.