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ORIGINAL ARTICLE

THE IMPORTANCE OF LEAN KNOWLEDGE MANAGEMENT FOR A SUCCESSFUL LEAN MANAGEMENT IMPLEMENTATION IN THE MALAYSIAN PUBLIC SECTOR

Zarifa Zulkeflee[1]*, Gusman Nawanir[1], Airin Abdul Ghani[1], Norhana Aripin[1]

[1]Faculty of Industrial Management, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Gambang, Pahang, Malaysia

ABSTRACT – The Malaysian public sector has implemented many programs to enhance service performance. One of them is lean management. Since the 2000s, lean management has been popular among the public sector to improve service quality and reduce operating costs. However, adequate lean knowledge to strengthen lean implementation is essential. Therefore, the purpose of this study is to address the role of lean knowledge management for effective lean management implementation in the Malaysian public sector. This cross-sectional quantitative survey has collected 131 responses from public organisations in Malaysia selected through a stratified random sampling technique. The data were analysed using the structural equation modelling (SEM) approach with SmartPLS 4.0. Findings show that lean knowledge management significantly affects lean management implementation. Theoretically, this study will aid academics and practitioners in choosing the best road forward in achieving a successful lean management implementation that will lead to a competitive advantage. From a practical standpoint, the findings of this study provide several recommendations to practitioners. They can comprehend and assess the potential benefits of implementing lean management on Malaysia's public sector performance.

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INTRODUCTION

The Malaysian government implemented a range of programs to improve the standard and accountability of government agencies in order to provide better services while maintaining financial transparency (Fernandez et al., 2017). In order to combat corruption and abuse of authority, the National Integrity Plan and the Integrity Institute of Malaysia (IIM) were formed in 2004 (Johari & Yahya, 2016). In order to increase accountability, the Government Transformation Program (GTP) was adopted in 2009, and National Key Results Areas (NKRAs) under the GTP were defined to promote Malaysia's socioeconomic growth (Siddiquee, 2014). Despite the improvements, Malaysia's public sector performance has remained generally low (Johari et al., 2019). As a result, the researcher intends to do research focusing on the Malaysian public sector since there are issues with public sector performance in Malaysia.

Public officials deal with various concerns and challenges in terms of the service they provide to citizens. Ansell et al. (2020) claim that while Malaysian residents complain about high long waiting times, service quality in the government is still declining. For a single service, the citizen must go through several government agencies (Ahbabi et al., 2019). The general public frequently criticises the service sector for being ineffective in providing and delivering public services (Bakar et al., 2017; Fei et al., 2019). For instance, in some government offices, customers are dissatisfied because they must wait more than two hours to meet with the person in charge of serving them, even though it should only take 15 minutes (Ahmed et al., 2018).

Furthermore, since the local government are mostly located in a rural area, there is no training institute for public servants as the primary is located in Kuala Lumpur City Hall (Bahardin et al.,2019; Mahbob, 2019). Therefore, inadequate facilities and subsidies might impact their service performance and job efficiency, hence, the poor service (Bahardin et al., 2019; Bakar et al., 2017). As a result, it is crucial to implement lean management in Malaysian public sectors. Moreover, knowledge of lean management is needed to enhance lean implementation. Lean knowledge management is to manage change efficiently and effectively by helping in the preparation phase, supporting new processes and procedures of lean implementation and maintaining the transformation with continuous improvement actions (Lota et al., 2019). Therefore, this study aims to evaluate the significance of lean knowledge management in the effective implementation of lean management in the Malaysian public sector.

This research will examine all levels of the Malaysian government (i.e., federal, state, and local). There are 821 public sector organisations in Malaysia, including ministries, departments, agencies, statutory bodies, and local authorities responsible for providing all types of government services to citizens (Samah et al., 2017). In summary, this study attempted to address a research gap in the role of lean knowledge management for effective lean management implementation in the Malaysian public sector. The theoretical and empirical data presented in this study will aid academics and practitioners in choosing the best road forward in achieving a successful lean management implementation that will lead to a competitive advantage. From a practical perspective, the findings of this study provide several

*CORRESPONDING AUTHOR | Z. Zulkeflee | ✉ zarifamiraaa@gmail.com

recommendations to practitioners. They can comprehend and assess the potential benefits of implementing lean management on Malaysia's public sector performance. First, this paper will thoroughly discuss the theoretical and conceptual framework. Following that, the quantitative data analysis and discussion were addressed. Finally, the findings' implications, limitations, and future research suggestions were discussed.

LITERATURE REVIEW

Resource-based View Theory

The firm's resource-based view (RBV) is an internally focused approach to strategic planning dependent on the organisation's resources. According to Brahma and Chakraborty (2011), a firm that intends to use RBV theory should identify its relevant resources and capabilities that are valuable, rare, inimitable, and non-substitutable. These will compel the organisation to develop a long-term competitive edge plan (Barney, 1991). As a result, this research presented lean knowledge management as a capability using RBV theory because lean knowledge management is a vital requirement in bureaucratic reform attempts for the public sector (Prasodjo, 2020). In addition, lean management is presented as a strategic resource as its practices have been widely used in service sectors and are believed to be an effective management strategy to enhance organisations' competitive advantage related to waste elimination.

Lean Management

Toyota Production System (TPS) was the first to use lean in the automotive industry. Lean manufacturing is a method of reducing waste in the manufacturing process. Waste is defined as non-added value actions for the customers (Ohno, 1988). According to George (2003), lean accelerates velocity in any process by decreasing all types of waste. Arfmann and Barbe (2014), on the other hand,define lean as a manufacturing method that attempts to reduce waste and improve production flow whileproviding more excellent value to customers. Lean definitions have evolved throughout the years in response to technological advancements, and they have benefited many organisations ranging from manufacturing to service sectors (Hasle et al., 2012; Radnor & Walley, 2008; Sloan et al., 2014; Solaimani et al., 2019). According to Papadopoulou and Özbayrak (2005), lean management corresponds to the areas of lean production (Rotter et al., 2019). As a result, the lean implementation differs across industries, with different academics employing different names in their studies for the same concept (Gupta et al., 2016; Hasle et al., 2012; Solaimani et al., 2019).

According to Hadid et al. (2016), lean in service is a practical imagination exercised in the sameway as lean in manufacturing. Therefore, it may still be used equally in the service sector. As a result, lean is increasingly popular among businesses and government agencies. The lean practices (total quality management (TQM), just-in-time (JIT), total productive maintenance (TPM), and human resource management (HRM)) were adapted from Shah and Ward (2003). They defined a lean bundle as a collection of practices that work synergistically to provide a high-quality service at the speed of customer demand. However, HRM is an exception since it is a collection of practices influencing the organisational environment using basic approaches (Furlan et al., 2011). HRM strategies (e.g., staff training, leadership, group problem resolution) are considered soft aspects of lean based on Sorooshianand Mad Ali (2017). Thus, this study focuses on TQM, JIT and TPM as lean management practices in the Malaysian public sector.

Lean Knowledge Management

Knowledge is the key source of competitive advantage (Schniederjans et al., 2020). Referring to Dombrowski et al. (2012), knowledge is the information that is interpreted out of the experiences and expectations and belongs to a person or the organisation. Consequently, it is necessary to incorporate knowledge management to arrange and coordinate the knowledge within the organisation. Jørgensen et al. (2007) explained that lean manufacturing implementation failed due to a lack of attention within the organisation to develop lean capabilities. By improving lean skills, employees can continually obtain a better understanding while implementing it and simultaneously create a learning environment that supports lean culture. The knowledge and experience of lean manufacturing could be obtained from external consulting companies specialising in lean manufacturing and providing expertise in the principles and tools. According to Vance (2017), external lean experts' utilisation has given many firms the correct knowledge and experience to implement and sustain their lean implementation.

In developing sustainable KM on lean practices in public sectors, it is necessary to form a knowledge culture that provides a direct influence. Hence, practices can be carried out, such as providing lean knowledge and experience to the employees and organising regular training or lean workshops. Enhancing awareness and understanding of the lean concept is crucial for applying lean practices in public sectors (Hussein & Zayed, 2021). Not only that, training and education on lean implementation are also necessary in order to be successful (Kundu & Manohar, 2012). Training is defined as a planned and aimed effort by an organisation or any higher authority to facilitate employees' or subordinates' learning of job-related competencies (Sorooshian & Ali, 2017). This occurs because some of the lean tools and processes used in the implementation process need employees' knowledge and abilities (Achanga et al., 2006). Therefore, seminars and workshops are critical for developing the communication and technical skills needed to apply lean practices. For instance, employers can implement Kaizen workshops involving all employees from the organisation with multiple functions to make small and quick changes (Radnor & Osborne, 2013). The employee often favours the approach since it delivers a fast return for effort, is visible, and does not question the current management control style (Radnor & Walley, 2008). From the previous study, it can be confirmed that lean tools positively affect lean sustainability via lean knowledge management (Zhang et al., 2020). Thus, this evidence leads to the following hypothesis:

H1: Lean knowledge management has a significant effect on lean management implementation

METHODOLOGY

In order to achieve the goals of this study, the researcher used a quantitative approach. This study focused on testing the hypothesis of a conceptual model that covered the correlation among several variables. The measurement development section stated that all the measurement items used an interval scale. However, different interval scales are used for each section to avoid common method bias on the measurement scales. For instance, a 5-point interval scale for lean knowledge management (LKM) and a 6-point interval scale for lean management (LM). Each measurement item was designed to examine a specific content adapted, adopted, and self-developed from previous studies such as Ambekarm (2016), Iranmanesh et al. (2019), Johari et al. (2018), Johnpaul (2016), Malmbrandt and Åhlström (2013), Nawanir et al. (2016), and Radnor and Osborne (2013). The pre-test involved three academicians and two practitioners reviewing the questionnaire while answering it to determine if any additional information should be added or removed. A pre-test was used to avoid misunderstanding and data bias if the researcher made a pre-test before collecting the actual data from actual respondents.

The unit of analysis involved was an organisation based on the research questions. Therefore, the questionnaire was given to only one respondent for each organisation (Easterby-Smith et al., 2012). The element in the unit of analysis or the targeted respondents is within the top to middle management levels, such as head of a department, manager, chief, or other related positions involved in service activities and familiar with lean management. The target population for this study is government public organisations in Malaysia, encompassing all federal, state, and local governments. Each level of government comprises public administrators from a variety of service schemes if not all of them (Arifin & Othman, 2018). According to the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), the total population of public organisations in Malaysia is 821. In the data collection, 650 organisations were chosen through stratified random sampling to participate in the survey. The population is divided into three strata: federal, state, and local governments, and from each stratum, a random number of samples were chosen from the stratum. The stratum for each level of the public sector was determined proportionally. The questionnaire was distributed via email through a Google Form link to those organisations in November 2020. After four months, 155 completed questionnaires were received, leading to a 23.85% response rate. However, 24 questionnaires were eliminated due to straight-lining issues that led to low standard deviation, thus, 131 surveys were used for analysis.

RESULT

Using the PLS-SEM and the statistical programme SmartPLS4 is the method chosen for estimating the hypothesised model (Ringle et al., 2015). PLS-SEM is a multivariate, non-parametric method utilised to estimate latent variable path models (Hair et al., 2018). PLS-SEM was used due to the exploratory nature of the research, where it can process complex research models (Hair et al., 2017). PLS-SEM through Smart-PLS software was used to analyse the causal relationships between constructs as it can produce sensible results even with the absence of little outliers, and the data would not be distorted (Ringle et al., 2015). Additionally, SmartPLS is capable when the subject has a limited number of a sample while the build of the model is complex (Sander & Lee, 2015).

The hypothesis was tested using a two-step approach (Hair et al., 2017). First, the measurement model was examined to test the validity and reliability of the instruments. Second, the structural model was run to test the hypothesis developed. The loadings, average variance extracted (AVE), and composite reliability (CR) for the measurement model were assessed. Following the suggestion from Hair et al. (2017), the values of loadings should be > 0.4, the AVE should be >0.5, and the CR should be >0.7. From the first PLS-SEM algorithm run, two outer loadings were found to be lower than 0.4. After the deletion of JIT1 and JIT5, the PLS algorithm was then calculated again and the results show that all outer loadings in the JIT construct are acceptable (above 0.4). The remaining items are sufficient to measure the construct as the value of composite reliability (CR), and average variance extracted (AVE) are considered reliable (Hair et al., 2017). This modified PLS path model will be used for the subsequent data analysis. Details of the convergent validity result are depicted in Figure 1 and Table 1.

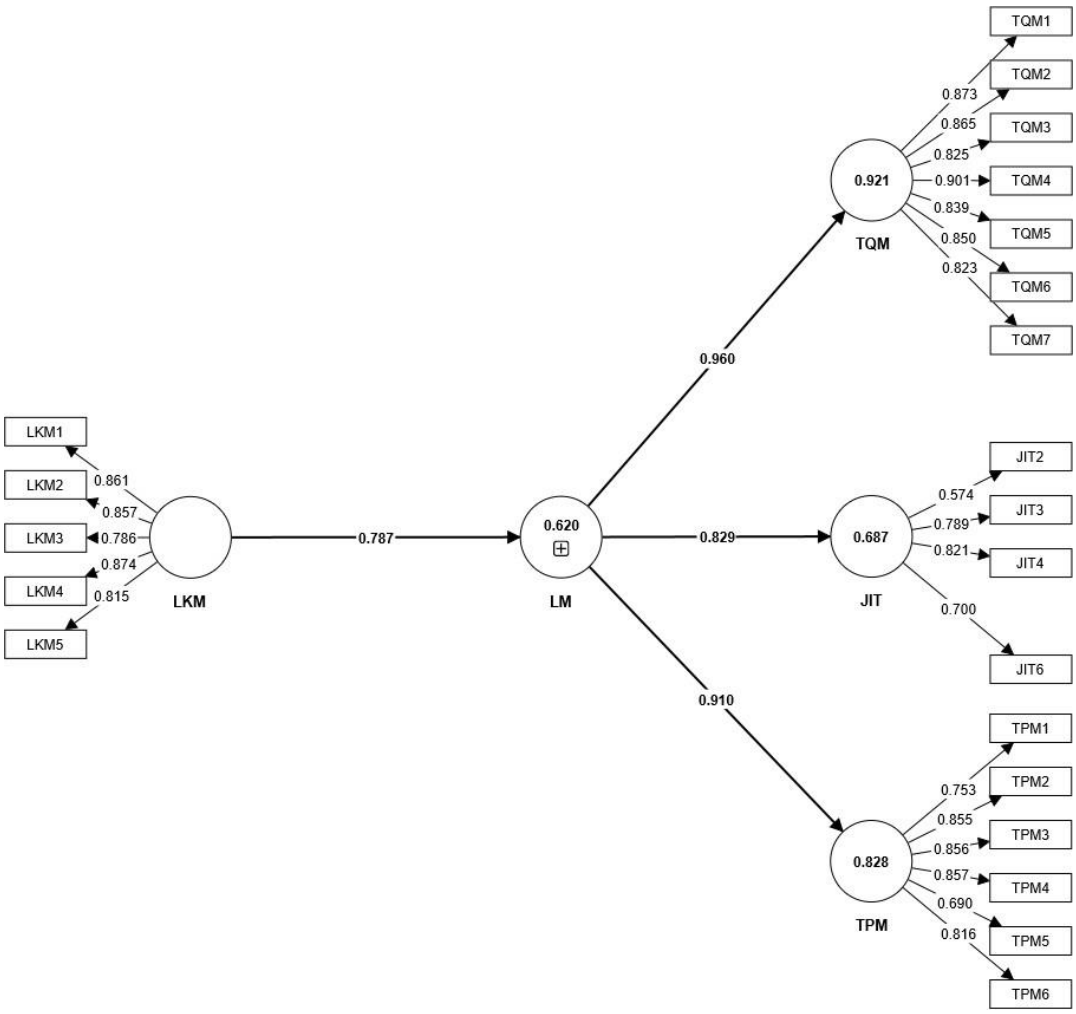

Figure 1. Modified PLS Path Model.

Table 1. Convergent Validity.

Construct	Item Code	Measurement Item	Outer Loading	CR	AVE
Lean Knowledge Management	LKM1	Our employees are encouraged to apply their knowledge to solve our organisational problems(e.g., elimination of non-value-added activities).	0.861	0.922	0.705
	LKM2	Our employees have adequate knowledge and know-how.	0.857		
	LKM3	Our employees are educated in subjects relatedto their speciality and daily work.	0.786		
	LKM4	Our employees are adequately trained ineliminating non-added-value activities.	0.874		
Construct	Item Code	Measurement Item	Outer Loading	CR	AVE
	LKM5	Our employees engage in lean continuous improvement-related events (e.g., training, competitions, exhibitions, etc.).	0.815		
Total Quality Management	TQM1	We strive to continuously improve our work process to minimise operational costs.	0.873	0.950	0.729

	TQM2	We standardise most of the work processes in our department	0.865		
	TQM3	Our work procedures are properly documented.	0.825		
	TQM4	We visualise our work procedures to show how works are to be done.	0.901		
	TQM5	We visualise important information (e.g., progress of works, current problems, issues, or deviations) in our workplace.	0.839		
	TQM6	All staff are responsible for ascertaining the quality of each operation.	0.850		
	TQM7	Our staff control the quality of work independently before completing any jobs.	0.823		
Just-In-Time	JIT2	We use a work signalling system (e.g., verbal signal, light flashing, electronic messages, etc.) to authorise a job.	0.574	0.815	0.529
	JIT3	Our processes are located close together to smooth workflow.	0.789		
	JIT4	We focus on eliminating non-value-added activities in the workplace	0.821		
	JIT6	We perform multiple types of jobs from day to day	0.700		
Total Productive Maintenance	TPM1	We apply 5S to ensure our stuff is properly arranged in our workplace.	0.753	0.917	0.651
	TPM2	We scrupulously clean workspaces (including tools and equipment) to maintain an orderly workplace	0.855		
	TPM3	We keep maintenance records for all equipment (e.g., computers, printers, etc.) used in our workplace.	0.856		
	TPM4	Our equipment (e.g., computer, printer, etc.) is maintained as per the schedule.	0.857		
	TPM5	Our staff are empowered to maintain their own equipment.	0.690		
	TPM6	We implement preventive maintenance (i.e., planned maintenance of equipment to prevent failure) for all equipment used in our workplace.	0.816		

In assessing the empirical criteria, discriminant validity refers to how different a construct is from otherconstructs (Hair et al., 2017). The heterotrait-monotrait (HTMT) ratio of correlations is used to examinethe discriminant validity tabulated in Table 2. Gold et al. (2001) proposed a threshold value of 0.90, where a high value of HTMT indicates a lack of discriminant validity. Table 2 shows that the values fordiscriminant validity through the HTMT test were lower than 0.900. This proved that all construct questions were different and not interchangeable in their meaning

Table 2. Discriminant Validity: Heterotrait-Monotrait Ratio (HTMT)

Construct	JIT	LKM	TPM	TQM
JIT				
LKM	0.873			
TPM	0.790	0.757		

TQM	0.886	0.828	0.861	[redacted]

After evaluating the reliability and validity of the measurement model, the structural model assessment is evaluated. It involves hypothesis testing on the relationships between the constructs, which will typically be latent variables. Moreover, the coefficient of determination (R^2), effect size (f^2), and PLS prediction are interpreted. In order to determine the hypothesis, bootstrapping method is used. Bootstrapping is a resampling technique in which a large number of sub-samples are randomly taken from the original data (with replacement), and models are estimated for each subsample (Hair et al., 2018). It is used to determine the standard errors for hypothesis testing. In bootstrapping procedure, 5000 bootstrap subsamples are used, as recommended by Hair et al. (2017), to estimate the PLS path model. In order to determine the significance level, the critical values for the one-tailed test were used with 1.645 (significance level = 5%).

The confidence interval offers a range of plausible population values for the parameter based on the variation in the data and the sample size, providing information on the stability of the computedcoefficient. The bootstrap confidence interval is based on standard errors derived from bootstrapping and specifies the range into which the true population parameter will fall, assuming a 95% confidence level (Hair et al., 2017). If a confidence interval for an estimated path coefficient excludes zero, the nullhypothesis is rejected, and a significant effect is assumed. The summary of hypothesis testing is presented in Table 3.

Table 3. Summary of Hypothesis Testing

Paths	Std. Beta	Standard Deviation	p-value	t-value	Confidence interval bias corrected		Decision
					5%	95%	
LKM → LM	0.787	0.039	0.000	20.073	0.714	0.844	Supported

Based on Table 3, the hypothesis is supported when the t-value is greater than 1.645 and the p-value is less than 0.05, which is supported at a 5% significance level. Besides, the ranges for confidenceintervals do not contain zero. Therefore, the hypothesis shows the path from LKM to LM, and the hypothesis is supported. The t-value is greater than 1.645, which is 20.039, and the range of confidenceinterval is between 0.714 and 0.844. From the outcome, the hypothesis of LKM strengthens the LM implementation is supported.

Assessing the coefficient of determination (R^2) evaluates the model's predictive accuracy. The coefficient represents the variance in the endogenous constructs explained by all the exogenousconstructs. According to Hair et al. (2014), the R^2 value in the rule of thumb indicates 0.75 as substantial, 0.50 as moderate and 0.25 as weak. Therefore, the R^2 value is 0.620, which is indicated as moderate. Besides evaluating the R^2 values of all endogenous constructs, the change in the R^2 value when a specificexogenous construct is deleted from the model can be used to evaluate whether the missing construct has a substantive impact on the endogenous constructs (Hair et al., 2017). This measure is referred to aseffect size, which is assessed using f^2. Guidelines for assessing f^2 are those values of 0.02 is small, 0.15is medium, and 0.35 is large (Hair et al., 2017). For example, the effect size for LM is small, with a value of 0.056.

DISCUSSION

The findings show a β-value of 0.787 with confidence intervals ranging between 0.714 and 0.844. It was determined that LKM affects LM implementation, and based on this finding, the public sector in Malaysia needs to embrace LKM to ensure the success of LM. Knowledge management is one of the crucial parts of implementing strategies in any organisation. Lota et al. (2019) stated that LKM is able to assist organisations in addressing change efficiently and effectively by helping in the preparation phase, supporting new processes and procedures of lean implementation, and maintaining the transformation with continuous improvement actions. Enhancing awareness and understanding of the lean concept is crucial before applying lean practices in public sectors (Hussein & Zayed, 2021). An added benefit of having knowledgeable employees is that lean practices can be implemented and carried out efficiently. Therefore, providing lean knowledge and experience to the employees and organising regular training or lean workshops are factors involved in lean knowledge management.

Based on the results, most respondents agree that their employees have adequate knowledge and know-how on lean management. It shows that having knowledgeable employees in lean management can strengthen lean implementation. Besides commitment and communication, lean knowledge is a crucial element that must be present, especially during the lean transition (Asnan et al., 2016). The success of lean management implementation depends on capturing explicit and tacit knowledge. Managing tacit knowledge such as kaizen, work standardisation, 5S, visual management, and Heijunka are practices that are difficult to implement without the proper support. Consequently, employees with lean knowledge are beneficial to strengthen lean implementation because they are aware of the procedure and how it can improve service quality.

Besides, employees can attain lean knowledge and experience through regular training and workshops. Both events can be conducted either internally or externally in the organisations for advance exposure. Therefore, exposure to various quality programmes such as lean through workshops and seminars can be done to encourage government entities or

agencies to implement quality improvement in their organisations. For instance, accreditation from relevant bodies like the International Standard for the Organization (ISO) and the Malaysian Productivity Corporation (MPC) may improve the organisation's reputation in the public eye and promote employee motivation for implementing lean (Bakar et al., 2017).

CONCLUSION AND IMPLICATIONS

This study conveys contributions to the body of knowledge summarised into two different points of view which are theoretical and practical. The theory used in this study is RBV theory which is a theoretical standpoint that endeavours to describe and predict how firms can achieve their sustainable competitive advantage by gaining and controlling internal resources (Barney, 1991). Barney (1991) proposed the VRIN criteria as key characteristics of strategic resources that will provide an organisation with a competitive advantage to distinguish strategic resources. Lean management meets the VRIN criteria as a strategic resource for the organisation's competitive advantage. On the other hand, the indicators of lean knowledge management are capable to strengthen lean management implementation.

From the practical point of view, this study's results offer practitioners suggestions. First, they can understand and validate the potential benefits of implementing lean management on Malaysia's public sector's performance. Other than that, the practitioners and policymakers could learn the critical factors as approaches to strengthen the implementation of lean management through lean knowledge management.

The research process identified several limitations for this study. These limitations should be addressed in the future for a more thorough study. First, the limitation is related to the population. This study involved lean practices in public sectors but was only limited to Malaysia. This might be irrelevant in other contexts with different countries as they have different processes for their public service. Moreover, to improve the generalizability of the findings, future research should test the existing model in more industries, countries, and geographic areas. The second limitation of this study is related to the data collection method, which is the low number of respondents due to the limited platform to distribute the survey. Future research should consider broadening the data collection method in the public sector to maximise the response rate

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CONFLICT OF INTEREST

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