

EXAMINING THE FACTORS THAT INFLUENCE AN ORGANIZATION'S INTENTION TO ADOPT A LEAN INTEGRATED MANAGEMENT SYSTEM IN MALAYSIA FOOD INDUSTRY

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ABSTRACT

In today's era, lean management is progressively important and has shown its potential application in the food industry. Thus, a lean integrated management system (LIMS) is the essential advanced technology that is well-equipped with a management system and lean thinking's tools to improve the performance of management and technical work. Nevertheless, the problem arises in which the LIMS adoption had a high failure rate in the food industry in Malaysia due to a lack of consideration of both internal and external factors when employing lean management for improving the organizational innovation performance. This explanatory research aims to analyze the determinants involved in influencing the organization's intention to adopt LIMS in the food industry and how it subsequently impacts the organizational performance. Hence, the Technology Adoption Model (TAM) as a proposed framework and hypotheses was formulated to study the causal relationships among the independent variable as the determinants, including technical lean tools and practices factors, organizational factors, individual factors, managerial factors, and external factors; the organization's intention to adopt LIMS as the mediating variable; and the dependent variable, which is organizational innovation performance. A quantitative research method with a survey questionnaire was utilized to collect the data from a total of 550 respondents, including the organization's staff in Malaysia's food industry. Furthermore, Pearson's Correlation Coefficient and regression analysis were mainly used to analyze the quantitative data through the software IBM SPSS Statistics 25. The analytical results showed that all the relationships between the independent variables and the mediator are significantly positive, while external factors possess the most significant positive relationship with the organization's intention to adopt LIMS, and ultimately the organization's intention to adopt LIMS has a significant positive contribution to organizational innovation performance. It concluded that the research benefits the organization in the food industry and the researcher with valuable insights for future study and decision-making in lean adoption.

Keywords: Lean Management, Technology Adoption Model, LIMS, Food Industry

1. INTRODUCTION

Lean Integrated Management System (Souza & Alves, 2018) is the crucial technology as an innovative paradigm and model that can cater to today's techno-savvy environment, which is equipped as a comprehensive quality system for resolving the issues regarding a variety of activities included in the sustainability improvement of organization performance, process innovation, and also production quality and progress.

However, numerous previous studies have shown that the lean management, or so-called lean concepts, tool is ubiquitously applied in focusing only on the manufacturing process and R&D-based operations for the purpose of eliminating waste from manufacturing and process innovation (Möldner et al., 2020; Iranmanesh et al., 2019). The implementation of lean thinking tools based on waste controls in research and development environments and innovation production processes or supply chains (Fok-Yew, 2018; Foruhi et al., 2018) is highly emphasized instead of the comprehensive innovative system in both R&D manufacturing processes and also organizational innovation management with employee development for in-depth know-how of lean principles and necessary organizational and cultural change.

Other than that, based on the previous research of Osman, et al. (2020) and Lodgaard, et al. (2016), many companies still struggle to accomplish a successful and sustainable lean implementation that can emphasize both organizational and technical improvements due to the minor focus on critical success factors as well as the sustainability of the lean integrated management system. Moreover, the high failure rate in conducting the lean integrated management system is obviously shown in several companies from different industries (Chan, et al., 2019; Johan, et al., 2019; AlManei, et al., 2017). It indicates that the importance of comprehensive organizational innovation management and integrated improvement of the organization is being overlooked regarding the lean management approach.

There is also the exploration of success factors at lean practices implementation is conducted (Fok-Yew, 2018); (Knol, et al., 2018); (Alok, et al., 2018) with all things considered within the internal and external of the organization, whereas there is the gap between the existing study and desired goal of this research, which the previous studies mostly analysed regarding the data collected from only the manufacturing industry, where the nature of the business is biased and has certain differences compared to other industries that cannot be fully applied by other industries.

Addressing the issues of a high failure rate and even low acceptance of lean integrated management system adoption from the food industry in Malaysia, the main problem is identified as due to the lack of considering both internal and external factors as the all-inclusive considerations for improving organizational innovation performance. This research is to study the determinants that influence the whole organization staff in all departments to completely adopt the lean integrated management system in the food industry. Since the success of lean integrated management system adoption can greatly boost the organization's business and operation performance and efficiency inside and out in the food industry, Thus, the intention of the entire organization in applying lean management is relatively critical and needs to be emphasized in this study for the benefit of strengthening and innovating organization management. Furthermore, many organizations or companies in the food industry from Malaysia are not yet fully aware of the importance of employing a comprehensive lean management system compared with the manufacturing industry, which can affect the efficiency of the organizational performance. Hence, the critical success factors of determining the organization and staff's intention in the food industry for adopting a lean integrated management system need to be further explored in this study.

2. LITERATURE REVIEW

A critical review of the literature regarding the research areas from published papers, which include lean management, integrated management systems with lean thinking, lean approaches in the food industry, technology adoption models, and other relevant elements, will be discussed with clarity and detailed explanation. Moreover, the theoretical framework with the conceptualized framework will also be proposed with all related variables' operational definitions in terms of technical lean tools and practices factors, organizational factors, individual

factors, managerial factors, external factors, intention to use a lean integrated management system, and organizational innovation performance to indicate how these variables are being interrelated.

2.1 Lean Management

Lean management has different ways to interpret and define, while based on the research of Rotter, et al. (2019), they mentioned that the most often interpreted and recited definition is known as Lean and is “an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer, and internal variability.” It can also be identified as lean management, which is a theory that encompasses aligning or so-called integrating all the activities of an organization or firm to eliminate or avoid the wastes altogether to meet the customer expectations and better organizational performance with considerations of product and service quality (Nini, 2020).

Singh, M. (2017) alleged that the term "lean in the organization perspective is no longer merely focused on manufacturing and production processes that are conducted for eliminating wastes and sophisticated processes at the workplace; instead, variable development and improvement have been implemented for perfecting lean management. Lean management that comprises lean tools and principles such as the 5S framework (Sort, Straighten, Shine, Standardize, and Sustain), Kaizen, Just-in-Time (JIT), Six Sigma, etc., can preferably be adapted to sustain lower lead times, reduce inventory, enhance leadership, increase employees' motivation, and ultimately improve the overall organizational performance. In short, lean management is considered the critical organizational management method that can be applied to slimming the business and operation processes from production lines through the administration department until energy consumption (Orynycz, et al., 2020).

2.2 Features and Benefits of Lean Integrated Management System Adoption

Jewalikar & Shelke (2017) found that an integrated management system with lean thinking, known as a Lean Integrated Management System (LIMS), has comprehensively demonstrated with its prominent aspects that are valuable inside and outside the firm, for example, through the related policies, well-organized and clearly stated strategic goals, procedures and management guides, formats and arrangements fixed with lean tools and techniques.

Furthermore, LIMS adoption contrasts with the implementation of lean manufacturing or the general approach of lean management that diminishes the success rate of the lean approach due to certain obstacles such as lack of expertise, lack of lean culture with proper planning, lack of commitment from top management, lack of strategic perspective, inappropriate use of lean tools and practices, lack of philosophy understanding and knowledge of lean principles, lack of motivation, and resistance to change (Elkhairi, et al., 2019; Lodgaard et al., 2016). It can be seen that LIMS, as an integrated and advanced management system in terms of lean methodology that complies with international norms in different aspects such as QMS and FSMS, allows the organization to gain more with less and be more preferable regarding today's business environment (Psomas, et al., 2018).

2.3 Lean Approach in Food Industry

In the light of the study from Melanie (2017), it indicated that waste issues in the food industry, which included overproduction, transport, wait time, inventory levels, food defects, and

processing and packaging progress, lean approach should be applied for continuous improvement by forming an environmentally friendly process with the streamlined flow regarding these variables that may occur in the food industry. Nevertheless, Kezia et al. (2017) claimed that lean principles are not easy to apply in food industries as similar to the situation of other industries due to certain uncertainties that involve manufacturing, quality control of packaging materials, and other management aspects that need to be all-rounded considered for ensuring the sustainability, wellness, and safety of the organization and people related.

Gładysz et al. (2020) also argued that lean management methods are required to be conducted in the food industry for eliminating the food wastes, reducing operational costs, and streamlining all processes as a unified flow throughout the entire food chain, from human resource management to inventory management, processing, packaging, logistics, transportation, distribution, retail businesses, and food service activities, which can lead to a great improvement of the organization.

2.4 Technology Adoption Model (TAM)

Based on the previous studies related to the integrated management system with lean thinking, many variables are found to influence intention on the adoption of the Lean Integrated Management System (LIMS), which acted as the new technology-based management system in the food industry regarding certain perspectives as determinants. In order to successfully complete this research study regarding the concern of organizational innovation performance as the dependent variable, the determinants that contain technical lean tools and practices, organizational factors, individual factors, managerial factors, and external factors as the independent variables will be analysed and tested; meanwhile, the organization's intention to adopt a lean integrated management system will be articulated as mediator variables. Thus, a conceptual framework designed through the Technology Adoption Model by relating to these three main variables will evidently show the relationship between the five independent variables towards the organization's intention of adopting LIMS and thereby to affect the organization's innovation performance.

Thus, an innovated and revised technology adoption model that conforms to the objectives of this study will be employed. It is considered by relating to the new theoretical framework by conceptualizing identified determinants with different theoretical insights, research problems and objectives, variables, organizational goals, and measurements (Lai, 2017).

2.5 Organizational Innovation Performance

Tanudiharjo et al. (2021) have alleged that organizational performance with a high degree of efficiency and satisfaction is required to be attained and therefore to sustain the competitive advantages and core competencies in the particular industry. Thus, the researchers have suggested studying the critical success factors and also testing other in-depth factors towards lean implementation process adoption that result in having significant improvement in organizational performance. It can also mean that the organizational performance is the crucial perspective or is considered the measurement aspect that allows the practitioners or future researchers to know about whether the lean implementation efforts with related management systems and practices can greatly contribute to the improvements in both the organization's operational and management performance through the assessment result of organizational performance (Tanudiharjo, et al., 2021; Mutua, et al., 2018).

2.6 Technical Lean Tools and Practices Factors

Möldner, et al. (2020); Seman, et al. (2020) have argued that technical lean practices can be

recognized as one of the primary tools that comprise such things as just-in-time, value stream mapping, total productive maintenance, continuous improvement, and so on that contribute to a strong positive impact on the process innovation; that is to say, it seems to boost the organizational performance, especially in the operational perspective. According to the study of Orynych et al. (2020), they proposed that the idea of lean management needs to be presented regarding the involvement of technical problems, rather than only emphasizing organizational issues based on the managerial areas to test the critical success factors (Knol, et al., 2018). Therefore, technical lean tools and practices play a critical role in influencing the organization's readiness to use an integrated lean management system, which can subsequently affect the organizational performance in process innovation, production, and technical operation perspectives through lean practices.

H1: Technical lean tools and practices factors have a positive impact on the organization's intention to adopt a lean integrated management system.

2.7 Organizational Factors

Gładysz et al. (2020) have found that support of organizational culture includes the process of food manufacturing, and communication among the departments can contribute to the effectiveness of lean program implementation, such as the 5S process and visual management, and will be the basis for further improvement in operational process and organizational performance. According to Barbosa et al. (2018), the organizational factor that involved the emphasis on organizational culture is one of the most critical factors for the great development of the standardized management systems that apply for the integration and interaction with the organizational strategy. Alyousef (2019) has also alleged that a strong organizational lean culture should be created with the adaptation of the related concepts and the driving of the organization's engine forward, such as building trust through the employees' empowerment, collaboration, and support of stakeholders in order to succeed by achieving continuous improvement, effectiveness in eliminating non-value adding processes and reducing waste, and improvement in the customer satisfaction level.

H2: Organizational factors have a positive relationship with an organization's intention to adopt a lean integrated management system.

2.8 Individual Factors

Jewalikar & Shelke (2017) discovered that acceptance of the Lean Integrated Management System can positively impact employee motivation, awareness, and qualifications; in other words, individual factors on employees' engagement with the improvement of internal efficiency and quality of management can be concerned to determine their impact on influencing the intention of the organization to accept LIMS. After that, based on the research of Castro et al. (2019), it can be seen that individual factors comprised of employees' motivation and awareness of commitment are critical to ensure the success of adopting a new strategy or innovation.

H3: Individual factors have a positive impact on the organization's intention to adopt a lean integrated management system.

2.9 Managerial Factors

Alok et al. (2018) have identified that leadership, top management commitment, support and preparation, and human resource management are the factors in the management-based approach that can reasonably influence the lean adoption intention of the employees in the organization and thereby standardize the innovation-related performance of the organization (Möldner, 2020). Mishra (2018) and Moyano-Fuentes, et al. (2020) observed that a dedicated management team based on the commitment of top-level managers as the senior team inspires

and encourages all the employees to adopt the new technology by making sure that sufficient knowledge of lean management has been delivered, while it is very crucial to enhance sustainability performance by ensuring the employees would be most willing to work according to the configured strategies in applying the lean initiatives.

H4: Managerial factors have a positive relationship with an organization's intention to adopt a lean integrated management system.

2.10 External Factors

Alyousef (2019) suggested that the external factors that can affect the intention or the process of adopting lean principles, such as suppliers and customers, are advised to be further researched due to their likelihood of impacting the success or failure of lean implementation. Based on the research of Belfanti (2019), it has involved the external factors, or so-called environmental factors, as the drivers and antecedents of lean management adoption that pertain to the competitive rivalry, negotiation skills towards suppliers and customers, the threat of new entrants in the same industry, institutional investors and supports, external relationships management, and socio-economic and socio-cultural context.

H5: External factors have a positive impact on the organization's intention to adopt a lean integrated management system.

3. METHODS

Based on this study, which is to identify the determinants that impact the organization's intention on adopting LIMS, and the intention to use will therefore positively drive organizational innovation performance in the food industry, the explanatory research design fits perfectly to collect and analyse the data by establishing causal relationships between the independent variable and the dependent variable.

From the research objectives and testable hypotheses that are constructed in this study whereby to analyse the determinants as the critical success factors in influencing the intention of the organization for using LIMS and its impacts toward organizational performance, the quantitative research method will be more tailored to this research scope, which will therefore be used for collecting and analysing the data in a numerical and convergent perspective.

The area of study that has been determined based on this research is the food industry perspective in Peninsular Malaysia. The Malaysian food company will be selected due to the developments of the food industry, especially in terms of food processing, which have positioned Malaysia as a leading nation among the ASEAN countries regarding the food industry (Shamsudin & Vincent, 2020). Meanwhile, there are more than 8,000 business establishments in the light of the food processing industry in Malaysia, which are commonly categorized as small and medium enterprises (SMEs), and there is recent concern about the high technology and integrated systems in managing the food manufacturing and production, processing, quality control, and even transportation process (Schutte & Bernthaler, 2020). Thus, this research will study the organization in accordance with the people employed in Malaysian food companies, where the sample size for the study is focused on the employees' perspectives in different departments of food companies in Perak, Malaysia, in order to gather unbiased and wide-ranging information from organization staff in different management levels and departments of the companies.

Based on the population of this study, the employees of different departments in the organization of the food industry in Malaysia are required to be studied. Department of Statistics, Malaysia (2021), the Labour Market Review (LMR) had revealed that there are approximately 459,000

people employed in the food industry in Malaysia, as the population size of this research. Hence, the sample size is envisaged with a total of 500 respondents (G-power), as the organization staff from different departments, including all levels of management from the companies in the food industry in Peninsular Malaysia, will be chosen for completing the research data collection and analysis.

A questionnaire that consists of a series of questions as a structured technique for collecting data is essential to be clearly designed in conjunction with the researcher's understanding of the data requirements. In the light of this research study, the questions' pattern should be constructed according to the conceptual framework that has been formulated by assessing and testing the questionnaire with validity and reliability. Meanwhile, the types of questionnaires created for this study are in the format of self-completed and they will be distributed to the respondents generally in internet mode. For this research study, there are a total of four main sections divided in the questionnaire, which consists of Section A, designed for capturing the background of the organization; Section B, constructed for reflecting the five determinants that influence the organization's intention to adopt LIMS; Section C, created for indicating the intention of the organization in adopting LIMS; and lastly, Section D, developed for appraising the organizational innovation performance after possessing the intention to use LIMS in the food company.

4. RESULTS AND DISCUSSION

The data analysis in quantitative research that pertains to the determinants of influencing organizational intention towards lean integrated management system adoption in the Peninsular Malaysia food industry will be conducted along with discussion in the light of the results obtained from the data analysed. The analysis will be performed based on the data collected from the targeted respondents in order to achieve the research objectives. Thus, the data collected with hypothesis testing will be analysed through Statistical Package for Social Sciences version 25, also known as IBM SPSS Statistics 25, as it provides relevant techniques and tools to conduct the quantitative data analysis.

4.1 Descriptive Analysis of Independent Variables

Descriptive analysis in terms of descriptive statistics is conducted to describe, indicate, and summarize data as the basic information about the variables in a dataset by turning raw numbers collected from the questionnaire into meaningful data. The quantitative data for independent variables are summarized and compared by demonstrating their respective rankings.

Table 1 Descriptive Statistics of Independent Variables (Source: SPSS Output)

| Descriptive Statistics | | | | | | |
|------------------------|----------|---------|---------|--------|----------------|---------|
| Independent Variables | N | Minimum | Maximum | Mean | Std. Deviation | Ranking |
| Technical | 500 | 2.60 | 5.00 | 4.3127 | .48229 | 1 |
| Organizational | 500 | 2.83 | 5.00 | 4.2109 | .39497 | 3 |
| Individual | 500 | 2.83 | 5.00 | 4.3108 | .43316 | 2 |
| Managerial | 500 | 2.60 | 5.00 | 4.1724 | .43426 | 5 |
| External | 500 | 2.67 | 5.00 | 4.2092 | .44063 | 4 |
| Valid (listwise) | N 500 | | | | | |

Table 1 indicated that the descriptive analysis of all independent variables is summarized in this research, which comprised the minimum, maximum, mean, and standard deviation as well as ranking based on the mean result for each of the independent variables among the total sample size of 500 respondents. All the items for respective independent variables are analysed based on the Likert-typed five-point scale. It shows that the mean score as the average of the population of interest for all independent variables is more than 4.0, with technical lean tools and practices possessing the highest mean score of 4.3127, followed by individual factors with a mean score of 4.3108, organizational factors with a mean value of 4.2109, external factors with a mean score of 4.2092, and lastly managerial factors with the lowest mean score of 4.1724. In other words, it can be interpreted that the majority of the respondents agreed that technical lean tools and practices and individual factors have influenced their intention to adopt a lean integrated management system.

On the other hand, the table above shows the result of standard deviation for each independent variable by measuring the spread of the variable's values as well as its dispersion. By comparison, technical lean tools and practices factors are spreading out with the score of standard deviation at 0.48229, followed by external factors with the score of 0.44063, managerial factors with the score of 0.43426, individual factors with the standard deviation of 0.43316, and last but not least, organizational factors with the score of 0.39497.

4.2 Multiple Linear Regression

Table 2 Model Summary of Multiple Linear Regression
(Source: SPSS Output)

| Model Summary^b | | | | | | | | | |
|----------------------------------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .686 ^a | .470 | .463 | .26344 | .470 | 67.139 | 5 | 378 | .000 |

- a. Predictors: (Constant), External, Individual, Technical, Managerial, Organizational
b. Dependent Variable: Intention

According to table 2 as above, it indicated that the value of R is 0.686, in which there is 68.6%, showing that the five independent variables are correlated and influence the mediator, which is the organization's intention to adopt LIMS. In addition, the model summary table above also showed that R-square is 0.470, which means that 47.0% of the variance of the organization's intention to adopt LIMS can be explained by the predictors, which involve technical lean tools and practices factors, organizational factors, individual factors, managerial factors, and external factors. Meanwhile, it suggested that 100% - 47.0% = 53.0% can be explained by other factors as the predictors of the impact on the organization's intention to adopt LIMS, which can be explored in future study.

Table 3 ANOVA of Multiple Linear Regression
 (Source: SPSS Output)

| ANOVA ^a | | | | | | |
|--------------------|------------|----------------|-----|-------------|--------|-------------------|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 23.298 | 5 | 4.660 | 67.139 | .000 ^b |
| | Residual | 26.234 | 378 | .069 | | |
| | Total | 49.532 | 383 | | | |

a. Dependent Variable: Intention

b. Predictors: (Constant), External, Individual, Technical, Managerial, Organizational

Table 3 shows the result of ANOVA between the five predictors and the outcome variable, mediator. It implied that the overall model is significant, since $F(5, 378) = 67.139$ and $p < 0.001$ with the value of 0.000 reported as a p-value less than 0.001, which resulted in a significant relationship by indicating that there is at least one independent variable in terms of technical lean tools and practices factors, organizational factors, individual factors, managerial factors, and external factors that is able to predict the outcome, which is the organization's intention to adopt LIMS.

Table 4 Coefficient of Multiple Linear Regression
 (Source: SPSS Output)

| Coefficients ^a | | | | | | | | |
|---------------------------|----------------|-----------------------------|------------|---------------------------|-------|------|---------------------------------|-------------|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | |
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound |
| 1 | (Constant) | 1.513 | .157 | | 9.631 | .000 | 1.204 | 1.822 |
| | Technical | .136 | .047 | .182 | 2.887 | .004 | .043 | .228 |
| | Organizational | .125 | .058 | .137 | 2.171 | .031 | .012 | .238 |
| | Individual | .092 | .046 | .111 | 2.010 | .045 | .002 | .182 |
| | Managerial | .103 | .051 | .124 | 2.006 | .046 | .002 | .204 |
| | External | .193 | .051 | .237 | 3.789 | .000 | .093 | .294 |

a. Dependent Variable: Intention

Table 4, it can be seen that every independent variable as the predictors in this study is able to determine the outcome, which is the organization's intention to adopt LIMS. In detail, it showed that the external factor is the strongest predictor, $\beta = 0.237$, $t(378) = 3.789$, $p < 0.001$, showing the external factor is the most important predictor in this study; meanwhile, the unstandardized coefficient in terms of beta for external factors is 0.193, which proves that external factors have the highest positive value relative to other independent variables. Consequently, external factors have the greatest impact on a significant positive relationship with the organization's intention to adopt LIMS. This result finding is thought to be similar to that of Abdallah et al. (2019) and Belfanti (2019) by claiming that external factors that comprise the involvement of suppliers, competitors, customers, social, and other stakeholders, such as the threat of new entrants, sustainable competitive advantage, management of external relations and partners, and cooperation from stakeholders, are highly required rather than only focusing on the internal perspectives, which are concerned as the significant determinant that influences the organization's intent to anticipate a proper and successful lean management system.

Technical lean tools and practices factors are the second strongest predictor, $\beta = 0.182$, $t(378) = 2.887$, $p < 0.05$, indicating that technical lean tools and practices factors ranked as the second most important predictor in this study, while the unstandardized coefficient in terms of beta for this factor is 0.136, which would be the second highest positive value opposed to other independent variables. In this circumstance, we consider the p-value to be less than 0.05, which is $p = 0.004$, showing that technical lean tools and practices factors significantly impact the organization's intention to adopt LIMS. Thus, this analysis proved that the result is parallel with the previous research, which stated that the benefits contributed through the multiple aspects of lean management along with the integrated management system in terms of its tools and practices that can be implemented as a comprehensive system are one of the reasons for the organization to embrace the LIMS (Jewalikar & Shelke, 2017).

Organizational factor, $\beta = 0.137$, $t(378) = 2.171$, $p < 0.05$, which $p = 0.031$, while with consideration of unstandardized coefficient $\beta = 0.125$, it asserted that the organizational factor is placed as the third highest positive value. This factor as the predictor is also significantly influential to the organization's intention to adopt LIMS, in which the previous studies argued that the organizational factor that encompassed organizational culture, change management, knowledge management, lean job design, and other internal organizational management with consideration of lean-based would affect the organization's willingness in lean adoption and implementation. (Tanudiharjo, et al., 2021; Gładysz, et al., 2020; Abdallah, et al., 2019; Belfanti, 2019)

Managerial factors, $\beta = 0.124$, $t(378) = 2.006$, $p < 0.05$, where $p = 0.046$, while with consideration of the unstandardized coefficient $\beta = 0.103$, it contended that managerial factors are placed as the fourth highest positive value by showing that managerial factors have a significantly positive impact on the organization's intention to adopt LIMS. As a consequence of this, managerial factors that include top management support and commitment, leadership, mutual trust between top management and employees, as well as leader experiences on the lean practices are the main elements that could stimulate the employees' willingness to engage themselves in lean technology adoption, which can be considered as a part of the organization's intention to adopt LIMS (Tanudiharjo, et al., 2021; Belfanti, 2019; Alok, et al., 2018; Lodgaard, et al., 2016).

Individual factors are the lowest predictor towards mediator, $\beta = 0.111$, $t(378) = 2.010$, $p < 0.05$ where $p = 0.045$, while with consideration of unstandardized coefficient $\beta = 0.092$, it contended that individual factors is reported to be the lowest positive value by showing that individual factors is the least yet still significantly positive influence on the organisation's intention to adopt LIMS. The result of this data analysis is also consistent with previous research which claimed that individual factors such as behaviour and attitude of employees, comprehensive training and education provided, employees' motivation, employees' awareness, professional skills and knowledge transferred to employees and other elements related with employees' participation are still relatively significant affecting the intention and success of lean implementation (Tanudiharjo, et al., 2021; Castro, et al., 2019; Garza-Reyes, et al., 2018; Shah, et al., 2017).

5. CONCLUSION

Table 5, which demonstrated the overall result of hypothesis testing, can be summarized as follows: all of the independent variables related to the mediating variable, which is the organization's intention to adopt LIMS, are considered to be significantly positively related, and all of the particular hypotheses (H1, H2, H3, H4, and H5) are accepted, showing that $p < 0.05$.

Table 5 Hypothesis Testing Result

| Variables | p-value | Result |
|--|----------------|---------------|
| Technical Lean Tools and Practices Factors | 0.004 | H1 Accepted |
| Organisational Factors | 0.031 | H2 Accepted |
| Individual Factors | 0.045 | H3 Accepted |
| Managerial Factors | 0.046 | H4 Accepted |
| External Factors | 0.000 | H5 Accepted |
| Organisation's Intention to Adopt LIMS | 0.000 | H6 Accepted |

According to the implication perspective of organizations and industries, this study recommended that instead of concentrating solely on internal aspects, the organization should prioritize improving their external level of elements regarding lean management and technical lean tools and practices. This is because, according to the analytical results of multiple linear regression analysis, the external factor was found to be the most significant factor influencing organizations' adoption of LIMS, followed by technical lean tools and practices factors. Therefore, external elements in evaluating external partners are crucial to the success of LIMS implementation, as the integration of suppliers and customers has a strong impact on the success of technology adoption (Belfanti, 2019).

The outcomes from the data analysis discovered that both of the internal and external aspects of determinants should be valued; in other words, organizational factors, individual factors, and also managerial factors should not be underestimated in the likelihood of influencing the organization's intention to adopt LIMS, although it has relatively low significance in influencing the organization's intention to use compared with external factors and technical lean tools and practices based on these result findings. In detail, firstly, for the organizational factors, it emphasized the cultivated lean culture in the organization, as well as change management, which would influence the internal staff to be inclined to implement the lean management (Alyousef, 2019; Mishra, 2018). It is also due to the demonstration of great knowledge management regarding the knowledge and principles of the lean integrated management system that needs to be grasped by the staff. Secondly, the managerial factor was also the antecedent that influenced the intention of the organization to adopt LIMS.

Managerial factors that encompassed top management behaviour and commitment still play an important role in influencing the adoption of LIMS due to the direct influence on the organization and the staff's intention and acted as the most significant critical success factors in leading the lean adoption process in past research findings, as Lodgaard et al. (2016). Thirdly, the individual factor cannot be ignored although it had the least significance with the organization's intention to adopt LIMS by comparing it to other factors. As part of the internal aspects, the employees as the invaluable assets of the organization, employees' awareness and motivation, involving in professional training in lean thinking, and being able to learn skills and knowledge transferred would therefore influence the organization's readiness to adopt LIMS (Elkhairi, et al., 2019), where the internal personnel who possess these characteristics are more likely to be interested in implementing a lean integrated management system.

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