

# Impact Of Lean Production Practices On Business Performance: Evidence From Malaysian Food Industry

Maryam Hamid Yaseen<sup>1</sup>, Rozilah Kasim<sup>2</sup>, Falah Saleem Falih<sup>3</sup>

<sup>1</sup>*Faculty of Technology Management & Business, University Tun Hussein Onn Malaysia, Batu Pahat, 86400, MALAYSIA. Email: [maryam2008hy@gmail.com](mailto:maryam2008hy@gmail.com)*

<sup>2</sup>*Faculty of Technology Management & Business, University Tun Hussein Onn Malaysia, Batu Pahat, 86400, MALAYSIA. Email: [rozilahkasim@gmail.com](mailto:rozilahkasim@gmail.com)*

<sup>3</sup>*Faculty of Technology Management & Business, University Tun Hussein Onn Malaysia, Batu Pahat, 86400, MALAYSIA. Email: [falah.cbi@gmail.com](mailto:falah.cbi@gmail.com)*

## Abstract: -

Evidence suggests that lean methods and tools have helped manufacturing organizations to improve their performance. However, the real effect of these methods and tools on contemporary measures of business performance, is still unclear. Therefore, this paper aims to examine the relationship between lean production and business performance of Malaysian companies in the food industry. To have empirical evidence about these relationships, data have been collected from (187) executive managers for (1309) Malaysian companies in the food industry. using a self-administered questionnaire. The collected data have been analyzed using both descriptive statistics and multiple regressions. Correlation analysis and multiple regressions using SPSS have been performed to measure the relationship between variables and to test the hypotheses related to the study. The results of this study have reported a positive correlation between lean production and business performance, but not with SMED practices, which indicates a weak effect on business performance. The study will help practitioners to anticipate potential obstacles and take proper measures to deal with them during lean implementation.

**Keywords:** Business Performance, Malaysian Food Industry, Lean Production.

## 1. Introduction

Today's market is characterized by shorter product life cycles and the increasing individualization of products, together with increasing global competition (Lasi et al. 2014). as well as the food industry experienced substantial growth globally for the past few decades, while the source indicates that the Malaysian food industry will witness a decrease in revenue growth in the coming years, up to 4.7 % in 2024 (Statista, 2019).

Despite its significance and the numerous policy initiatives introduced by the Government to promote the companies' growth, the performance of Malaysian companies in the food industry was below economists' expectations in 2018 and 2019 (Department of Statistics, Malaysia, 2019).

According to the Department of Statistics, Malaysia, (2020) the food industries' growth rates on a year-on-year basis were declined. The Gross Domestic Product by Kind of Economic Activity at Constant 2015 Prices (Growth YoY, %) recorded a decrease in the years 2017 2018 2019 respectively (11.2, 3.7, 3.5), the decrease in Index of Industrial Production (IPI) (Growth YoY, %) also appeared in the same years (10.8, 3.2, 3.05) (Department of Statistics, Malaysia, 2020).

Attract satisfactory business performance is the basis for the enterprise's survival and the principal reason for the existence of the firm, as a firm can generate acceptable results and actions in terms of market growth, an increase of market shares and the industry's relative growth (Liu, GE & Wang, 2014; Maziriri, 2018). Further, business performance is a set of achievement gained after

implementing a set of practices. Measuring performance means assessing achievements resulted from the implementation of a set of practices (Nawanir, 2016).

To meet the challenges faced by manufacturing companies, they are forced to continuously seek new approaches to improve their performance. Lean manufacturing has in the last two decades arguably been the most prominent methodology for improving the performance in manufacturing companies (Holweg, 2007; Found and Bicheno, 2016).

Lean manufacturing (LM) is a strategy that aims to achieve smooth production flow by eliminating waste and increasing the activities that create value, elimination of non-value-added activities, continuous improvement practices and others to enhance business performance (Bevilacqua, Ciarapica, & De Sanctis, 2017; Nordin, Deros, & Wahab, 2010; Sahoo & Yadav, 2018)

Food is an industry that handles raw materials, semi-finished and finished products that are perishable and largely variable in quality and manufacturing lead times thereby has several ways and supply chain points of generating and accumulating wastes. In addition, the highly unpredictable supply of raw materials is a common feature in food sector (Dora et al., 2014). Therefore, practicing lean, which focuses on reducing waste would be critical for food manufacturing companies.

The original purpose of this paper is to examine the relationship between lean production and business performance of Malaysian companies in the food industry.

To cover the knowledge gap, this paper examines modern methods to improve the business performance of Malaysian companies in the food industry through lean production practices.

The problem is crystallized in the light of the need for companies to a richer, more nuanced conceptualization of the relationship between lean production practices and improving business performance in the food industry. On this basis, the research problem was formulated in response to the knowledge gap.

## **2. Literature Review**

### **2.1 Lean production**

Lean production is a strategy or philosophy that promotes the use of practices, such as kanban, TQM, just-in-time, TPM, automation and value stream mapping to minimize waste and enhance firm performance (Belekoukias, Garza-Reyes & Kumar, 2014; Hofer et al., 2012). Lean production, rather than a method, is a modern way of operating and a systemic solution to the method that produces the atmosphere that enhances processes in a company (Sahoo and Yadav, 2018; Hofer et al., 2012).

Lean production is usually represented from both practical and philosophical viewpoints (Poksinska & Swartling, 2018). The practical one includes a variety of methods and strategies employed to minimize waste. The philosophical viewpoint concerns driving principles, values, and company actions like 'people respect' cultivation and long-term ties with suppliers (Piercy & Rich, 2015; Snyder, Ingelsson & Bäckström, 2016).

Lean production technology is specifically targeted at reducing multiple waste in an industry by diverse enhancements. What's waste? It may come in several ways, but the underlying concept is to eradicate anything or everything that in a manufacturing environment does not create value. Any waste types are: waiting is the time a part takes to continue with the next step. Transportation is the time required to transport the raw material unnecessarily. Motion are people's unproductive moves (Hiremath, Narayanan & Shettar, 2018).

The researchers will adopt a group of practices (Kanban, SMED, TPM, JIT) as variables for this study. As these practices are consistent with the practices approved by researchers in the food industry (Dora et al., 2014; Khusaini et al., 2014; Borges Lopes et al., 2015; Psomas, et al., 2018).

### **2.2 Business performance**

Business performance is an important component in investigating organizational phenomena (Ho, Ahmad & Ramayah 2016). Business performance could be described by utilizing the main data in recognition of 'subjective business performance' calculating the secondary data to quantify 'objective business performance' or both as a cumulative indicator of the company's ability to serve its stakeholders (Shad, Lai, Fatt, Klemeš & Bokhari 2019).

Uddin, Bose and Yousuf (2014) indicate that business performance is important to any business firm. Liu and others (2014) state that business performance is the basic embodiment of enterprise management, effectiveness, and efficiency. Further, to attract satisfactory business performance is the basis for the enterprise's survival and the principal reason for the existence of the firm (Liu et al., 2014). Gharakhani and Mousakhani (2012) view business performance as the ability of a firm to generate acceptable results and actions. Shehu and Mahmood (2014) describe performance of business in terms of revenue development, market share growth and the overall growth of the company. Mark and Nwaiwu (2015) clarify that the organization is working to meet its customer satisfaction, employee happiness, social satisfaction, and sustainability targets by making the business productive.

Maziriri (2018) see business performance measurement is critical for the survival and development of business sodalities. The author expresses that performance quantification guarantees ceaseless change as the advance in objective accomplishment is always performed. The author maintains that if there are issues, these performance measurement frameworks give systems to actualizing change endeavors.

### 2.3 Malaysian Food Industry

The Malaysian food industry is a fast-growing industry characterized by a large export market. Malaysia's most significant food exports are in the oils and fats category, particularly palm oil-based products, for which the country is one of the two largest exporters in the world. The food industry accounted for approximately 9.8% of Malaysia's exports in 2017. The country is also heavily dependent on imports of many staples including rice and most meat and seafood for domestic consumption (MIDA, 2018).

The Malaysian food industry is as diverse as the cultures in Malaysia with a wide range of processed food with Asian taste. This industry is predominantly Malaysian-owned, dominated by small and medium scale companies (SMEs). Besides the SMEs, there are notable foreign and MNCs companies producing processed food products in Malaysia. It encompasses sectors such as cocoa and chocolate products, fishery

products, cereals and cereal products, processed fruits and vegetables, confectionery, food ingredients, herbs and spices, beverages, animal feed, and others (USDA/FAS, 2018)

Increasing consumer awareness in nutrition value and food fortification for healthcare has created the demand for functional food, healthy minimally processed fresh food, organic food and natural food flavors from plants and seafood. Food ingredients such as customized formulations required by food manufacturers, natural food additives and flavors have the potential for further growth (ITA, 2018)

therefore, the organizations in this industry must consider implementing radical, incremental innovations or changes to gain competitive advantages (Zainal et al., 2018).

Malaysia's food processing industry is transitioning from the employment of conventional processes to the use of emerging technologies. Malaysian industry players are also moving towards more automated flexible, and efficient operations vis-à-vis Industry 0.4 as global competition for new and existing products, intensifies within the industry (MIDA, 2018).

Even though the industry has developed significantly over the years in terms of new technology and innovations, several challenges remain. These include a fragmented manufacturing environment and aging infrastructure that inhibit productivity. While the food processing industry is growing, it still accounts for only about 10 per cent of manufacturing output (MIDA, 2018).

### 3. Research Hypotheses Developing

This study tested several research hypotheses to analyze the question of whether lean production practices improve business performance in the study sector.

There are amount of scholarly publications that are explicitly investigated by various practices or criteria for the effect of lean production on business performance, like (Curkovic et al., 2000; Kaynak, 2003; Ahmad et al., 2004; Fullerton & Wempe, 2009; Mackelprang & Nair, 2010; Yang et al., 2011; Inman et al., 2011; Hofer et al., 2012; Klingenberg et al., 2013; Ghobakhloo & Hong, 2014; Dora et al., 2014; Dora et al., 2016; Mutua et al., 2018; Sahoo and Yadav, 2018; Abreu-Ledón et al., 2018; Negrão et al., 2019).

Although most studies have reported a positive correlation between lean production and business performance, in several instances, the mean impact of LP on business performance barely reaches a moderate or medium level in many cases (Mackelprang & Nair, 2010). Abreu-Ledón, et al, (2018) indicated that the reason for the weak relationship is due to other variables

related to other organizational units, the operations area may not be directly responsible for these variables, which might be related to other areas of the company (Klingenberg et al., 2013; Abreu-Ledón et al., 2018).

Table 1 shows the studies which examined the effect on business performance of lean production.

Table 1: Summary from Literature Review on Lean Production and Business Performance. Source: Literature Review 2022

No.	Authors	Title	Methodology	Scope
1	Negrão et al, 2019	Lean manufacturing and business performance: testing the S-curve theory	Survey quantitative questionnaire	Manufacturing companies in an industrial cluster in Brazil
2	Abreu-Ledón et al, 2018	A meta-analytical study of the impact of Lean Practices on firm performance	Meta-analysis-based correlations approach	30 articles published from 2000 to 2016
3	Sahoo & Yadav, 2018	Lean production practices and bundles: a comparative analysis	Survey quantitative questionnaire	The Indian manufacturing industries.
4	Mutua et al., 2018	Influence of Lean Production Practices on Performance of Large Manufacturing Firms in Kenya	Survey quantitative questionnaire	Large Manufacturing Firms in Kenya
5	Dora et al., 2016	Determinants and barriers to lean implementation in food-processing SMEs – a multiple case analysis	case study qualitative interviews	food-processing SMEs in Belgium
6	Dora et al., 2014	Application of lean practices in small and medium-sized food enterprises	Survey quantitative questionnaire	European food processing SMEs

It is seen from Table 1 that any of the studies reviewed have been tested in the current study sector specifically (Malaysian food industry). This leads to the following hypothesis:

Hypotheses:

lean production practices have a positive effect on business performance.

The following sub-hypotheses derive from it:

H1: Kanban have a positive effect on business performance

H2: SMED have a positive effect on business performance

H3: TPM have a positive effect on business performance

H4: JIT have a positive effect on business performance

#### 4. Methodology

This section gives full details about the methodologies followed in the study for sample selection, data collection, data analysis, and validity and reliability assessments of the research framework constructs. A quantitative methodology was taken in which the data collected were separated into two sections by a survey. The first section focusses on the general features of the subjects, including the gender, age, educational, years of service of the respondent, and company size. In the second section, measuring the research variables (lean production and business performance). Questions for the lean production variable were based on Nawair (2016) and Mutua et al. (2018). While elements of Business Performance were based on Braun et al. (2019); Shad et al. (2019). The target population of these (1309) companies was

composed of both large and SMEs companies (FFM, 2015; MATRADE, 2015). As a sampling method, systematic random sampling was selected.

This study used primary data for further analysis. As the nature of this study was descriptive as well as correlational, so, the researcher collected primary data using self-administered questionnaires from a sample of 187 executive managers for the companies in the Malaysian food industry. The participants were invited to give their opinions on a Likert-scale (1-5) ranged from strongly agree to strongly disagree to analyze data obtained using SPSS correlation and regression analysis.

## 5. Results and Discussion

The first section of the survey provided a profile's overview of the responding organizations and individual respondents.

In this case, most participants were males, they constitute 60.9% of the respondents, and the rest, 39%, were females. The results of the statistical descriptive analysis in terms of the respondents' educational status showed that most of the participants have a bachelor's degree with a percentage of 63.1 %, diploma degree at 18.1 %, master's degree with a percentage of 9%, a PhD degree at 3.2%, and those with other levels of education 6.4% of the total number of the respondents.

Most participants (i.e., 149 respondents or 79.6%) are engaged with their business longer than five years, depending on the duration of working in the companies. Others have represented their companies for fewer than five years (38 respondents, or 20.3 %). Furthermore, for more than three years, 91 respondents (48.6%) have served in current positions; 78 (41.7%) for one to three years; and, for less than a year, 18 (9.6%) of respondents were named to their new posts. Although some participants have worked for less than one year at the present time, they have worked for more than five years in the companies. They were therefore found knowledgeable in engaging in this research. The size of companies was 13.4 % for big companies while 44.9% for medium companies, and 41.7% for small companies.

This research analyzed the common statistical description using a statistical descriptive analysis.

The mean, minimum, maximum and standard deviations for the constructs are measured (i.e., independent, and dependent variables). Indicators are used in the 5-point Likert scale varying from 1 to 5 "strongly disagree" to "strongly agree". The mean score decision interval from Algahtany et al. (2011) was taken to analyze scaled perception responses.

Lean production practices are the main construct and captures four dimensions, namely, Kanban, SMED, TPM, and JIT, and it was observed that SMED had the highest mean value, followed by TPM and JIT. This indicates that the responding firms pay more attention to SMED than other practices. Also, the total indicators' mean score was  $m = 3.599$  which is considered as a high level.

Likewise, Business Performance was measured using two items, market performance and process performance in the explored companies, where the mean value and the standard deviation of the Market performance variable are 3.614 and 0.657, the mean value and the two criteria are 3.698 and 0.619 for Process performance. In general, all respondents tend to agree highly.

To recognize the factors associated with Malaysian food industries' business performance, correlation analysis was conducted where the correlation coefficient illustrates the relationship between the independent variables (Kanban, SMED, TPM, JIT), and dependent variable (business performance).

The number reflecting the Pearson correlation is called the correlation coefficient according to Hair and others (2017). It is between -1.00 and +1.00, with +1.00 reflecting a perfect positive relationship, and 0 is totally non-association between the two matrix variables. Meanwhile, -1.00 implies a perfectly negative or reverse relation (the larger the correlation coefficient, the stronger the linkage or level of association). Lean production practices also have a positive correlation with business performance. Based on the Cohen (1988) directives, all the R-values are ranging between 0.457 and 0.600 and significant at .01 (two-tailed). Between SMED's and business performance the lowest R-value and between TPM and business performance the highest. From these observations, it can be claimed that lean production practices aim to enhance business performance.

## 6. Hypotheses test

The study tested four hypotheses which sought to establish the effect of the study variables: Kanban, SMED, TPM, JIT on business performance. The study tested all the four hypotheses using linear and multiple regression analysis, and correlation analysis, and the results interpreted according to the values of t, R2 and F values at the 95% level of significance.

The regression model from table 2 justifies that 46.1% of the four lean production practices explained the variation in business performance by ( $R^2=0.461$ ). The  $R^2$  value of 0.461 indicates a 46.1% relationship between lean production practices and business performance this implies that lean production practices explain the variation of business performance by 46.1%. The regression model is significant as shown from the ANOVA table values ( $F=188.870$ ;  $p<0.05$ ).

Table 2 Relationship Between Lean Production Practices and Business Performance. Source: Survey data (2022)

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	0.679 <sup>a</sup>	0.461	0.458		0.43872
ANOVA <sup>a</sup>					
Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	36.352	1	36.352	188.870	0.000 <sup>b</sup>
Residual	42.536		0.192		
Total	78.888				
Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (constant)	1.078	0.190		5.677	0.000
Lean Production	0.716	0.052	0.679	13.743	0.000

In reference to the coefficients table, Table 2, the study established a strong positive relationship ( $\beta= 0.679$ ;  $p<0.05$ ). The statistical level of significance for this variable between lean production practices and business performance of food industry companies in Malaysia is  $p= 0.000$  which is lower than  $p= 0.05$ . As a result, the null hypothesis has failed to accept, and the alternate hypothesis was accepted. This suggests that there

is a strong positive relationship between lean production practices and business performance that is statistically significant.

Table 3 illustrates the result of multiple regressions to examine the effects of lean production practices (Kanban SMED, TPM, JIT) on business performance in companies of Malaysia food industry.

Table 3 Relationship Between Lean Production Practices (Kanban, SMED, TPM, JIT) and Business Performance. Source: Survey data (2022)

Model Summary <sup>b</sup>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.692 <sup>a</sup>	0.479	0.469	0.43432
ANOVA <sup>a</sup>				

Model	Sum of Squares	Df	Mean Square	F	Sig.
<b>1 Regression</b>	37.767	4	9.442	50.054	0.000
<b>Residual</b>	41.121		0.189		<sup>b</sup>
<b>Total</b>	78.888				
Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
<b>1 (constant)</b>	1.146	0.192		5.981	0.000
<b>Kanban</b>	0.162	0.064	0.190	2.540	0.012
<b>SMED</b>	0.013	0.066	0.013	0.192	0.848
<b>TPM</b>	0.252	0.080	0.275	3.166	0.002
<b>JIT</b>	0.272	0.083	0.285	3.283	0.001

The results indicated that lean production practices (Kanban, SMED, TPM, JIT) explained only 47.9 per cent of business performance of companies of Malaysia food industry ( $R^2=0.479$ ,  $F=50.054$ ,  $p<0.01$ ). In Malaysian food industry companies, only three dimensions have had significant impacts on business performance. They were Kanban ( $\beta=-0.190$ ,  $t=-2.540$ ,  $p<0.05$ ), TPM ( $\beta=0.275$ ,  $t=3.166$ ,  $p<0.05$ ), and JIT ( $\beta=0.285$ ,  $t=3.283$ ,  $p<0.05$ ).

On the contrary, the other dimension, SMED, failed to predict business performance in the Malaysian food industry companies ( $p>0.05$ ).

Hence, a reasonable conclusion can state that a significant and positive impact of managing the Kanban is found, TPM and JIT on business performance, and we reject our empty assumptions and thus support the assumptions:

H1: There is a positive relationship between Kanban and Business Performance.

H3: There is a positive relationship between TPM and Business Performance.

H4: There is a positive relationship between JIT and Business Performance.

On the contrary, the other dimension, SMED, failed to predict business performance in the Malaysian food industry companies ( $p>0.05$ ). and we accept our empty assumption

H2: There is no positive relationship between SMED and Business Performance.

## 7. Conclusion

The following research work addresses the issue of possible relationships between lean production practices and the company's business performance. To be exact, this study i) investigated the relationships between (Kanban, SMED, TPM, JIT) and business performance. And ii) examined the impact of lean production practices toward improving business performance. Therefore, this study provides authentic empirical evidence on which to base discussions about the impact of lean production practices on business performance in the food industry.

Thus, managers will be able to take better and more effective decisions about the implementation of lean methods. Even the largest and most profitable organizations will face some type of resource constraint that may stop them from implementing all lean methods and tools simultaneously. Thus, this study can also guide organizations to prioritize the implementation of lean methods according to the performance measures they consider more strategically important to improve. In terms of its theoretical value, this study complements the previous research performed in this area by considering the analysis of the effects of all the most essential lean methods on the most currently important measures of business performance

The results of this study support most studies have reported a positive correlation between lean production and business performance, but not with SMED practices, which indicates a weak

effect on business performance. The reason for the weak relationship may be due to other variables related to other organizational units or to the influence of control variables (such as the size of the company), the operations area may not be directly responsible for these variables, which might be related to other areas of the company.

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