Journal of Engineering and Applied Sciences 13 (8): 2108-2113, 2018
ISSN: 1816-949X

Effect of JIT on Organisational Performance: Influence of Performance Measurement System

[1]Zarinah Abdul Rasit, [2]Nurul Huda Abdul Satar and [1]Aliza Ramli
[1]Faculty of Accountancy, Universiti Teknologi MARA, Shah Alam, Malaysia
[2]Kolej Poly-Tech MARA, Bangi, Malaysia

Abstract: In today's current market demands and globalization, companies need to constantly analyse their strategies in order to thrive and sustain their competitive positions. Among the strategies generally adopted by companies to enhance manufacturing performance are through implementing management accounting practices particularly, just-in time and the use of traditional and advanced Performance Measurement Systems (PMS). The implementation of these practices enable them to improve productivity as JIT focused on reducing and eliminating cost while PMS is a system that enables an organization to manage its performance and perform its strategy into deliverable results. Incorporating contingency theory, this study aims to examine the relationship between JIT practices and organizational performance and to determine the influence of PMS use in the relationship. Data were collected using self-administered questionnaire survey on a sample of Malaysian manufacturing companies. The results support the view that more extensive performance measurement system benefits performance as we find that, firms implementing JIT system with more advanced performance measurement systems, especially, those that include financial and nonfinancial measures have higher performance. The results revealed that the relationship is more significant for companies using more advanced PMS compared to companies that used traditional PMS.

Key words: Just-in time, performance measurement systems, organizational performance, contingency theory, PMS, companies

INTRODUCTION

As the globalization of business environment continues, companies will be presented with significant challenges that force companies to compete soundly in order to survive and to sustain their market position. One of the most vital and effective strategies is the implementation of Just in Time (JIT) system. JIT was being introduced by the Japanese and was being implemented earlier by Toyota company in the mid-twentieth century (Chen and Tan, 2013). In general, JIT can be defined as a manufacturing process with the ultimate goal to improve productivity and reduce and eliminate waste with company-wide involvement and supports by all of the employees in a particular organization (Isa and Tay, 2008; Fullerton *et al*., 2003). The essence of JIT system is to eliminate the non-value added activities and to reduce the cost in manufacturing process as to enhance performance (Mackelprang and Nair, 2010).

The basic idea that bring JIT system to a successful philosophy is the idea that the production of essential product is done in essential quantities at the essential time while reducing waste (Matsui, 2007). One of the benefits that could be derived from JIT is that it assists companies to efficiently and effectively meet customer's demand and sustain competitive advantage (Mackelprang and Nair, 2010). The philosophy that underlined the JIT system is the demand pull and lean manufacturing in which the products will only be produced when there is demand from customers (Isa and Tay, 2008). The JIT system evolved to be a program that focuses on the continuous improvement and waste elimination in production.

Implementation of an effective Performance Measurement System (PMS) can contribute to ensure successful implementation of JIT system. PMS has evolved from focusing on financial performance to non-financial performance which is suitable for modern manufacturing industries. Evidence from prior research indicate the use of financial and non-financial measures may help to increase performance for companies that implement JIT system (Hyvonen, 2007). According to Chenhall and Langfield-Smith (1998) in order to remain competitive in the industry, organizations need to make some changes on various aspects of planning, directing and monitoring procedures. An effective performance measurement, a good strategy in terms of business

Corresponding Author: Zarinah Abdul Rasit, Faculty of Accountancy, Universiti Teknologi MARA, Shah Alam, Malaysia

developments, resource allocation and employee willingness will support the thrive of an organization (Sinclair and Zairi, 1995). Most studies discovered that financial or traditional performance measures are no longer able to provide adequate decision making information for managers (Rasit and Isa, 2014; Azofra *et al*., 2003). Further to that, Azofra *et al*. (2003) claimed that financial measures delay the information and provide inaccurate data regarding the performance which has led to its limited use. In most organizations, the contemporary or advance performance measurement systems have been adopted as a result of globalization and competition.

Medori and Steeple (2000) stated that balanced performance measurement systems would assist the organization to be constantly align with the company's objectives and strategies. In the manufacturing sector, the ultimate focus is on the effectiveness and efficiency of production process. The cost efficiency and quality improvement seems to be vital concern of the management. In order to achieve those goals, appropriate management accounting techniques like JIT with the implementation of appropriate PMS would be able to help firms in achieving their objectives to improve performance. This research will provide empirical evidence on the effect of JIT on organizational performance. The research will also identify if there is any effect on the organizational performance with the use of either traditional or advance performance measurement systems. The remainder of this study is organized as follows: the next section presents the conceptual framework and hypothesis development. Then, followed by research methodology, results and discussion and conclusion.

Conceptual theoretical framework and formulation of hypothesis: This study will provide empirical evidence on the relationship between JIT practice and organizational performance with PMS moderating the relationship. In management accounting field, contingency approach referring to the idea that there is no commonly appropriate accounting techniques that would be applicable to all organizations in similar circumstances (Otley, 1980).

Each organization has its own specific design of accounting system and it depends on how the organization adapts with that specific factors. Since, the PMS is important in the implementation of these techniques, this study would further examine how the more advanced PMS can influence the implementation of JIT towards achieving improved organizational performance. The conceptual framework is as shown in Fig. 1.

JIT and organizational performance: A considerable number of studies have provided empirical evidence of

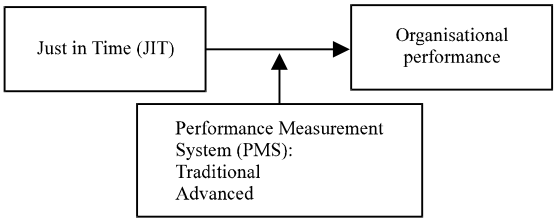

Fig. 1: Conceptual framework

the positive implication of JIT implementation towards performance (Fullerton *et al*., 2003, Isa and Tay, 2008). Manufacturing firms that implement and maintain the JIT techniques may probably improve in terms of financial result (Fullerton *et al*., 2003). In fact, Flynn *et al*. (1995) stated that JIT practices with a combination of other infrastructural practices result in a positive effect towards performance. In implementing some aspects of JIT manufacturing and purchasing practices, manufacturing firms could attain better financial and non-financial organizational performance (Isa and Tay, 2008). In analyzing the relationship between JIT practices and manufacturing performance, Sakakibara *et al*. (1997) found that JIT practices will only provide value and improve performance if they are used together with other organization practices like quality management, work force supervision, manufacturing plan, organizational features and product design. Hence, the first hypothesis in this study is developed as:

- H_1: just-in-time has positive relationship with organizational performance

JIT, advanced PMS and organizational performance: Besides, JIT would provide better benefits for companies using non-financial performance measures or advanced performance measures. Chen and Tan (2011) found a positive impact on JIT implementation with Chinese manufacturing companies production operation performance. The use of production operation performance includes operation cost, quality level on time ratio of product delivery and WIP inventory level. In considering the relationship between organizational support and JIT implementation, Chong *et al*. (2001) found that there is an improvement in manufacturing performance in terms of its quality and productivity. Based on the literature, the following hypothesis is being proposed:

- H_{2a}: there is a significant positive relationship between JIT practice and OP for companies using Advanced PMS

JIT, traditional PMS and organizational performance: Empirical studies showed mixed findings on the

relationship between JIT techniques and traditional or financial performance measures towards companies performance. Inman and Mehra (1993) claimed that with the implementation of JIT, there is a significant effect on the improvement in financial status of a company that will improve the overall performance. In comparing JIT adopters and non-adopters, Kinney and Wempe (2002) found that there is a greater improvement in financial performance in terms of profit margin in JIT adopters. Was also reported by Claycomb *et al.* (1999) when JIT has a direct impact on companies financial result such as Return on Investment (ROI), companies profit and Return on Sales (ROS). However, a study by Balakrishnan *et al.* (1996) showed that there is no significant difference between companies that implemented JIT and non-JIT to their Return on Assets (ROA). This study is an evident to claim that JIT implementation would not guarantee a better financial performance. So, the hypothesis is:

- H_{2b}: there is a weak positive relationship between JIT practice and OP for companies using traditional PMS

MATERIALS AND METHODS

The sample and data collection: The study employs a sample of company as the unit to be analyzed. About 200 large Malaysian manufacturing companies are randomly selected from the lists of companies in the 2016 Federation of Malaysian Manufacturing (FMM) Directory. The study focused on the manufacturing industry, since, these companies are much more related with the management accounting practices and changes (Sulaiman and Mitchell, 2005). The method of data collection was using a survey design and the questionnaires were distributed through postal mail and electronic mail similar with the study carried out by Isa and Tay (2008). The response rate for this current study is 24%. As claimed by Smith (2003) a response rate of <25% is common in accounting research and is considered reasonable for statistical analysis and suggestion.

Data analysis and measurement of variables: The data were analyzed using SPSS Statistics Software. For the hypothesis testing, data were analysed using simple regression analysis.

Just-in time: The instruments used to measure JIT are derived from Isa and Tay (2008) with total of six items. The respondents were asked to indicate to what extent the Just-in Time (JIT) practices adopted in their organization. To measure JIT, a 5-point Likert scale was used. The scale is ranged from 1 = least extent to 5 = greatest extent.

Performance measurement system: The PMS was measured using a 5-point Likert scale ranging from 1 = not used to 5 = widely used. The items used for PMS are derived from (Hyvonen, 2007) to measure the extent of PMS used. There are 8 items comprises traditional PMS and advanced PMS.

Organizational performance: To measure the performance of the company, the respondents were asked to indicate the level of their organizational performance compared to industry using a 5-point Likert scale. The scale ranges from 1 = below average and 5 = above average. The items of organizational performance are derived from the study by Hoque and James (2000) and Upton (1998).

RESULTS AND DISCUSSION

Descriptive analysis: Table 1 shows JIT mean value is 3.54 indicating that JIT is moderately used by the manufacturing companies. As for PMS the mean value is 3.91 and organizational performance 4.02.

The result of the reliability test shows Cronbach's alpha value for each variable; JIT (0.859), PMS (0.912) and organizational performance (0.886). The Cronbach's alpha values are all above 0.8 which suggests the measurements used are all consistent (Hair *et al.*, 2007). For the normality test, all the variables have the amount of Skewness and Kurtosis within ±2 indicating data for this study is in normal distribution (George and Mallery, 2010). Thus, the assumption of normality has not being violated and the parametric test can be carried out for this study.

Test of hypothesis

Simple regression analysis: Table 2 presents the regression result for the relationship between JIT and organizational performance. The result shows that JIT technique has a significant positive relationship with the organizational performance with Adj. R^2 of 0.374 ($B = 0.400$, $t = 5.398$, $p<0.01$). Thus, H_1 is supported. This indicates that, if the company increases the implementation of JIT technique, there will be 37.4% variation in organizational performance. This result signifies the result from previous literatures that support the implementation of JIT will correspondingly improve the company's performance (Inman and Mehra, 1993; Isa and Tay, 2008; Fullerton *et al.*, 2003; Matsui, 2007).

Table 1: Descriptive statistics of the main variables

Variables	Min.	Max.	Mean	SD
Just-in time	1.50	5.00	3.54	0.90
Performance measurement system	1.75	5.00	3.91	0.77
Organizational performance	3.00	5.00	4.02	0.58

Table 2: Regression analysis

Variables	B	R^2	Adj. R^2	t-values	Sig.
Constant	0.388	0.374	9.629	0.000	
JIT	0.400	-	-	5.398	0.000***

Significant at ***p<0.01

Table 3: Descriptive statistics for PMS variable

Research construct	Theoretical range (observed range)	Median (n[a])	Mean (SD)
PMS	0-40 (14-40)	32 (48)	31.31 (6.16)
Traditional PMS	0-32 (14-32)	29 (25)	27.1 (5.57)
Advanced PMS	33-40 (33-40)	35 (23)	35.91 (2.15)

Table 4: Regression analysis

Variables	B	R^2	Adj. R^2	t-values	Sig.
Constant	-	0.398	0.370	6.178	0.000**
JIT	0.411	-	-	3.730	0.001**

Significant at **p<0.01

Multigroup analysis: In order to further explore the influence of PMS in the relation between JIT and organizational performance. PMS is categorized into traditional and advanced PMS subgroups based on the PMS median scores as shown in Table 3.

Higher PMS scores specify advanced PMS and traditional PMS with lower PMS scores. The classification leads to the most equal split possible between the two types of PMS with median score of 32. The first group (25 companies) is using traditional PMS (relative to the median of the distributions <32). The second group is using advanced PMS (23 companies, median>32).

JIT, advanced PMS and organizational performance: As reported in Table 4, the results show significant positive relationship between JIT and performance ($\beta = 0.411$, $t = 3.730$ and $p<0.01$). The result also indicates that there is a significant and positive association between JIT and organizational performance for companies that use more advanced PMS. This result is supported by Upton (1998), who found that for JIT and non-JIT firms, the use of non-financial measures have significant association with organizational performance.

In addition, Isa and Tay (2008) also reported that the level of JIT systems was positively related to business performance and companies that implement non-financial performance measure in JIT manufacturing and purchasing practices are performing better. This result supports the view that advanced performance measurement systems may be best suited for organization with JIT system. The Beta value for this model is higher compared to the Beta value for the next model. This result indicates that companies that use more advanced performance measures perform better than those companies that used traditional performance measures. Hence, H_{2a} is supported.

Table 5: Regression Analysis

Variables	B	R^2	Adj. R^2	t-values	Sig.
Constant	-	0.156	0.120	9.105	0.000*
JIT	0.211	-	-	2.065	0.050

Significant at *p<0.01

Table 6: Summary of research hypothesis and findings

Hypothesis	Findings
H_1: JIT has positive relationship with organizational performance	Supported
H_{2a}: there is a significant positive relationship between JIT practice and OP for companies using advanced PMS	Supported
H_{2b}: there is a weak positive relationship between JIT practice and OP for companies using traditional PMS	Supported

JIT, traditional PMS and organizational performance: Hypothesis H_{2b} proposes the relationship between JIT and organizational performance is not significant for companies implementing traditional PMS. This hypothesis is being tested using a simple regression model similar to the earlier model, however, the only difference is that this analysis uses using data for companies that implement traditional PMS. The results is presented in Table 5. The estimated regression model is significantly positive with ($B = 0.211$, $t = 2.065$ and $p<0.01$). This result indicates that the relationship between JIT and organizational performance is significantly positive but less strong for companies implementing traditional PMS (Table 5, $B = 0.211$) compared to companies implementing advanced PMS (Table 4, $B = 0.411$). The findings are also consistent with the results by Upton (1998) who found a significant association with performance with the use of more advanced performance measurement or non financial measures. Hyvonen (2007) also claimed that companies using financial performance measures improves its performance when applying customer-focused strategy which is related to JIT practices. The beta value for this model (Traditional PMS subgroup) is 0.211 (Table 5) which is lower than beta value for earlier model is 0.411 (Table 4 for advanced PMS subgroup). Thus, H_{2b} is supported. However, the relationship between JIT and performance is stronger for companies using advanced PMS compared to using Traditional PMS. Table 6 presents the summary of the hypothesis testing result.

CONCLUSION

Generally, this study develops an integrated framework that support the use of management

accounting techniques particularly, JIT and PMS towards improving organisational performance. This research contributes an important finding for manufacturing industry that for successful implementation of JIT, the use of advanced PMS play a significant role to improve the organizational performance.

LIMITATIONS

The major limitation of this study is the use of a questionnaire survey for data collection which may not able to gather extensive information on the implementation of the techniques. Other than that, the small sample size of 48 respondents and low response rate of 24% could lead to some variations while reporting the result.

SUGGESTION

Future research may extend the research to other types of industries such as service industries.

REFERENCES

Azofra, V., B. Prieto and A. Santidria, 2003. The usefulness of a performance measurement system in the daily life of an organisation: A note on a case study. Br. Accounting Rev., 35: 367-384.

Balakrishnan, R., T.J. Linsmeier and M. Venkatachalam, 1996. Financial benefits from JIT adoption: Effects of customer concentration and cost structure. Accounting Rev., 71: 183-205.

Chen, Z. and K.H. Tan, 2013. The impact of organization ownership structure on JIT implementation and production operations performance. Intl. J. Oper. Prod. Manage., 33: 1202-1229.

Chen, Z.X. and K.H. Tan, 2011. The perceived impact of JIT implementation on operations performance: Evidence from Chinese firms. J. Adv. Manage. Res., 8: 213-235.

Chenhall, R.H. and K. Langfield-Smith, 1998. The relationship between strategic priorities, management techniques and management accounting: An empirical investigation using a systems approach. Accounting Org. Soc., 23: 243-264.

Chong, H., R.E. White and V. Prybutok, 2001. Relationship among organizational support, JIT implementation and performance. Ind. Manage. Data Syst., 101: 273-281.

Claycomb, C., R. Germain and C. Droge, 1999. Total system JIT outcomes: Inventory, organization and financial effects. Intl. J. Phys. Distrib. Logistics Manage., 29: 612-630.

Flynn, B.B., S. Sakakibara and R.G. Schroeder, 1995. Relationship between JIT and TQM: Practices and performance. Acad. Manage. J., 38: 1325-1360.

Fullerton, R.R., C.S. McWatters and C. Fawson, 2003. An examination of the relationships between JIT and financial performance. J.Operat. Manage., 21: 383-404.

George, D. and P. Mallery, 2010. Using SPSS for Windows Step by Step: A Simple Guide and Reference. Allyn & Bacon, Boston, Massachusetts, USA.,.

Hair, J.F., A.H. Money, P. Samouel and M. Page, 2007. Research Methods for Business. 1st Edn., John Wiley & Sons, Hoboken, New Jersey, USA.,.

Hoque, Z. and W. James, 2000. Linking balanced scorecard measures to size and market factors: Impact on organizational performance. J. Manage. Account. Res., 12: 1-17.

Hyvonen, J., 2007. Strategy, performance measurement techniques and information technology of the firm and their links to organizational performance. Manage. Accounting Res., 18: 343-366.

Inman, R.A. and S. Mehra, 1993. Financial justification of JIT implementation. Int. J. Oper. Prod. Manage., 13: 32-39.

Isa, C.R. and Y.K. Tay, 2008. Just-in-time manufacturing and purchasing practices and business performance: An exploratory study. Asia Pacific Manage. Accounting J., 3: 67-85.

Kinney, M.R. and W.F. Wempe, 2002. Further evidence on the extent and origins of JIT's profitability effects. Accounting Rev., 77: 203-225.

Mackelprang, A.W. and A. Nair, 2010. Relationship between just-in-time manufacturing practices and performance: A meta-analytic investigation. J. Oper. Manage., 28: 283-302.

Matsui, Y., 2007. An empirical analysis of just-in-time production in Japanese manufacturing companies. Int. J. Prod. Econ., 2: 153-164.

Medori, D. and D. Steeple, 2000. A framework for auditing and enhancing performance measurement systems. Int. J. Oper. Prod. Manage., 20: 520-533.

Otley, D.T., 1980. The Contingency Theory of Management Accounting: Achievement and Prognosis. In: Readings in Accounting for Management Control, Emmanuel, C., D. Otley and K. Merchant (Eds.). Springer, Boston, Massachusetts, ISBN:978-0-412-41490-9, pp: 83-106.

Rasit, Z.A. and C.R. Isa, 2014. The influence of Comprehensive Performance Measurement System (CPMS) towards managers' role ambiguity. Procedia Soc. Behav. Sci., 164: 548-561.

Sakakibara, S., B.B. Flynn, R.G. Schroeder and W.T. Morris, 1997. The impact of just in time manufacturing and its infrastructure on manufacturing performance. Manage. Sci., 43: 1246-1257.

Sinclair, D. and M. Zairi, 1995. Effective process management through performance measurement: Part I-applications of total quality-based performance measurement. Bus. Process Re-eng. Manage. J., 1: 75-88.

Smith, M., 2003. Research Methods in Accounting. SAGE Publications, Thousand Oaks, California, USA., ISBN:0-7619-7147-5, Pages: 241.

Sulaiman, S. and F. Mitchell, 2005. Utilising a typology of management accounting change: An empirical analysis. Manage. Accounting Res., 16: 422-437.

Upton, D., 1998. Just-in-time and performance measurement systems. Intl. J. Oper. Prod. Manage., 18: 1101-1110.