BEST MANUFACTURING PRACTICES AND FIRM PERFORMANCE IN THE CONTEXT OF VIETNAM'S MECHANICAL ENTERPRISES

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Abstract

The results of past studies show that applying best manufacturing practices has promoted firms to improve performance with mixed success. This study aims to examine the extent to which mechanical firms in Vietnam context have adopted best manufacturing practices and whether these practices contribute to firm performance. A structured questionnaire has been developed based on literature of best practices known as world-class. Out of the 204 questionnaires sent, 122 completed replies were received and valid. The data were analyzed using descriptive statistics and regression analysis. The results show that most of best manufacturing practices are adopted and implemented with fairly high degree of acceptance. Three over fourteen best practices (JIT delivery by suppliers, supplier quality management and equipment layout) are proved to be significant and positively related to financial performance, while four over fourteen best practices (JIT delivery by suppliers, cleanliness and organization, Kanban and maintenance) are significantly and positively related to non-financial performance. Implications, recommendations and future research are discussed.

Keywords: Best manufacturing practices, firm performance, mechanical firms, Vietnam

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1. Introduction

Today, fierce competition in the marketplace has forced manufacturing firms to optimize their internal resources, reduce costs, improve quality of product, maintain on-time delivery and flexibility of changing products and increase customer satisfaction in order to achieve a competitive performance. These challenges urged firms to change from their old traditional business management approach to the new one by implementing an integrated set of best manufacturing practices. Among them, just-in-time (JIT), total quality management (TQM), and other infrastructure practices are often used and referred as components of "World-class manufacturing" (Flynn et al.1995, Sakakibara et al. 1997, Cua et al. 2006, Matsui 2007, Battistoni et al. 2013).

Mechanical industry is considered as one of the most essential manufacturing industries in Vietnam. It plays an important role in

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the country's progress of modernization and industrialization. It encompasses the manufacture of machinery, mechanical components and spare parts for vehicles and other transportation, components for electrical and electronic industry, etc. Total value of industrial production has reached to 700,000 billion Vietnamese Dong and total export value was 13 billion US dollars in 2013 (Viet Nga, 2015). There are 53,000 mechanical businesses, which employ more than 500,000 people, accounts for 12% of all labours in manufacturing industry (Prime Minister Direction, 2014). Besides the achievements, there are many drawbacks in this industry. Especially, state mechanical firms are hard to adapt to new changes in management and technology, while private ones are small and medium scaled. They have faced with many obstacles in product specialization, research and development, product design capacity, out of date manufacturing process, inefficient management and quality control, lack of business planning and cooperation. All of these problems cause high cost of production, low product quality, lack of customer satisfaction, and after all, low competition of mechanical firms in domestic and foreign market. Therefore, it is essential for the mechanical firms to look for suitable best business practices to improve their performance and maintain competitive advantages.

This research attempts to reveal, firstly, the extent to which mechanical firms in Vietnam have adopted the best manufacturing practices and secondly, whether these practices contribute to firm performance. Besides the introduction, it encompasses the literature review, research method, findings and discussion, conclusion and implication of the research.

2. Literature review

2.1. Best manufacturing practices

Camp (1989) indicates that best practices are those to lead superior performance of a company, whereas Heibeler et al. (1998) define best practices as the best ways to perform a business process (cited in Davies and Kochhar, 2002).

According to Seedee et al. (2009), best practices are the key for moving companies to higher gear to achieve higher performance, which are market performance, operational performance, financial performance, and maintain global competition. It is also stated that the introduction of new manufacturing practices is related to expected performance improvement in specified areas (Voss and Blackmon, 1996).

However, firms must be aware of "best" when they use those practices. Accorded to IQS study (1993), some certain best practices may be appropriate and relevant to companies at particular time point in their development. This means some are not suitable for other firms in other time (cited in Seedee et al., 2009). So Davies and Kochhar (2002) show a need to determine which practices should be used to improve specific areas of performance. The study of Ketokivi and Schroeder (2004b) impresses the evidence that shows the better suitability of some practices to some strategies than other. It also states that "The effect of these practices is contingent upon strategic manufacturing goals".

In recent years, numerous manufacturing practices have merged to meet up with the need of improving firm performance, such

as product quality, shortening lead times, increasing responsiveness, lowering the costs, market share, sales and profitability growth. Among them, JIT, TQM and some infrastructure practices have received much attention from both academics and practitioners (Kannan and Tan, 2005). JIT describes the idea of producing the necessary items in the necessary quantities at the necessary time, and eliminating all sources of wastes in operations (Matsui, 2007). This is a weapon for reducing manufacturing costs and improving performance. JIT practices have been used by many researchers. A comparison of JIT practices discussed in seven empirical studies (Flynn et al., 1995; Sakakibara et al., 1997; Cua et al., 2001; Ahmad et al., 2003; Matsui, 2007; Battistoni et al., 2013) leads to the identification of practices that are commonly cited as a part of manufacturing program. These practices are daily schedule adherence, equipment layout, JIT delivery by suppliers, Kanban, and setup time reduction.

TQM aims at not only continuous improvement, but also process and product quality sustainability by capitalizing on the involvement of management, workforce, suppliers, and customers in order to meet or exceed customer expectations (Cua et al., 2001). There are five commonly cited practices in eight empirical researches: cleanliness and organization, process control, supplier quality management, customer focus, and maintenance, which are used in Flynn (1994), Flynn et al. (1995), Sakakibara et al. (1997), Cua et al. (2001), Ahmad et al. (2003), Ketokivi and Schroeder (2004a), Ketokivi and Schroeder (2004b), Cua et al. (2006), Matsui (2007), Phan (2014).

Besides two core sets of practices, infrastructure practices are identified as practices that create an environment for JIT and TQM to be effective in a plant (Ahmad et al., 2003). They are related to strategic-oriented and human-common practices, such as committed leadership, cross-functional training, employee involvement and information and feedback. Cua et al. (2001) use those practices to support JIT, TQM and TPM programs' implementation.

Table 1. Commonly suggested best practices used in literature

Literature	1	2	3	4	5	6	7	8	9	10	11
JIT practices											
Daily schedule adherence	X	X	X	X	X	X			X	X	X
Equipment layout				X	X	X			X	X	X
JIT delivery by suppliers		X		X	X	X	X	X	X	X	X
Kanban		X	X	X		X				X	
Setup time reduction	X	X	X	X	X	X	X	X	X	X	X
TQM practices											
Cleanliness and organization		X	X							X	X
Customer focus		X	X		X	X	X	X	X	X	X
Maintenance				X						X	X

Literature	1	2	3	4	5	6	7	8	9	10	11
Process control		X	X	X	X	X		X	X	X	X
Supplier quality management		X	X	X	X	X	X	X	X	X	X
Infrastructure practices											
Committed leadership		X	X	X	X	X				X	X
Multi-functional employee training			X	X	X	X			X	X	X
Employee involvement				X	X	X			X	X	X
Information and feedback				X	X	X			X	X	X

References: 1. Banker et al. (1993), 2. Flynn (1994), 3. Flynn (1995), 4. Sakakibara et al. (1997), 5. Cua et al. (2001), 6. Ahmad et al. (2003), 7. Ketokivi and Schroeder (2004a), 8. Ketokivi and Schroeder (2004b), 9. Cua et al. (2006), 10. Matsui (2007), 11. Phan (2014).

2.2. Firm performance

Dilber, et al. (2005) show that performance measurement is essential for organization's optimum management. The success of firm performance has been measured not only by financial criteria traditionally, like market share, earnings, profit and growth, but also by non-financial categories by product quality, cost, delivery, flexibility and customer satisfaction.

The most common approach for firm performance used in literature is non-financial performance, including cost (low cost unit), quality (conformance quality), delivery (on-time delivery) and flexibility (volume flexibility), which are used in the researches of Cua et al., 2001; Ahmad et al., 2003, Ketokivi and Schroeder, 2004a; Cua et al. 2006; Matsui, 2007; Phan, 2014. Besides, firm performance is measured by financial variables as well, like return on assets (ROA), return on investment (ROI), return on sales (ROS), sales growth and profitability (Yusuff, 2004; Seedee et al., 2009); or profitability and revenue growth rate (Duarte, et al., 2011). Some researches use both financial and non-financial performance, such as researches of Dilber, et al. (2005), Kannan and Tan (2005).

2.3. Relationship between best manufacturing practices and firm performance

In fact, researches show the significant relationship and positive performance when firms apply these best manufacturing practices. The results of empirical studies show the significant relationship between JIT practices and plant performance (Sakakibara et al., 1997; Matsui, 2007; Phan, 2014), TQM practices and quality performance (Rungtusanatham et al., 2005; Kristal et al., 2010), as well as common infrastructure practice and plant performance (Ahmad et al., 2003), and also the integrated program that includes three sets of practices and the positive effect on firm performance (Ahmad et al., 2003; Yusuff, 2004; Cua et al., 2006; Anuar and Yusuff, 2011, Phan, 2014).

Flynn et al. (1995) shows that the combination of JIT and TQM practices yields synergies for further performance improvement. Besides, common infrastructure practices have formed a strong foundation for

both JIT and quality performance. Sakakibara et al. (1997) indicate that core JIT practices without considering other ones, such as quality management, workforce management, manufacturing strategy, etc. cannot support firm to improve their performance. Cua et al. (2006) provide evidence that implementing TQM, JIT, and TPM practices exhibits a consistent positive effect on multiple dimension of manufacturing performance. Seedee et al. (2009) indicate that best practices do lead to higher firm performance, in which four out of nine dimension of best practices were positively an significantly related to firm performance.

Battistoni, et al. (2013) recommend to focus on the firm as a complex system, where the interactions among elements are more important than each single element, then the main operational management practices can generate improvements in the performance of manufacturing companies; and positive effects can be increased by the synergies of combining different approaches: TQM, JIT, TPM and SCM optimization.

However, in some researches, there is no positive relationship between operational practices and financial performance (Duarte, et al., 2011). It is explained that the impact of these practices in performance can be dependent on the context.

Thus, it is necessary to identify the best manufacturing practices suitable for mechanical manufacturing in Vietnam. This enables firms to define and focus directly on the areas that require improvement and increase their performance and competitiveness.

3. Research method

3.1. Research framework

JIT practices has adopted from common cited literature, including five variables: daily schedule adherence, equipment layout, JIT delivery by supplier, Kanban and setup time reduction. TQM practices include five variables: cleanliness and organization, process control, supplier quality management, customer focus and maintenance. Infrastructure practices include committed leadership, Multi-functional training, employee involvement and information and feedback (See table 1).

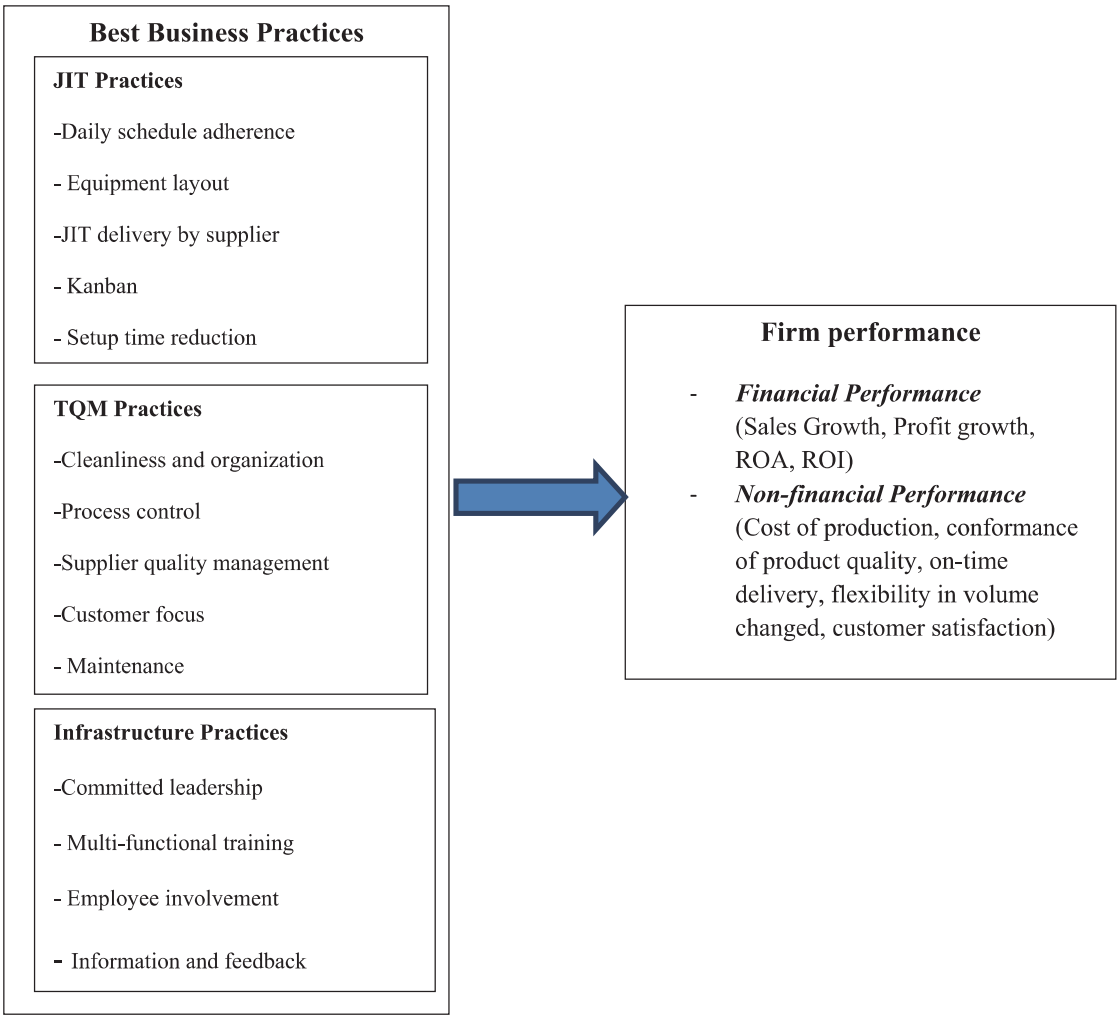
Financial performances are illustrated by four elements: sales growth, profit growth, ROA, ROI (Yusuff, 2004; Kannan and Tan, 2005; Seedee et al. 2009). Non-financial performances are presented by five elements: conformance product quality, production cost, on-time delivery, flexibility in volume changed (Cua et al., 2001; Ahmad et al., 2003; Matsui, 2007; Phan, 2014), and customer satisfaction (this factor is taken because all managers asked have already given it as one of the most important non-financial performances. It decides the continuous relationship between enterprises and their customers).

The research framework shown in Figure 1 shows the relationship between best manufacturing practices and firm performance.

Research hypotheses:

- H1: In Vietnam's mechanical enterprises, best manufacturing practices are significantly related to financial performances.

Figure 1. Research framework



- H2: In Vietnam's mechanical enterprises, best manufacturing practices are significantly related to non-financial performances.

3.2. Data collection and analysis

This research is mainly implemented using a questionnaire-based survey. The data used for empirical examination were collected by the author from February to May, 2018. In order to verify the data, the author firstly reviewed extensive relevant literature on best manufacturing practices and firm performances. Secondly, she checked the content validity of the measurement when they were translated into Vietnamese by interviewing three academics and managers in the field. Thirdly, the instrument was pre-tested by thirty managers in different manufacturing firms to check whether the practices are suitable for Vietnam's enterprises and re-worded if necessary.

The questionnaire is adopted from Dilber, et al. (2005), Cua et al. (2006), Matsui (2007) and Phan (2014). Questionnaire's items use a five point Likert scales. For best manufacturing practices, a scale from 1 as totally disagree to 5 as totally agree with the

statement indicates the implementation level of each criterion. For financial performance, a scale from 1 as totally disagree to 5 as totally agree with the statement indicates the perception of respondents about financial performance based on their actual business results (Seedee et al., 2009; Duarte et al., 2011). For non-financial performance, a scale from 1 as much lower than competitors to 5 as much higher than competitors is used to evaluate the plant performance relative to its competitors (Cua et al., 2006).

After development of instrument, the authors calls to 80 mechanical firms for arranging the survey. Firms varied in size from 10 (small-sized firm) to over 200 employees (large-sized firm). Target respondents are directors, vice directors, senior managers in operations, material, finance and accounting, and supervisors in the shop floor. List of firms is taken from Keieijuju's club - one member of Vietnam - Japan Institute of Human Resources Development (VJCC) and Vietnam Chamber of Commerce and Industry (VCCI Vietnam). According to Hair et al. (2014), the sample size is calculated by n = 50 + 8*m (m is number of independent variables). So the author dispatched 204 questionnaires. 140 ones were returned, in which 122 questionnaires from 51 mechanical enterprises were valid and able to use.

The data collected were analyzed using the Statistical Package for Social Sciences (SPSS) 20.0. The statistical methods used are descriptive statistics, reliability analysis and factor analysis, then regression analysis for hypothesis testing.

4. Findings and discussion

4.1. Descriptive statistics

As the result shown in table 2, all practices have overall mean scores of 3.16 to 4.22 (over 5). It indicates that mechanical firms' adoption and implementation of best practices is fairly high. Among JIT practices, equipment layout has the highest score (4.06). This is an important dimension to reduce costs of production. The firms try to facilitate equipment as groups in order to make product family or cell manufacturing, so the firms can reduce the production's transportation and stock in the production process. Daily schedule adherence (3.98) indicates that the daily schedule of production is fairly suitable and mechanical firms are able to complete tasks as scheduled. JIT delivery by suppliers (3.86) shows that the suppliers of the firms are quite on time to delivery stuff. Firms are trying to reduce setup time in order to reduce costs and this setup time production practice has a mean score of 3.84. Lastly, Kanban has a score of 3.16, the lowest among five JIT practices. It means the mechanical enterprises somehow agree and they are applying Kanban partly in order to increase the efficiency and reduce cost of production.

Table 2. Descriptive statistics and reliability analysis

JIT practices	Mean	Factor loading	Cronbach's Alpha	TQM practices	Mean	Factor loading	Cronbach's Alpha
Daily schedule adherence	3.98		0.701	Cleanliness and organization	4.14		0.857
DSA1	3.86	.586		LO 1	4.26	.532	

JIT practices	Mean	Factor loading	Cronbach's Alpha	TQM practices	Mean	Factor loading	Cronbach's Alpha
Daily schedule adherence	3.98		0.701	Cleanliness and organization	4.14		0.857
DSA2	4.13	.763		LO 2	4.21	.556	
DSA3	4.20	.787		LO 3	4.20	.542	
DSA4	3.73	.573		LO 44	3.92	.770	
Equipment layout	4.06		0.728	LO 55	4.11	.869	
EL1	4.28	.551		Process control	3.74		0.866
EL2	3.78	.484		PC 1	3.70	.699	
EL3	4.20	.628		PC 2	3.77	.806	
EL4	4.14	.756		PC 3	3.56	.645	
EL5	3.92	.703		PC 4	3.76	.757	
JIT delivery by suppliers	3.86		0.630	PC 5	3.92	.781	
SUP1	3.93	.839		Supplier quality management	4.16		0.814
SUP2	3.58	.582		SQM1	4.16	.581	
SUP3	4.07	.694		SQM2	4.06	.606	
Kanban	3.16		0.923	SQM3	4.23	.833	
Kan1	3.22	.869		SQM4	4.18	.826	
Kan2	3.19	.865		SQM5	4.16	.775	
Kan3	3.07	.850		Customer focus	4.12		0.742
Setup time reduction	3.84		0.907	CF1	4.23	.723	
SETUP1	3.97	.853		CF2	4.38	.706	
SETUP2	3.85	.870		CF3	3.90	.682	
SETUP3	3.85	.902		CF4	3.96	.613	
SETUP4	3.70	.807		Maintenance	4.05		0.790
				MA 1	4.20	.566	
				MA 2	4.07	.639	
				MA 3	3.88	.644	

Infrastructure practices	Mean	Factor loading	Cronbach's Alpha	Firm performance	Mean	Factor loading	Cronbach's Alpha
Committed leadership	4.22		0.731	Financial performances	3.86		0.860
CL1	4.24	.528		Sales growth	4.08	.903	
CL2	4.15	.740		Profit growth	3.95	.891	
CL3	4.29	.838		ROA	3.68	.796	
CL4	4.26	.636		ROI	3.74	.760	
CL5	4.32	.670		Non-financial performances	3.89		0.832
CL6	4.05	.490		Conformance of product quality	3.93	.755	
Cross-functional training	4.01		0.815	Cost of production	3.67	.633	
CFT1	4.07	.871		On-time delivery	3.97	.834	
CFT2	3.95	.880		Flexibility in volume changed	3.89	.843	
Employee involvement	4.05		0.864	Customer satisfaction	3.97	.802	
EI1	4.08	.712					
EI2	3.96	.897					
EI3	4.11	.807					
Information and feedback	3.91		0.819				
IF1	4.14	.823					
IF2	4.16	.851					
IF3	3.94	.667					
IF4	3.71	.901					
IF5	3.59	.909					

Source: Research's results

Total quality management has played a vital role for enterprises in order to improve quality and customer satisfaction. The implementation of quality management in these mechanical enterprises is fairly high, from 3.74 to 4.16. Supplier quality management has the highest score (4.16), followed by cleanliness and organization (4.14); customer focus (4.12); maintenance (4.05) and process control (3.74).

Infrastructure practices are considered as the ones to support the successful implementation of JIT and TQM. Committed leadership (4.22) proves the highest implementation in these mechanical firms, followed by employee involvement (4.05), multifunctional training (4.01), and information and feedback (3.91).

Firm's financial performance has the mean score of 3.86, in which sales growth has the highest degree of acceptance over four (4.08). It indicates that sales over the past three years of those mechanical firms has increased, which is followed by the profit growth over the past three years. It has fairly high degree of acceptance (3.95). Return on investment (ROI) and return on asset also have increased, which have somehow degree of acceptance of 3.74 and 3.68 accordingly.

Furthermore, firm's non-financial performance has the mean score of 3.89, which means these firms' performances are equal and higher than competitors' performances. Customer satisfaction and on-time delivery have the same score (3.97), followed by conformance of product quality (3.93), flexibility in volume changed (3.89), and cost of production (3.67). Cost of production of these firms are equal and usually lower than the competitors' ones.

4.2. Reliability and factor analysis

According to Matsui (2007) and Phan (2014), the reliability of measurement scales is judged based on the Cronbach's alpha coefficient, which should be more than 0.6. Then the validity of measurement scales is tested through factor analysis, which has the factor loading from 0.4 and above.

Table 2 shows the results of reliability and factor analysis. The Cronbach's alpha coefficient of all practices is above 0.6, and factor loading is above 0.4, so they are reliable and valid for further research (Matsui, 2007).

4.3. Hypothesis testing

This part uses multiple regressions to test whether hypotheses are accepted or not in order to find out the significant relationship between best practices and firm performance. Table 3 shows that best manufacturing practices were significantly related to financial performance and explained an additional 22.2% of the variance in financial performance (Adjusted R square = .222, $p < .05$).

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.558a	.312	.222	.56148

Table 4 shows the Sig. (F) = 0.000< .05, it means that this regression model is rational with 95 percent of the credibility. Moreover, it ensures that the financial performance can be interpreted by the best manufacturing practices.

Table 4. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.267	14	1.091	3.459	.000b
	Residual	33.733	107	.315		
	Total	49.000	121			

Among fourteen practices, JIT delivery by suppliers (Beta = .434, p <.05), Supplier quality management (Beta = .304, p < .1), Equipment layout (Beta = .269, p < .1) have significant and positive relationship with financial performance. The results on these best practices in table 5 support hypothesis 1. However, process control practice is significant by negatively related to financial performance (Beta = -.248, p < .05).

Table 5. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.824	.649		1.271	.207
	Daily Schedule Adherence	.146	.113	.146	1.295	.198
	Equipment layout	.269	.139	.199	1.937	.055**
	JIT delivery by suppliers	.434	.108	.406	4.023	.000*
	KANBAN	-.050	.063	-.078	-.788	.433
	Setup time reduction	.090	.093	.102	.960	.339
	Cleanliness and organization	.113	.132	.103	.859	.392
	Process control	-.248	.118	-.308	-2.104	.038*
	Supplier quality management	.304	.165	.235	1.844	.068**
	Customer focus	-.068	.156	-.052	-.433	.666
	Maintenance	-.065	.130	-.069	-.498	.620
	Committed leadership	-.179	.181	-.127	-.988	.325
	Multi-functional training	-.080	.086	-.085	-.923	.358
	Employee involvement	.052	.110	.050	.476	.635
	Information and feedback	.025	.119	.026	.213	.832

a. Dependent Variable: Financial Performances

** significant at the 0.1 level

* significant at the 0.05 level

Table 6 shows that best manufacturing practices were significantly related to non-financial performance and explained an additional 38.6% of the variance in financial performance (Adjusted R square = .386, p< .05).

Table 6. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.676a	.457	.386	.42383

Table 7 shows the Sig. (F) = .000 < .05, it means that this regression model is rational with 95 percent of the credibility. Moreover, it ensures that the non-financial performance can be interpreted by the best manufacturing practices.

Table 7. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.153	14	1.154	6.423	.000b
	Residual	19.220	107	.180		
	Total	35.373	121			

Among fourteen practices, JIT delivery by suppliers (Beta = .246, p <.05), cleanliness and organization (Beta = .268, p < .05), Maintenance (Beta = .190, p < .1), and Kanban (Beta = .081, p< .1) have significant and positive relationship with non-financial performance. The results on these best practices support hypothesis 2.

Table 8. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.784	.490		1.601	.112
	Daily Schedule Adherence	-.015	.085	-.017	-.174	.862
	Equipment layout	.155	.105	.135	1.475	.143
	JIT delivery by suppliers	.246	.081	.271	3.026	.003*
	Kanban	.081	.048	.149	1.703	.091**
	Setup time reduction	.038	.070	.051	.535	.594
	Cleanliness and organization	.268	.099	.288	2.700	.008*
	Process control	-.028	.089	-.041	-.313	.755
	Supplier quality management	-.097	.124	-.088	-.779	.438
	Customer focus	-.012	.118	-.011	-.103	.918
	Maintenance	.190	.098	.240	1.935	.056**
	Committed leadership	-.038	.137	-.032	-.279	.781

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	Multi-functional training	.048	.065	.061	.742	.460
	Employee involvement	.031	.083	.035	.375	.708
	Information and feedback	-.075	.090	-.090	-.840	.403

a. Dependent Variable: Non-Financial Performances

** significant at the 0.1 level

* significant at the 0.05 level

4.4. Discussion

The first question of this research is the extent to which the best practices are adopted and implemented by mechanical firms in manufacturing industry in the context of Vietnam. The results show that fourteen practices are adopted from a wide range of literature, known as daily schedule adherence, equipment layout, JIT delivery by suppliers, Kanban, setup time reduction, cleanliness and organization, process control, supplier quality management, customer focus, maintenance, committed leadership, multi-functional training, employee involvement and information and feedback, which range from 3.16 to 4.22. It is a bit higher than those of Thailand companies, ranging from 3.46 to 4.16 (Seedee et al. 2009); it is also higher than the level of manufacturing best practices by Malaysian small and medium enterprises, which gave score from 2.95 to 4.16 respectively (Anuar and Yusuff, 2011).

From the findings, the author also found that most of mechanical firms in Vietnam consider committed leadership plays an essential role for their success, especially the commitment to product quality and firm's quality as a whole. They pay attention to manage the relationship with their supplier and quality of input source in order to reduce and eliminate waste during the production. The firms also try to establish the long term relationship with their customer and adapt customer need and want to maintain customer satisfaction. They try to delivery product in good quality and on-time basis. But sometimes some enterprises have to delayed a delivery to one customer and take the stock delivered to others. Although daily schedule adherence is usually followed strictly, because of the contingent changes in customer order, on-time delivery purpose is not achieved and customer satisfaction is not fulfilled sometimes. This is a drawback that mechanical firms have to overcome.

Cleanliness and organization receive much attention from mechanical firms. They consider this practice as one to improve their quality as well as production and business standards. They try to arrange the equipment layout in order to reduce the transportation between work stations to cut cost. Workforce management is important for not only mechanical firms, but also the others as well. Mechanical firms take the employee involvement into account by encouraging team work and small group problem solving. Employees are trained to do multiple tasks. The firms also promote information

exchange and feedback in the shop floor and between levels of management. In short, the best manufacturing practices are adopted and implemented with a fairly high degree of acceptance in Vietnam's mechanical firms.

To answer the second question about the relationship between best manufacturing practice and firm's performance, the finding of the research shows that 22.2% changes in financial performance can be explained by fourteen best practices, with the highest positive impact of JIT delivery by suppliers, followed by supplier quality management and equipment layout practices. Process control has a significant negative impact on financial management. The result also indicated 38.6% of the variance of non-financial performance can be explained by fourteen best practices, with the highest positive impact of cleanliness and organization, followed by JIT delivery by suppliers, maintenance, and Kanban. Obviously, these practices should be concentrated to improve firm performance.

On the other hand, other practices are not strongly and positively impacted to firm performances, both financial and non-financial performances. It does not mean those practices are not important for mechanical firms in Vietnam. It may be understood that the given sample is taken at a particular time point, while all best practices are used to improve firm performance in a long time basis. So there is a difference between short and long-term view. This offers an opportunity for further longitudinal qualitative case study research.

Besides, the research would be taken in more mechanical enterprises and sample size should be bigger in order to increase the data representativeness and generate better research results, especially in case of discovering the relationship between best manufacturing practices and firm performances using hypothesis testing.

5. Conclusion and implication

The results show the extent of best manufacturing practice adoption and implementation is fairly high. This also finds that among fourteen best practices, JIT delivery by suppliers, supplier quality management and equipment layout have significantly positive impact on financial performance; whereas JIT delivery by suppliers, cleanliness and organization, maintenance and Kanban have significantly positive impact on non-financial performance. The mechanical firms in Vietnam should employ these practices to maintain and improve performance and gain competitive advantages. The findings also encourage the researcher to increase the sample size and implement further qualitative case study research to answer why some of best practices are still important to mechanical firms whereas they have no significant relation with firm performance.

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