ISBN: 978-979-3649-81-8

MODERN MANAGEMENT PRACTICES AND FIRM'S PERFORMANCE

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Abstract

To date, the role of technology as factors of success in competitive arena has become a subject of significant interest amongst practitioners and academicians. This paper is based on a field investigation via mailed questionnaire that was sent to CEOs (Chief Executive Officer) of manufacturing firms Indonesia that involved small and medium companies (SMEs). This research is an exploratory one that was conducted to invetigate the extent of soft technology adoption and to examine the relationship between the level of soft technological adoption on firm performance, in term of financial and manufacturing performance. The significant relationship was found between the level of soft technological adoption (TQM, MRP2 and Benchmarking) and performance implies the fact that adoption of TQM, MRP2, and benchmarking can improve the performance of an organization. TQM has an important role for improving manufacturing performance, while MRP2 plays an important role for enhancing financial and manufacturing performance. Further, benchmarking is very importance to be done for increasing financial performance. This study also indicates that Indonesian manufacturing SMEs that success in adopting TQM, MRP2 and Benchmarking can compete successfully. In addition, JIT and TPM seem to be left out by Indonesian manufacturing SMEs. The effect of JIT and TPM on financial and manufacturing performance is not significant.

INTRODUCTION

There have been many studies which focus on determinant technological adoption, and technological innovation, but the empirical research about the relationship between technology adoption to performance, still very little been done, especially in developing countries and SMEs (Small and Medium Enterprises) (Ellitan, 2001, Ellitan dkk, 2001). There is a reason why the empirical research which focus on the effect of technology adoption to performance is very scarce. It is because the assumption that adoption of technology will produce beneficial result only for it's adopter, such as increasing profitability, increasing productivity, and to achieve better operational performance (Irwin and Hoffman, 1998). As a result, many research more concentrated on what factors that make the adoption of technology successful rather than what is the consequences of technology adoption it self.

While the empirical study or empirical literature that investigate the effect of technological adoption to manufacturing performance, there are abundant of article and conceptual literature that analyzed the relationship between technology adoption and performance (Porter,1985; Higgins, 1995, Hottenstein and Dean, 1995). The issues of technological adoption or technological innovation as a potential source of competitive advantage is found repeatedly in literature. For example, Madique and Patch (1988) argue that technology presence is critical force for the business organization in competitive environment. Morone (1989) stated that technology as a source of competitive advantage, and he was confidence that his idea would be accepted widely in the management and economic literature. Technology advancement plays vital role in long term profitability (Stacey and Aston, 1990), beside technology has been identified as factors

ISBN: 978-979-3649-81-8

innovative corporate operation (Higgins, 1995). Base on these literature, it is very reasonable conceptual support for the existence relationship between technological adoption to firm's performance.

Technology in the theoretical context means both hard technology and soft technology. For manufacturing companies, hard technology means the process equipment used to physically transform and transport of raw material in to saleable component or products (Harrison and Samson, 1997). Hard technology, here has been focused on computer based technology and advanced manufacturing technology. Soft technology means the system which control the technical processes and the human resources process within the organization such as TQM (Total Quality Management), JIT (Just In Time), TPM (Total Productive Maintenance), MRP2 (Manufacturing Requirement Planning), and benchmarking (Harrison and Samson, 1997).

Based on experience from developing country, process technology is more dominant to be adopted, such as the experience in China (Chen, 1995; Tsang 1995), Latin America (Correa, 1995), as well as others developing countries as Thailand, South Korea, Turkey (Burgess, et al. 1998) and Indonesia (Shariff, 1997). The reason why the adoption of process technology has been done is the cost of adoption of process technology is relative less than adoption of product technology, the adoption of product technology is more risky, and the limited skill worker in developing country. It's also very interesting to note that soft technology is adopted more in small companies rather than hard technology.

In view of the background and the corresponding literature review, this study incorporate the following objectives:

- To investigate the extent of the level of soft technological adoption by Indonesian manufacturing firms.
- To investigate what is the relationship between the level of soft technological adoption and performance.

LITERATURE REVIEW

Technology and Competitive Advantage

Technology as one of potential sources of competitive advantage is not new issue but widely accepted in management and economic literature. Technological adoption and technological innovation have been powerful forces for industrialization, increasing productivity, supporting growth, and increasing standard of living (Abernathy and Clark, 1985).

The success of technology adoption, technology implementation, and empowerment of technology in pursuing competitive advantage depend on how the organization manages the technology itself. Managing technology is concerned with how the organization generates the technology internally, developes technology externally, integrates the technology within operational activities, and how organizations manage the existing skilled and operational workers (Morone, 1989). Finally, the balance between internally developed technology and externally developed technology is very important to create and establish technology capability of the organization (Mansfield, 1987).

Schroeder (1990) investigated the impact a new manufacturing technology had on industry competition and competitive strategies. The study found that technology adoption (innovation) created competitive opportunities and threats for firm's that both adopted it and those that did not. Technology adoption and new operation techniques have proven to have positive effect on SMEs' performance such as payroll size, asset size, financial rating, sales rating and operating problem. (Ignance, et al., 1998). To develop competitive advantage, organization need to choose, design, and implement manufacturing technology that is consistent with the needs of competitive advantage (Hottenstein and Dean, 1995).

Hard and Soft Technology

As mentioned earlier, this study focuses more on sc

ISBN: 978-979-3649-81-8

considering hard technology due to the choosing of SMEs as object. Hard technology comprises the process equipment used to physically transform and transport raw material into saleable components or products (Harrison and Samson, 1997). On the other hand, soft technology refers to the system which controls the technical processes and the human resources process within the organization such as TQM (Total Quality Management), JIT (Just In Time, TPM (Total Productive Maintenance), MRP2 (Manufacturing Requirement Planning), and benchmarking (Harrison and Samson, 1997, Moorthy, et.al, 2012).

the design, manufacturing, and administration all of the activities that are necessary to produce a product or provide service.

Many past studies were done concern with the role of hard technology for improving performance, especially manufacturing performance. According to empirical research that was done by Youseff (1993), firms that adopted and implemented computer based technology have higher degree flexibility than firms did not adopt. Beside flexibility, computer based technology also reduces costs, increases delivery capability, improves product quality and effectiveness of production process. Zammuto and Connor (1992) found that advanced manufacturing technology (AMT) gives a number of benefit as 40% reduction in lead time, 30% in machine utilization,

Management Practices

Management practices that investigated in this study includes, TQM, JIT, MRP2, TPM, and benchmarking. This section will present the soft technology comprehensively.

Total Quality Management (TQM) is the optimization of the performance of all parts and functions of an organization's operations, procedures and systems, control, and structure, in order to achieve conformance to the requirements and expectations. There are considerable empirical evidences that have shown that effective implementations of quality improvement practices lead to improvements in organization performance. Generally, the empirical studies suggest that TQM has significant relationships with increased quality and productivity along with customer and employee satisfaction (Sun, 2000; Fosberg and Nilson, 1999, Pudelko and Harzing, 2010).

Just In Time is a set of method or techniques that applied to purchasing, manufacturing and delivery functions. The philosophy of JIT is to eliminate waste and unnecessary activity wherever they occur (Warnock, 1996). JIT practices include set up time production, schedule flexibility, maintenance equipment layout, kanban and JIT supplier relationship (Sakakibara, et al. 1997). Other authors classified JIT practices as procedures-related practices and operation-oriented practices. Procedure-oriented practices included training managers and workers, reducing the number of suppliers, and establish joint quality control procedures with supplier. Operation oriented practices include modifying plant layout, reducing machine set up time, use multifunction machine, increasing the level of automation, standardization of operations simplification and reducing machine down time (Yasin, Small, and Wafa, 1997).

Total Productive Maintenance (TPM) is an innovative maintenance program (cost effective and proactive) approach to maintenance equipment (Nakajima, 1988 in Tsang, et al. 2000) that was widely and adopted successfully in Japanese industries. The documented success story about TPM implementations can be found in many literature Patterson et al, (1996); Tsang and Chan (2000); Yamashima (2000). For example a case study about TPM implementations in Asten Inc. (Patterson ,1996) found that TPM implementation was a contributing factor in reducing work in process, improving response to customer through reduced cycle time, and improving product quality. Further, a case study in China (Tsang and

ISBN: 978-979-3649-81-8

implementation could improve equipment availability, emergency work, unplanned down time, productivity of TPM tasks entrusted to operators, work in process, team work, and empowerment in the workforce, and also improved product quality. In Japan, implementation of TPM successfully became the first step to become a world class manufacturer and to create an active organization (Yamashima, 2000).

Manufacturing Resources Planning (MRP2) was developed in the 1970s from material requirement planning (MRP) and has been defined as ' an integrated computer based system to plan, control, and run each function of a business' (Warnock, 1996). While MRP2 has been criticized on the grounds that few benefits accrue for high implementation costs the potential rewards however for persistent organizations are very attractive. For example, Humpreys, et al. (2001) showed that companies able to implement MRP2 successfully report enhanced competitive positions, improved customer service level, a better financial position, increased plant efficiency, heightened morale in production, more effective coordination with marketing and finance, more efficient production and scheduling, reduced inventory level, fewer component shortages, reduced manufacturing costs and lead times and improvements in inventory turn over. In another study, Lowe and Sim (1993) found that when MRP2 was implemented together with JIT, it reduced cost, increased productivity, reduced paper work documentation, improved product and process quality, integrated all function to manufacturing, improved inventory control and gave a better control of manufacturing processes.

Benchmarking is a strategy for implementing change in an organization. It is a way of measuring operations against similar operation in order to improve business processes. The purpose of benchmarking is to improve products and processes to meet customer need. One of the empirical study about benchmarking in the UK, that has been done by Hinton, et al. (2000). They suggested that benchmarking is a relatively common tool for performance improvement in both the public and private sectors. Benchmarking is used to transfer best practices and continuous learning (Zairi and Whymark, 2000). While, Freytag and Hollensen (2001) point out that benchmarking is not a one time project. It is continuous strategy and a change management process. Thus, benchmarking is a way of moving away from tradition. If a company wants to exist with the status quo, it should not benchmark. For example, Zaire and Whymark's (2000) finding and their case study finding in the UK, it suggested that benchmarking should be done to open an organization to change and learning, with the overall goal of achieving the competitive excellence (Helper and Herderson, 2014).

Hypothesis.

Five hypotheses were tested for this study. They are:

1. There is a significant positive relationship between the level TQM adoption and firm's performance.
2. There is a significant positive relationship between the level of JIT adoption and firm's performance.
3. There is a significant positive relationship between the level of TPM adoption and firm's performance.
4. There is a significant positive relationship between the level of MRP2 adoption and firm's performance.
5. There is a significant positive relationship between the level of benchmarking adoption and firm's performance.

RESEARCH METHOD

Sample Selection

Companies listed in the statistic of center bureau with full employee less than 500 were used as the sampling frame in this study. The companies selected from the list are those that are involved in manufacturing activities and run their operatic

ISBN: 978-979-3649-81-8

of 500 manufacturing firms that selected randomly fulfilled the criteria. Mailed questionnaires were used to collect the data required for this study. The questionnaires were sent to the chief executive officer of each firm requesting them to respond to the questionnaire. Out of 500 questionnaires sent out, 79 useable responses were received giving a return rate 15.8%.

Variable Measurement

Level of technological adoption. Instrument for this variable adapted from different sources. In the case of level of technological adoption there were five dimensions (1) Total Quality Management (2) Just In Time (3) Total Productive Maintenance (4) Manufacturing Resources Planning (5) Benchmarking. The CEOs of manufacturing firms were asked to indicate level of technological adoption to statement on 5 point Likert type scale (1 = not adopted to 5 = very high). Measures of TQM was obtained and modified from Sohal and Terziovsky (2000). For measure level of JIT adoption the items from Yasin, Small, and Wafa (1997) as well as Sakakibara, Flynn, Schroeder, and Morris (1997) were adopted and modified base on the objective of this study. Level of TPM adoption is measured with the instrument developed by Tsang and Chan (2000), MRP is measured with instrument developed by Warnock (1996) and level of benchmarking adoption is measured base on benchmarking practices generally (Hinton, Franciss, Holloway, 2000). Base upon existing literature review, TQM, JIT, TPM, MRP2, and Benchmarking were classified as soft technology.

Performance. This study looks at performance from two perspectives, first, the financial performance compare to average industry performance, and second is manufacturing performance. Financial performance was measured in term of ROI (Return on Investment), ROA (Return on Asset) and GIS (Growth In Sales). In the other hand, manufacturing performance was measured in term of productivity, product cost per unit, product and process quality, product and volume flexibility, on time delivery and delivery capability.

Since the level of language proficiency is low in Indonesia, the questionnaire used was translated into Indonesian language. The translate-retranslating technique was used to ensure accuracy in translation.

FINDINGS

As mentioned earlier, 79 manufacturing firms were involved in this study. The 79 chosen companies operate in food and beverage, tobacco, textile, garment, plywood, rattan, furniture, handicraft, chemical, metallic, plant and equipment, and also machinery industries. All of the companies are private companies that have been operating for more than ten years. Their sizes range from 50 to as large as 492 full time employees, with asset ranging from 25 billion Rupiahs to 100 billion Rupiahs or more.

Reliability related to the extent to which the experiment, test, or any measuring procedure yields the same result on repeated trial. It is a statistical measure of how reproducible data of the survey instrument. Internal consistency reliability is the most commonly used psychometric measure in assessing survey instrument and scales. Internal consistency is indicator of how well the different item measures the same concept. This is important since a group of items purposing to measure one variable should indeed be clearly focused on one variable. Internal consistency is measured by calculating a statistic known as cronbach's coefficient alpha (Nunnally, 1967). Coefficient alpha measures internal consistency reliability among a group of items combined to form a single scale. It is a statistic that reflects the homogeneity of the scale. The Cronbach alphas for the measures used in this study ranged from 0.8610 (Benchmarking) to 0.92 (MRP2)

A selected descriptive statistics of raw data is shown in Table 1. The table shows the extent of the level of soft technology adoption by SMEs (Small an

ISBN: 978-979-3649-81-8

manufacturing firms. Base on this data, the level of TQM adoption seems to be higher than other type of soft technology. However, the difference of the adoption level among soft technology is not significant.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
TQM	79	1.86	5.00	3.4394	.6773
JIT	79	1.00	5.00	3.2604	.7723
TPM	79	1.00	5.00	3.2046	.9187
MRP2	79	1.25	5.00	3.3528	.8250
Benchmarking	79	1.25	5.00	3.3291	.8684
Valid N (list wise)	79				

Sperman correlation was used to check for any relationship between the variables. Table 2 presents the correlation among TQM, JIT, TPM, MRP2 and Benchmarking. The positive significant relationship between the soft technologies indicates that they support each other.

Table 2: Correlation Between TQM, JIT, TPM, MRP2 and Benchmarking

	TQM	JIT	TPM	MRP2	Benchmarking
TQM	1.000	.636**	.746**	.537**	.479**
Sig.	.	.000	.000	.000	.000
JIT	.636**	1.000	.771**	.548**	.301**
Sig.	.000	.	.000	.000	.007
TPM	.746**	.771**	1.000	.651**	.494**
Sig.	.000	.000	.	.000	.000
MRP2	.537**	.548**	.651**	1.000	.605**
Sig.	.000	.000	.000	.	.000
Benchmarking	.479**	.301**	.494**	.605**	1.000
Sig.	.000	.007	.000	.000	.

** Correlation is significant at the 0.01 level (2-tailed).

Hypotheses 1 to 5 are tested by using linier regression analysis. There are two reasons behind the decision to use of linear regression instead of correlation to evaluate hypothesis 1 to 5. The first reason is to assets multicollinearity. The regression analysis was done to each individual independent variable (TQM, JIT, TPM, MRP2 and Benchmarking) with financial performance and manufacturing peformance as dependent variables. The second reason is that regression enables us to identify and remove outliers. The composite results were shown in Table 6 and Table 7. As a whole, in these two model hard technology and soft technology explained 31.9% of the variance in the financial performance and 36.3% in the manufacturing performance. The result was significant at 0.01level (sig. F = 0.01).

Hypothesis 1 states that there is a significant positive relationship between the level of TQM adoption and firm's performance is partially accepted due to TQM does not an impact on financial performance, however, TQM have a positive significant effect on manufacturing performance (Significant at 0.05). While, the t statistic for JIT and TPM in the two models is not significant (see Table 6 and 7). This indicates that the level of JIT

ISBN: 978-979-3649-81-8

SMEs do not affect financial and manufacturing performance. These mean the hypotheses 2 and 3 cannot be accepted. Hypothesis 4 states that there is a significant positive relationship between the level of MRP2 adoption and firm's performance, the result of t statistic for the two models are significant at 0.05 (see Table 6 and 7). Therefore hypothesis 4 is accepted. Finally, hypothesis 5 that states that there is a significant positive relationship between the level of Benchmarking adoption and firm's performance is partially accepted. Benchmarking only has a positive relationship with financial performance, but not with the manufacturing performance.

Table 3: Regression Analysis with Financial Performance as Dependent Variable.

Independent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.	Durbin-Watson
TQM, JIT, TPM, MRP2, Benchmarking	.564	.319	.272	.5416	6.826	.000	1.676

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.240	.368		3.367	.001
TQM	6.575E-02	.141	.070	.467	.642
JIT	.159	.130	.193	1.220	.226
TPM	-.150	.132	-.218	-1.140	.258
MRP2	.237	.110	.307	2.148	.035
Benchmarking	.228	.094	.312	2.435	.017

a Dependent Variable: Financial Performance
b. Predictors: (Constant), TQM, JIT, TPM, MRP2, Benchmarking

Table 4: Regression Analysis with Manufacturing Performance as Dependent Variable.

Independent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.	Durbin-Watson
TQM, JIT, TPM, MRP2, Benchmarking	.603	.363	.320	.4739	8.337	.000	2.084

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.497	.322		4.646	.000
TQM	.323	.123	.381	2.623	.011
JIT	6.901E-02	.114	.093	.607	.546
TPM	-2.617E-02	.115	-.042	-.227	.821
MRP2	.213	.096	.306	2.208	.030
Benchmarking	-3.818E-02	.082	-.058	-.466	.643

a Predictors: (Constant), TQM, JIT, TPM, MRP2, Benchmarking
b Dependent Variable: Manufacturing Performance

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DISCUSSION

Regarding the impact of soft technology on performance, I find that the four soft technologies jointly explain better the manufacturing performance than in financial performance. This is largely due to the fact that technology directly affects the manufacturing system in organization, whereas, the translation of improved manufacturing performance into financial figures may require some time lag. It is also influenced by other factors (such as strategy, marketing, and contextual factors) within the organization but outside the bounds of production functions (Ellitan 2003a, Ellitan 2003b). This is in line with Sim (2001), who cited that financial performance is the results of manufacturing performance improvement, such as low cost, high flexibility, high speed and high flexibility, although increases in manufacturing performance does not assure increases in financial performance (Sim, 2001). It can be caused by the instability of business environment, such as high inflation and economic recession so that the purchasing power of buyer decreases too.

Adoption of MRP2 and benchmarking will increase financial performance through the cumulative effect of cost reduction and efficiency. By adopting MRP and benchmarking the quality of product and process can be improved, leading to efficiency, which in turn increases profitability (Link 1993; Beaumount & Scroeder, 1997).

Regarding to the impact of soft technologies on manufacturing performance, we find that TQM and MRP2 have positive significant effects on manufacturing performance. This finding indicates that companies can improve manufacturing performance by adopting TQM and MRP2. Adoption of TQM is a vehicle to increase process and product quality, process and volume flexibility, as well as delivery reliability (Ellitan, 2002a, Ellitan 2003b). Thus, improvement of manufacturing performance and its growth can be attained. TQM is essential in modern manufacturing firms to increase efficiency.

This finding shows that the effective implementation of TQM and MRP2 leads to improvement in manufacturing performance. Implementation of this technology can reduce rework, scrap, and product defect. The findings of this study appear to be in line with many previous studies about adoption of soft technology. Most of previous studies investigate the impact of particular soft technology on performance (Sohal & Terziovsky, 2000; Gamyah & Gargeya, 2001; Sum & Yang, 1993; Hinton et al. 2000, Ellitan 2003a, Ellitan 2003b, Ellitan 2003d). It shows that adoption of all types of soft technology will result in better performance than adoption of the specific soft technology. It is due to complementary factors among all types of soft technology (Ellitan, 2002b, Ellitan, 2003c, Ellitan, 2003d).

CONCLUSION AND SUGESSTION

The significant relationship found between the level of soft technological adoption (in term of TQM, MRP2 and benchmarking) and performance implies the fact that adoption of TQM, MRP2, and benchmarking can improve the performance of an organization. TQM has an important role for improving manufacturing performance, while MRP2 plays an important role for enhancing financial and manufacturing performance. Further, benchmarking is very importanct to be done for increasing financial performance. This study also indicates that Indonesian manufacturing SMEs that success in adopting TQM, MRP2 and Benchmarking can compete successfully. In addition, JIT and TPM seem to be left out by Indonesian manufacturing SMEs. The effect of JIT and TPM on financial and manufacturing performance is not significant

This study has some possible limitation. They are: 1. The number of companies involved is still considered too small to enable generalization towards the Indonesian population. 1. The data on the level of technological adoption and performance were perceptual data obtain from the CEOs of

ISBN: 978-979-3649-81-8

the manufacturing firms in East Java, which may lack in accuracy.

The need to be aware of and to adopt soft technology is inevitable to manufacturing firms. It is one of the important factors in the competitive environment. Firm risk losing their competitive advantage due to a lack of commitment to investing in new technology, research and development, as well as to implement new management practices (Ellitan 2001). The decision to adopt innovation changes such advanced manufacturing technology, computer based technology and new management practices is important for competitiveness and survival of the company. Therefore firms must innovate constantly with courage. Organizational leaders must provide the context that nurtures and acknowledge such innovation at every level.

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