European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.5, No.10, 2013

Creating Superior Operational Performance Through Total Quality Management Practices at Manufacturing Companies in Surabaya, Indonesia

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Abstract
The aim of this study was to empirically investigate the effect of critical TQM practices on operational performance of medium and large manufacturing companies in Surabaya. The critical total quality management (TQM) practices divided into three factors, i.e. strategic, tactical, and operational factors as predictors of operational performance. Total of population were 236 manufacturing companies. A questionnaire designed and distributed to all population, a total of 118 returned. It consists of both 58 medium companies and 60 large companies. Data analysis use both descriptive and multiple regression analysis. Data is analyzed by IBM SPSS 21. The empirical analysis demonstrates several key findings: data analysis shows that there was a positive effect of critical TQM practices which consists of strategic, tactical, and operational factors on operational performance. Tactical factors were the strongest significant predictors of operational performance. Overall, the results showed the central role of the tactical factors as critical factors in improving the operational performance within medium and large companies. There were some research limitations. For instance, the study is using perceptual data provided by production managers or quality managers which may not provide clear measures of performance.
Keywords: critical TQM practices, operational performance, manufacturing companies

1. Introduction

Manufacturing companies in the globalization era with increasingly competitive today want to win the competition in the market by giving full attention to the quality (Rahman, 2001). Attention to quality should give positive impact to the business performance through two ways, namely: (1) the impact on production costs and; (2) the impact on earnings. First, the impact on production costs going through the process of making products that have a high level of standards and degree of conformation that free from damage. Second, the impact on increasing revenues going through increased product sales (Gasperz, 2005).

In order still exist in the global environment, manufacturing firms should be able to compete in creating the conditions that would enable them to be competitive in the domestic and international markets. Accordingly, all manufacturing firms seek to adopt and implement a set of operations management practices that have been successful elsewhere and that will help them to identify changes in their environment and to respond proactively through continuous improvement. There are many forms of best management practices in operation management area. They are Just In Time (JIT) systems, Material Requirement Planning (MRP), Six Sigma, Lean Manufacturing, Enterprises Resources Planning (ERP), Supply Chain Management (SCM), and Total Quality Management (TQM). One of the best forms of

operations management practices is Total Quality Management (TQM) which has received great attention in the last two decades (Jung and Wang, 2006).

Manufacturing companies have central role in the national economy (e.g. employment absorption, reduce poverty, and economic growth). Manufacturing enterprises especially large and medium scale have an important and strategic role to reduce unemployment in Indonesia. Small Medium Enterprises (SMEs) Statistic (2012) reports the absorption of labor at medium and large enterprises is 4.88%, while micro and small enterprises is 10.16%. This indicates that role of medium and large enterprises is high enough to absorption of labor. Data of the growth of employment absorption by enterprises scale was presented in the following table (Table 1)

Table 1. Trend of Absorption of Labor by Enterprise Scale, 2010 – 2011

No.	Enterprise Scale	Total (person)		Growth	
		2010	2011	Total	%
1.	Micro Enterprises	93,014,759	94,957,797	1,943,038	2.09
2.	Small Enterprises	3,627,164	3,919,992	292,828	8.07
3.	Medium Enterprises	2,759,852	2,844,669	84,816	3.07
4.	Large Enterprises	2,839,711	2,891,224	51,513	1.81

Source : SMEs Statistics (2012)

In general, Table 1 shows the role manufacturing companies to economic growth at national scale. Manufacturing firms also play important role to improve the economy growth in Surabaya. Contribution of manufacturing sector to GDP (Gross Domestic Product) from 2010 to 2011 is 10% - 15% (Statistical Bureau Center of Surabaya, 2012).

The success of industry in all sectors, including of small and medium enterprises (SMEs) have a direct impact on economic development in developing countries and emerging countries. Manufacturing companies have ability in creating jobs with minimum cost. They were play important role not only as pioneer in the innovation of the world, but also they have high flexibility which enable them to meet the customer needs (Brock and Evans, 1986; ACS and Audretsch, 1990).

Performance measurement is an important factor for effective management. In general, performance is defined as the extent to which an operation meets performance goals, the major steps in order to meet customer needs (Slack et al., 2001). The fact is that without a measurement performed on the performance, every company will difficult to fix its performance. Therefore, improving of organizational performance needs to identify variables and measure them.

According to Demirbag et al. (2006) operational performance measurement is very important for an organization, in order to achieve optimal efficiency and performance. Organizational performance can be measured in two dimensions i.e. (1) operational performance and (2) organizational performance. Operational performance reflects the company's internal operating performance in terms of cost and reducing waste, improving product quality, new product development, improve delivery performance, and increased productivity. These indicators and variables are considered as the main factor because they follow directly from the action taken in the company's operating activities. While the

organizational performance measured by financial metrics like revenue growth, net income, Return on Investment (ROI), Return on Asset (ROA), and non-financial measures such as investment in Research and Development (RD), and the capacity for developing competitive profile of organization (Brah and Lim, 2006).

Empirical studies that link between TQM and performance have been widely used by researchers. For example, Samson and Terziovski (1999) examine the effect of total quality management practices on operational performance of a large number of manufacturing companies (1200 Australian and New Zealand manufacturing organizations). The study reveals that the relationship between TQM practice and organizational performance is significant in a cross-sectional sense, but not all of the categories of TQM practice were particularly strong predictors of performance. The categories of leadership, management of people and customer focus were the strongest significant predictors of operational performance.

Rahman (2001) conducted a study on 53 SMEs in Australia and found that the critical success factors of implementing TQM is a leadership, strategy and planning, employee empowerment and employee involvement, employee training and development, information and analysis of customer management. Thus, Demirbag et al. (2006) conducted an empirical study to identify the factors critical to the success of TQM in SMEs in Turkey. They concluded that there are seven CSF (critical success factors) from the practice of TQM, namely data and reporting quality, the role of top management, employee relations, supplier quality management, training, quality policy and process management.

The other empirical studies that investigate the relationship between TQM practices and company performance (e.g. Ahire and Golhar, 1996; Brah and Lim, 2006; Sila, 2007). In general, many researchers find out a positive effect between TQM practices and performance.

Based on descriptions above, the aim of this study were: (1) to investigate the effect of strategic factors of TQM practices on operational performance; (2) to investigate the effect of tactical factors of TQM practices on operational performance; and (3) to investigate the effect of operational factors of TQM practices on operational performance.

2. Conceptual Framework and Hypotheses

The conceptual framework of the current study is drawn from two streams of research, namely total quality management (TQM) literature and organizational performance literature. The first survey study that attempted to identify the critical factors of TQM that must exist in a business unit to achieve effective quality management is that by Saraph et al. (1989). This study used organizational and managerial aspects of the works of a number of quality management practitioners such as Deming, Juran, and Crosby to organize and synthesize the critical factors identified by them. Saraph et al. (1989) also developed measures of each critical factor and overall organizational quality management. A similar study were conducted by another research (e.g. Black and Porter, 1996; Anderson and Sohal, 1999; Samson and Terziovski, 1999). The researchers have been developed critical TQM practices based on different objects, so that they generate the different factor for critical TQM practices (Demirbag et al., 2006).

Several empirical studies have been conducted to establish the link between TQM practices and organizational performance (e.g. Samson and Terziovski, 1999; Brah and Lim, 2006; Demirbag et al., 2006; Feng et al., 2006). The

results of these studies indicated that there are various measures, i.e. organizational performance, corporate performance, business performance, operational performance, financial and non-financial performance, innovation performance, and quality performance. There are various measures of organizational performance. Accordingly, this study focus on operational measurement to evaluate of organizational performance.

Unlike some previous studies found in the literature, this study investigates the effect of critical TQM practices on organizational performance embedded to operational performance. Operational performance reflects the performance of internal operation of the company in terms of cost and waste reduction, improving the quality of products, improving flexibility, improving delivery performance; and productivity improvement. They are considered as primary measures because they follow directly from the actions taken during the implementation of TQM (Salaheldin, 2009).

This study explores critical TQM practices based on previous research into three levels i.e. strategic factors, tactical factors, and operational factors, and then attempts to investigate their effect on operational performance as direct result from critical TQM practices. Based on the background of the problem, the purpose of the research, theoretical and empirical studies which have been described previously, conceptual model are presented in the following figure (figure 1).

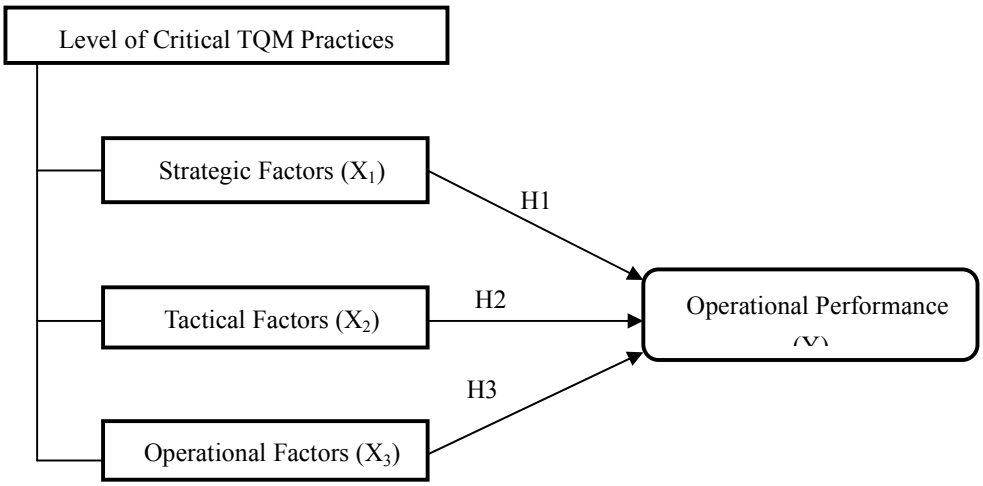

Figure 1. Conceptual framework

The scheme of conceptual framework that shows above clearly link the critical TQM practices on operational performance. So that, research hypotheses could be formulated as follows:

1. Strategic factors of critical TQM practices have significant effect on operational performance (H1).
2. Tactical factors of critical TQM practices have significant effect on operational performance (H2).
3. Operational factors of critical TQM practices have significant effect on operational performance (H3).

3. Method

This research uses quantitative approach. The research design employed in the current study was a cross sectional study. Population is the whole object that has the same basic characteristics or meet certain criteria for a research problem (Aaker et al., 2001; Arikunto, 2006). While sample is a sub group of the population selected to participate in order to fulfill the objectives of the study (Malhotra, 1996).

Target population was 236 manufacturing companies. They were consists of medium and large scale that obtained from listings provided by the Statistical Bureau Center of Surabaya. The criteria of medium and large companies based on Statistical Bureau Center, because it is more relevance with the study. Large enterprises have a number of employees more than 100 persons. In contrast, the medium enterprises have a number of employees 20-99 persons (BPS Surabaya, 2012).

Data collected through a questionnaire instrument. The questionnaires mailed by post in part, and the rest delivered directly by researchers at company sample. Target respondents both operational manager and quality manager. A total of 59 firms thus comprised the final sample which represents a (118/236) 50 percent response rate. It consists of 60 large firms, and 58 medium firms.

According to Hair et al. (1998) the number of samples always varied, a good sample should be able to represent the population characteristics. The data used consists of both primary data and secondary data. Secondary data obtained from Statistical Bureau Center and Department of Industry and Commerce. While the primary data directly obtained from respondents through both directly interview and questionnaires.

There were two variables in this study which investigate their relationship. They were critical TQM practices as independent variable and operational performance as dependent variable. Critical TQM practices adopted from Salehaldin (2009) i.e. strategic factors, tactical factors, and operational factors. Strategic factors consists of 6 indicators, tactical factors consist of 8 indicators, and operational factors consists of 10 indicators. Then, operational performance variable consists of 5 indicators which adopted from Brah and Lim (2006).

All indicators in the questionnaire measured by a five-point Likert Scale. The scale from very low (1) up to very high (5). For easier interpretation the results of the study, the scale changed into interval class as follows: (1) 1.00 to 1.80 = Very Low; (2) 1.81 to 2.60 = Low; (3) 2.61 to 3.40 = high enough, (4) 3.41 to 4.20 = High; and (5) 4.21 to 5.00 = Very High (Sekaran, 2002; Sugiyono, 2008).

The test of validity used to evaluate the accuracy and precision of a measuring instrument in the measuring function. It would be analyzed by Pearson Product Moment Correlation method. An instrument can be said valid when the value of $r > 0.30$ (Cooper and Emory, 1999). Then, the test of reliability construct conducted to determine the reliability of an instrument. An instrument can be said reliable if the instrument produces consistent results (Cooper and Emory, 1999). Cronbach Alpha scores is computed for each construct (strategic factors, tactical factors, operational factors, and operational performance) to measure the internal consistency and to indicate how different items can reliably measure

the construct. Kline (1998) pointed out that a reliability coefficient of around 0.90 can be considered excellent, values of around 0.80 as very good, and values of around 0.70 as adequate, depends on the questions.

According to the research objectives, the data analysis uses both descriptive statistics and multiple regression analysis. The data have been collected, edited, and tabulated would be analyzed by descriptively with average (mean), and percentage (%). Multiple regression analysis is used to test the effect independent variables to dependent variable (Hair et al., 1998). The model formulation is presented as follows:

$$\mathbf{Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon} \quad (1)$$

Where : Y = Operational performance
α = Constant
$\beta_1, \beta_2, \beta_3$ = Regression coefficient
X_1 = Strategic factors
X_2 = Tactical factors
X_3 = Operational factors
ε = Error term

Thus, to test of hypotheses use level of significance at 5% or level of confidence at 95%. Data processing is performed by IBM SPSS 21. Technically, the effect of variable of critical TQM practices partially on operational performance could be performed by comparing t-value with t-table or by comparing the significance calculated with $\alpha = 5\%$. If the t-value > 1.980, it means that there is significant effect between variables or if the t-value < 1.980, it means there was no significant effect among variables in the study.

4. Results

This section will describes three parts of data analysis result i.e.: validity and reliability test, descriptive statistic and multiple regression analysis. Based on data analysis, the results of validity test presented in table 2 and 3 below.

Table 2. The result of validity test of Critical TQM Practices

No.	Variables/Indicators	Correlation	Description
1.	Strategic factors (X_1)		
	Leadership ($X_{1.1}$)	0.473	Valid
	Organizational culture ($X_{1.2}$)	0.622	Valid
	Top management support ($X_{1.3}$)	0.512	Valid
	Continuous improvement ($X_{1.4}$)	0.637	Valid
	Benchmarking ($X_{1.5}$)	0.485	Valid
	Quality goals and policy ($X_{1.6}$)	0.574	Valid
2.	Tactical factors (X_2)		
	Team building and problem solving ($X_{2.1}$)	0.532	Valid
	Employee empowerment ($X_{2.2}$)	0.446	Valid
	Employee involvement ($X_{2.3}$)	0.604	Valid
	Employee training ($X_{2.4}$)	0.538	Valid
	Use of information technology ($X_{2.5}$)	0.524	Valid
	Supplier quality ($X_{2.6}$)	0.466	Valid
	Supplier relationships ($X_{2.7}$)	0.653	Valid
	Assessment of performance of suppliers ($X_{2.8}$)	0.578	Valid
3.	Operational factors (X_3)		
	Product and service design ($X_{3.1}$)	0.435	Valid
	Enterprise performance metrics for TQM ($X_{3.2}$)	0.657	Valid
	Process control ($X_{3.3}$)	0.681	Valid
	Customer orientation ($X_{3.4}$)	0.623	Valid
	Management of customer relationships ($X_{3.5}$)	0.553	Valid
	Resources value addition process ($X_{3.6}$)	0.445	Valid
	Realistic TQM implementation schedule ($X_{3.7}$)	0.533	Valid
	Customer and market knowledge ($X_{3.8}$)	0.545	Valid
	Resources conservation and utilization ($X_{3.9}$)	0.606	Valid
	Inspection and checking work ($X_{3.10}$)	0.646	Valid

Source: Primary data, processed

Table 3. The result of validity test of Operational Performance

No.	Variables/Indicators	Correlation	Description
1.	Cost reduction (Y_1)	0.611	Valid
2.	Waste reduction (Y_2)	0.445	Valid
3.	Improving the quality of products (Y_3)	0.522	Valid
4.	Improving delivery performance (Y_4)	0.630	Valid
5.	Product/service development (Y_5)	0.548	Valid

Source: Primary data, processed

The table shows that correlation value each indicator greater than 0.30. So, it could be concluded that the instrument used in this study was valid. Therefore, the instrument could be used for the next process. The result of test reliability completely is shown in following table.

Table 4. The result of Reliability test of Constructs

No.	Variables/Constructs	Cronbach Alpha (α)	Description
1.	Strategic factors (X_1)	0.718	Reliable
2.	Tactical factors (X_2)	0.784	Reliable
3.	Operational factors (X_3)	0.825	Reliable
4.	Operational Performance (Y)	0.735	Reliable

Source: Primary data, processed

Table above shows score of cronbach alpha greater than 0.60. So, it could be concluded that the instrument used in this study was reliable. Therefore, the instrument could be used for collecting data in the field. Respondents of this study have quite different characteristics. Diversity can be seen from the personal data of respondents including gender, position, educational level, and duration of the implementation of TQM practices in the organization. General description of respondent characteristics could be seen in the following table (Table 5)

Table 5. Respondent Characteristics

No.	Description	Frequency	Percentage (%)
1.	Sex :		
	a. Male	84	71.19
	b. Female	34	28.81
	Total	118	100.00
2.	Position :		
	a. President Director (CEO)	10	8.47
	b. Production and Operations Manager	58	49.15
	c. Quality Manager	22	18.64
	d. Others : (Supervisor)	28	23.73
	Total	118	100.00
3.	Education :		
	a. Senior High School	22	18.64
	b. Diploma	38	32.20
	c. Bachelor (S1)	50	42.37
	d. Master (S2)	8	6.78
	Total	118	100.00
4.	TQM Implementation :		
	a. 1 – 3 years	50	42.34
	b. Above 3 years	68	57.66
	Total	118	100.00

Source: Primary data, processed

The table shows that respondents of this study were dominant male gender, i.e. 84 peoples (71.19%) and women 34 peoples (28.81%). Most respondents have position within the company as a production manager and operations, which is 58 persons (49.15%), and supervisor of 28 persons (23.73%). The rest were the chief executive officers (8.47%), and the quality manager (18.64%). Level of respondents education were the Bachelor degree (S1) (42.37%), Diploma level (32.2%), Senior High School (18.64%) and Master degree (S2) (6,78%). The duration of implementation of critical TQM practices in the organization was very important, because it related to the degree of application each factor in organization. The firms have been implementing TQM practice over three years, namely 68 companies (57.66%), and 50 companies (42.34%) between 1-3 years.

Variable characteristics in this study described based on the average value (mean) of each indicator that forming the constructs or variables. The research variables tested in this study consists of three independent variables i.e. strategic factors, tactical factors, and operational factors. The dependent variable was operational performance.

The results of data processing indicates that the average value (mean) strategic factors were in good category (4.17) with the support of top management as the most powerful indicator (4.45). Tactical factors were in the very good category (4.58) with quality training for employees as the most powerful indicator (4.69). Operational factors were in good category (4.10) with the most powerful indicator was customer orientation (4.33). Then, the operational performance variable according to the perception of respondents were in the good category (4.05). The highest indicator value was the increase in delivery performance (4.17). In contrast, the lowest was the development of new products (3.56). Delivery performance is a major strength for the manufacturing companies in a dynamic and fast competitive environment. Product development was relatively lower compared than other indicators. It reflects of products innovation in the manufacturing companies was not optimal yet. Nevertheless, some activities of innovation or product development has been done, for instance: food and beverage companies have focus on developed hygienic, economical, attractive, and durability packaging.

Furthermore, testing of research hypotheses use SPSS for Windows. The results completely presented in the following table (Table 6).

Table 6. The summary of Multiple Regression Analysis Results

Variable/Construct	Regression Coefficients (β)	t-values	Sig.
Constant = 0,181	-	1.023	0.309
Strategic Factors (X_1)	0.414	4.811	0.000
Tactical Factors (X_2)	0.468	5.179	0.000
Operational Factors (X_3)	0.362	3.150	0.001
F_{value} = 18,610	Sig. = 0,000		n = 118
F_{table} = 3,145	R = 0,904		
t_{tabel} = 1,980	R Square = 0,817		

Source : Primary data, processed

Based on the summary of multiple regression analysis results as presented in the table above, accordingly, the equation of multiple linear regression could be formulated as follows:

$$Y = 0.181 + 0.414\ X_1 + 0.468\ X_2 + 0.362\ X_3$$

The equation shows that the critical of TQM practices which consists of strategic factors (X_1), tactical factors (X_2), and operational factors (X_3) have significant effect on operational performance. The value of determination coefficient (R Square) was 0.817. It means that 81.7 percent the variation of increasing and decreasing of the operational performance could be explained by the variations of the critical TQM practices. While 18.3 percent could be explained by other variables which didn't test in this study. Partially, the effect of critical TQM practices that consists of strategic factors (X_1), tactical factors (X_2), and operational factors (X_3) on operational performance were significant (prob. < 0.05).

5. Discussion

The finding of this study was the strategic factors have significant effect on operational performance (H1 accepted). It could be seen at t-value greater than t-table (4.811> 1.980). The strategic factors such as leadership, organizational culture, top management support, quality improvement and quality goals and policy were good predictors on operational performance. The result of this study consistent with Samson and Terziovsk (1999), Demirbag et al. (2006), Stevenson (2007) and Salehaldin (2009).

Then, the tactical factors have significant effect on operational performance (H2 accepted). It could be seen on t-value greater than t-table (5.179> 1.980). Company activities such as employee empowerment, employee training, employee involvement, team building, quality and supplier relationships were the important factors to build the strength of the company's operating structure in maximizing the tactical factors effect of critical TQM practice on operational performance. This finding was consistent with previous studies (Ahmad and Schroeder, 2002; Demirbag et al., 2006, Sila, 2007, Salehaldin, 2009).

Furthermore, operational factors have a significant effect on operational performance (H3 accepted). It could be seen on t-value greater than t-table (3.150> 1,980). Operational activities in organization such as process control, customer orientation, TQM implementation schedule which realistic, and the inspection and work evaluation were important components in improving the operational performance. This finding consistent with Handfield et al., 1998, Anderson and Sohal, 1999, Samson and Terziovski, 1999; Demirbag et al., 2006; Sila, 2007; and Salehaldin, 2009.

6. Conclusions

Simultaneously, the critical TQM practice which consists of strategic factors, tactical factors, and operational factors have positive and significant effect on operational performance. Partially, tactical factors have dominant effect on operational performance. Company's activities in the tactical factors, such as employee empowerment, employee training, employee involvement, team building, quality and building relationships with suppliers and have been done well, so its impact on operational performance of manufacturing firms was relatively more powerful than the strategic and operational factors.

Instruments which developed and used in this study would be very useful to policy makers within the enterprise as a tool for evaluating the effectiveness of their current TQM practices. In order to gain the full potential of TQM need to train everyone on all levels in order to create awareness of TQM as part of a cultural organization. Thus, management attention might be more useful if focused on developing appropriate training programs for implementation of TQM practices in organization. The results of this study can be used by managers to prioritize the implementation of TQM practices. For instance, those practices that are found to have a positive impact on operational performance can be recommended to managers so that they can allocate resources to improve these practices to get the best results

In the future study, this study could be developed to test the effect of critical TQM practices on organizational performance (financial and non financial measurement), where the operational performance variables could be used as moderating variable. Furthermore, because of this study focused on manufacturing companies, the next research could be carried forward with a focus on service companies in order to obtain either best results or specific area.

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