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Enhancing Production Performance and Customer
Performance Through Total Quality Management (TQM):
Strategies For Competitive Advantage

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Abstract

During the past two decades, Total Quality Management (TQM) programmes have been implemented in many organizations. A strategy of high quality leads to a sustainable competitive advantage. This paper examines the importance of incorporating TQM in the Malaysian manufacturing industry. The study measures senior production or TQM managers' perception of TQM and level of performances of their companies. Specifically, the paper investigates relationships between TQM, production performance and customer-related performance and the associations were analyzed through statistical methods such as Pearson's correlation and structural equation modeling (SEM). The findings suggest that TQM and its adoptions have significant correlations with production performance and customer-related performance. This study provides striking demonstrations of the importance of TQM in enhancing performances of Malaysian manufacturing companies. The result indicates that retail manufacturing companies should emphasize greater attention to quality measurement aspects of TQM and a greater degree of management support for TQM initiatives to ensure strategic sustainable competitive advantage.

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Keywords: Total Quality Management (TQM), customer-related performance, production performance, strategic competitive advantage and structural equation modeling (SEM).

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1. Introduction

Quality creates not only a price/value advantage over competitors but also enables the firm to charge a higher per/unit sale price through differentiation (Porter 1980, 1986). A strategy of high quality leads to a sustainable competitive advantage (Porter 1980, Buzzell 1982). Firms competing on quality pursue an operational strategy that controls quality of the product/service and seeks continuous improvement. TQM provides a set of practices that emphasizes, among other things, continuous improvement, meeting customers' requirements, reducing rework, long-range thinking, increased employee involvement and teamwork, process redesign, competitive benchmarking, team-based problem-solving, constant measurement of results, and closer relationships with suppliers (Crosby 1984; Juran, 1992; Feigenbaum 1991). Within this context, Deming (1995) proposed the "theory of profound knowledge" which states that the success of quality management efforts depends on the effective integration of various management subsystems. This idea is shared by Anderson et al. (1994) who made the effort of synthesizing a theory of quality management. They assessed the impact of Deming's management method on a firm's organizational behavior and practice of quality management. In addition, Waldman (1994) provided some theoretical direction to the study of leadership and TQM. Arawati Agus and Za'faran Hassan (2010) links TQM to Strategic management, while others engaged in theory or model building related to TQM (Ho & Fung 1995; Kanji 1996). Firms should seek a sustainable competitive advantage by developing competence in continuous improvement (Reitsperger 1986). Deming (1995), Juran (1992), Feigenbaum (1991) and Crosby (1990) suggest focusing on improving quality to gain this competence rather than on traditional foci of success: market share, revenues, efficiency, share price or profits.

1.1 TQM Practices and Performance Measures

In this study, in order to determine the domain that encompasses TQM practices, exhaustive theoretical, empirical and practitioner literature were reviewed. Adapting from Powell's (1995) TQM practices and also factors suggested by Saraph et al. (1989), Malcolm Baldrige's (Malcolm Baldrige 1992) framework as well as a thorough review and synthesis of TQM literature (Flynn et al. 1994; Deming 1995; Walton 1986; Juran, 1992; Crosby 1984; and others), the researcher has identified four important elements of TQM practices namely: 1) Supplier Relations, 2) Benchmarking, 3) Quality Measurement, and 4) Continuous Process Improvement. Further discussions on the four TQM elements are as follows:

- a) Supplier relations (SSREL): Supplier relation is generally an interactive relationship between parties involved in producing an output that require an input from another. Manufacturers should work closely and cooperatively with suppliers over the long term to eliminate defects from all

incoming parts and ensure they provide inputs that conform to customers' end-use requirements (Swinehart & Green 1995).

- b) **Benchmarking (BENCH):** Benchmarking refers to the researching and the observance of best competitive practices to provide a guideline for rational performance goals and to help set expectations for cost, product reliability and other factors. They can study their competitors and identify the best practices in different functions so that they have benchmarks. Improvement accelerates when performance is measured and benchmarked against the best in the world. As a result, productivity, performance, and effectiveness can be enhanced (Kotler 1994, Tillery & Rutledge 1991, Zairi, 1998).
- c) **Quality Measurement (QMEASURE):** Quality measurement is a goal-orientation with constant performance measurement, often with the use of statistical analysis. The analysis process ensures that all deviations are appropriately considered, measured and responded to consistently. In addition, managers must also analyze variations detected in the business and the environment and provide consistent response and improvement. The information from the analysis of change must be used to modify the responsible processes in a manner that fosters continuous improvement (Shores 1992).
- d) **Continuous Process Improvement (PIMPROVE):** Continuous improvement is accomplished by placing emphasis on the processes by which quality improvements are achieved. In a typical organization, there are interrelated processes: design, manufacturing, marketing and customer service. Improvement made on a particular process will lead to the overall improvement of the organization and every employee and department is responsible for quality. Process improvement becomes an exercise in optimizing effectiveness and efficiency while improving process control and strengthening internal mechanisms for responding to changing customer demands (Mann 1992; Shetty 1987).

To meet the challenges of the new global environment, companies have started considering quality as an integral part of their strategic business plans. When quality improvement investments lead to better financial performance, TQM becomes a viable competitive strategy. In order to capture the multi-dimensional nature of performance measures, production performance is manifested by production effectiveness and production efficiency.

- a) **Production Effectiveness (EFFECT):** Production Effectiveness measures the percentage of goal achievement in production output.
- b) **Production Efficiency (EFFICIEN):** Production Efficiency measures how efficient raw material is utilized to produce output.

Finally, customer performance construct is operationalized by two proxies namely 'offer high customer value products' and 'fast response to customers' needs'.

- a) Offer High Customer Value Products (SCVALUE): Ability to offer superior customer value (products and services) after SCM implementation.
- b) Fast Response to Customers' Needs (FASTRESP): Ability to respond faster to customer needs after SCM implementation.

2. The Conceptual Framework

2.1 The Conceptual Model and Hypotheses

2.1.1 The Conceptual Model

This section explores the linkages between TQM, Production performance and customer related performance constructs and variables within the context of the Malaysian manufacturing industry. The proposed model, as depicted in Figure 1, is based on three main constructs—(i) Total Quality management (TQM-P); (ii) Production Performance (PRODPERF); and (iii) Customer related Performance (CPERFORM).

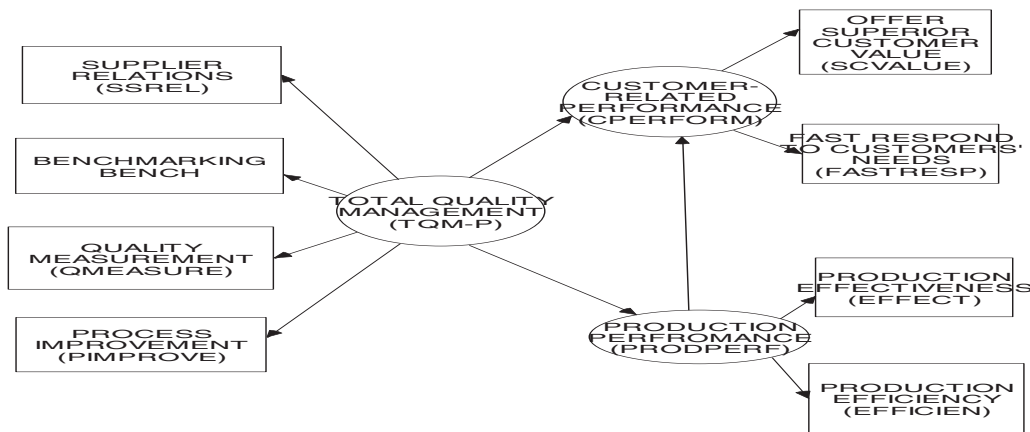


Figure 1. The Conceptual Framework linking Total Quality Management, Production Performance and Customer -Related Performance

2.1.2 Hypotheses

The researchers believe that TQM has important influence on production performance and customer-related performance results. A structural equation model is used in this study to analyze the structural

effect of TQM on the performance results. In this paper, firstly, the study aims to test the fitness of the overall SEM model based on the main null hypothesis:

H_0 : The overall hypothesized model has a good fit.

For structural modeling, accepting this hypothesis indicates that the model presented adequately reproduce the observed covariance matrix (Bollen, 1989; Joreskog, 1989; Mueller, 1996) and suggests that the data fit the proposed SEM model. Therefore, in the test of goodness of fit for the structural equation modeling, the probability that is expected should not be significant (probability value > 0.05) to support the overall null hypothesis which suggests that the overall hypothesized model has a good fit.

Then secondly, the study looks at the main research hypotheses of the study regarding the relationships between TQM with production performance and customer related performance. The first hypothesis states that implementing effective TQM can enhance production performance. The second hypothesis proposes that implementing TQM improves customer related performance. The third hypothesis assumes that production performance has a significant impact on customer-related performance. Therefore, the following main research hypotheses are investigated:

H_1 : TQM has a positive structural effect on production performance

H_2 : TQM has a positive structural effect on customer related performance

H_3 : Production Performance has a positive structural effect on customer-related performance

In investigating the structural effect of TQM, Production performance on customer related performance results; it is also pertinent to determine the structural loadings of each variable. Therefore, thirdly, it examines the contribution of each TQM variable. Thus, this study also attempts to test the following hypotheses:

H_{1A} : 'Supplier Relations' has positive structural loading on TQM implementation.

H_{1B} : 'Benchmarking' has a positive structural loading on TQM implementation.

H_{1C} : 'Quality Measurement' has a positive structural loading on TQM implementation.

H_{1D} : 'Continuous Process Improvement' has a positive structural loading on TQM implementation.

3. Research Methodology

The sample units of analysis in this study are Malaysian manufacturing companies. The sampling frame was derived from the Federation of Malaysian Manufacturers Directory-FMM and each company is represented (the respondent) by either senior production or quality manager. One hundred and sixty nine responses were received and analyzed. The primary purpose of the research is to measure senior production managers' or quality managers' perceptions of TQM in their organizations and to gain insight into the benefits of implementing TQM in the manufacturing industry. The goal is to understand and determine measures of TQM that can enhance production performance and customer-related performance. Face to face interviews with the managers were carried out to ensure the information accuracy, validating the outcome of analysis and developing an understanding of practical aspects of TQM principles adoption. To enable respondents to indicate their answers, seven–point interval scales were used for the questionnaire.

The confirmatory factor analysis (CFA) or a measurement model using AMOS 5 was employed for examining construct validity of each scale by assessing how well the individual item measured the scale (Ahire, Golhar and Walter 1996). Specifically, the confirmatory factor analysis was used to detect the unidimensionality of each construct. Unidimensionality is evidence that a single trait or construct underlie a set of measures (Hair et al. 1988). The goodness of fit index (GFI) and comparative fit index (CFI) of the three constructs computed from the confirmatory factor analysis (CFA) exceeded the 0.90 criterion suggested by Hair et al. (1998), hence, establishing the construct validity (see Table 1). CFA showed all the items were loaded highly on their corresponding constructs, which supported the independence of the constructs and provided strong empirical evidence of their validity.

Table 1. Descriptive Statistics of Constructs

<i>Constructs</i>	Original items	Final items	Mean	Std. Dev.	Reliability
Total Quality management: (TQM)	4	4	5.625	1.140	0.920
Production Performance (PRODPERF)	2	2	5.325	1.123	0.914
Customer related performance (CPERFORM)	2	2	5.390	1.155	0.910

Since data for this study was generated using multi-scaled responses, it was deemed necessary to test for reliability (Frohlich & Westbrook, 2001). The reliability analysis was conducted by calculating the Cronbach’s alpha for the main constructs. Items that did not significantly contribute to the reliability were eliminated for parsimony purpose. The result shows that the Cronbach’s alpha measures for the three main constructs exceeds the threshold point of 0.70 suggested by Nunnally (1978). Alpha coefficients for supply chain management, customer related performance ranged between 0.910 and 0.920 after the alpha maximization process were carried out. As a result, eight items were retained for the three constructs.

4. Finding

4.1 Correlation Analyses

As a preliminary analysis, Pearson’s correlation analysis was conducted to establish associations between TQM and Production performance as well as customer-related performance. The main purpose of computing correlations among TQM is to establish convergent validity among the constructs and to detect any possible multicollinearity problems. Table 2 exhibits correlation among the new technology and innovation practices and collinearity statistics. The result indicates that the TQM variables have significant correlations with one another. This may suggest that TQM practices complement each other and need to be implemented in a holistic manner. Statistically, the result of the collinearity test does not indicate any multicollinearity problem (Agus, 2000).

Table 2. Pearson’s Correlation among TQM Variables and Collinearity Statistics

TQM		1	2	3	Collinearity Statistics	
					Tolerance	VIF
1	Supplier relations (SSREL)	1	.707(**)	.694(**)	.458	2.186
2	Benchmarking (BENCH)	.707(**)	1	.819(**)	.269	3.716
3	Quality Measurement (QMEASURE)	.694(**)	.819(**)	1	.234	4.272
4	Continuous Process Improvement (PIMPROVE)	.635(**)	.773(**)	.817(**)	.299	3.347
1. *P≤0.05, **P≤0.01 2. All tests are one-tailed						

Pearson’s correlations were conducted to investigate relationships between TQM, production performance and customer-related performance. Production performances namely, production effectiveness and production efficiency have highest and significant correlations quality measurement and supplier relations. Similarly, customer-related performance also demonstrates significant correlations with all TQM dimensions. These findings are consistent with several previous studies that proclaimed better organizational transformations as a result of TQM initiatives (Saraph et al. 1989; Flynn et al. 1994; Ahire et al. 1996, Powell 1995; Agus, 2008).

Table 3. Pearson Correlation Between TQM And Production Performance And Customer-Related Performance.

<u>Total Quality management: (TQM)</u>		Production Performance (PRODPERF)	
		Production Effectiveness (EFFECT)	Production Efficiency (EFFICIEN)
1	Supplier relations (SSREL)	.543(**)	.532(**)
2	Benchmarking (BENCH)	.514(**)	.564(**)
3	Quality Measurement (QMEASURE)	.544(**)	.608(**)
4	Continuous Process Improvement (PIMPROVE)	.501(**)	.552(**)
<u>Total Quality management: (TQM)</u>		Customer related performance (CPERFORM)	
		Offer High Customer Value Products (SCVALUE)	Fast Response to Customers’ Needs (FASTRESP)
1	Supplier relations (SSREL)	.520(**)	.531(**)
2	Benchmarking (BENCH)	.513(**)	.556(**)
3	Quality Measurement (QMEASURE)	.548(**)	.559(**)
4	Continuous Process Improvement (PIMPROVE)	.504(**)	.530(**)

** Correlation is significant at the 0.01 level (1-tailed).

4.2 Structural Equation Modeling

A SEM model was employed to investigate simultaneous linkages that allow a researcher to determine the relative strength of relationships between variables. The linkages between TQM, production performance and customer-related performance are depicted in the model shown in Figure 2. The SEM model was

evaluated to check if the specified items provided adequate fit. To support the assumption regarding the fitness of the SEM model with the empirical data, the acceptance of the null hypothesis of the overall model is expected. Hence, in this test of goodness of fit for the structural equation modeling, the resulting probability should be higher than 0.05 to support the overall null hypothesis of the model.

The SEM result indicates that the Chi-square value is 19.150 with p-value of 0.320 (Figure 2). This suggests that the model has a good fit. The p-value is considerably sufficient (p-value > 0.05) in supporting the proposition that the overall model fits the data. In addition, other statistical structural indices such as Goodness of fit index (GFI = 0.972), Bentler comparative fit index (CFI = 0.998), and Normed fit index (NFI = 0.983) further suggest that the model has a satisfactory fit (Figure 1). Since the probability value and structural modeling indices are well above the recommended level, the model is considered to be a reasonable representation of the data (Hair et al., 1998; Agus, 2001; Agus et. al, 2000).

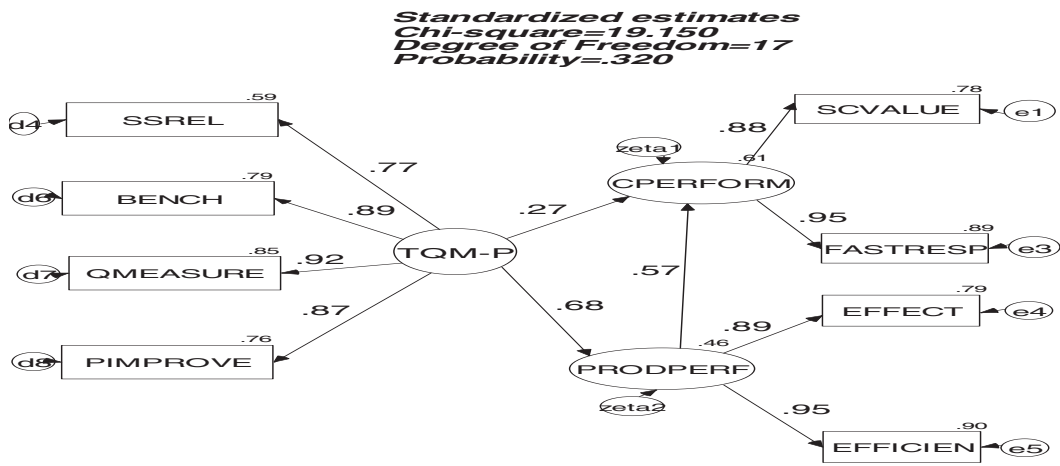


Figure 1: The Structural Equation Model Showing The Linkages TQM, Production Performance And Customer-Related Performance.

The direct structural effect of TQM on production performance (structural effect = 0.681) is considered sufficiently high given the complex causal linkages, suggesting the importance of ‘quality measurement’ followed by ‘benchmarking’ ‘Continuous Process Improvement’ and ‘Supplier relations’ in supporting TQM implementations in Malaysian manufacturing industry. Establishing the causal linkages between input and bottom-line outcomes is difficult in most complex system. Surprisingly, the direct

structural effect of TQM on customer-related performance is substantial and significant (structural effect = 0.272). Subsequently, the direct structural effect of production performance on customer related performance (structural effect = 0.571) is also high and significant. Therefore, we have enough evidence to accept the three hypotheses. Firstly, Total Quality management (TQM) has a positive effect on Production Performance (H_1). Secondly, Production Performance (PRODPERF) has a positive structural effect on Customer related Performance (H_2). Thirdly, Production Performance has a positive structural effect on customer-related performance (H_3). These findings suggest that TQM have significant contributions toward production and customer performance.

Table 4. Results of The Overall Model Fit

Statistics	Model Values	Recommended values for good fit
Chi square	19.150	-
Probability Level	0.320	≥ 0.05
Degree of Freedom	17	-
χ^2 /df	0.0188	≤ 3.00
Bollen (1989) Incremental Fit Index (IFI)	0.998	≥ 0.90
Tucker & Lewis (1973) TLI	0.997	≥ 0.90
Bentler (1988) comparative fit model (CFI)	0.998	≥ 0.90
Normed fit index (NFI)	0.983	≥ 0.90
Goodness of fit index (GFI)	0.972	≥ 0.90

*Chau (1997)

Table 5. Structural and Measurement Results of the SEM Model

(i)Constructs and indicators	Std. Loadings	Std. errors	Critical Ratio	Probability
a. <u>Total Quality management: (TQM)</u>				
Supplier relations (SSREL)	0.766	0.067	12.609	0.000
Benchmarking (BENCH)	0.891	0.094	12.610	0.000
Quality Measurement (QMEASURE)	0.924	0.096	13.149	0.000
Continuous Process Improvement (PIMPROVE)	0.870	0.095	12.243	0.000
b. <u>Production Performance (PRODPERF)</u>				
Production Effectiveness (EFFECT)	0.888	0.058	16.254	0.000
Production Efficiency (EFFICIEN)	0.948	0.065	16.255	0.000

c. <u>Customer -related Performance (CPERFORM)</u>				
Offer Superior Customer Value (CVALUE)	0.884	0.059	15.655	0.000
Fast respond to customer needs (FRESPOND)	0.946	0.047	15.656	0.000
(ii) Exogenous/endogenous Path				
a. TQM-P→ PRODPERF [is supported]	0.681	0.111	8.189	0.000
b. TQM-P→ CPERFORM [is supported]	0.272	0.105	3.169	0.002
C. PRODPERF → CPERFORM [is supported]	0.571	0.082	6.414	0.000

Looking at the structural loadings of each TQM determinants on performance (Figure 1), quality measurement (structural loading = 0.924) indicates the highest contribution towards TQM implementation. This is followed by benchmarking (structural loading = 0.891), continuous process improvement (structural loading = 0.870) and supplier relations (structural loading = 0.766). All of these indicators have significant probability values (critical values ≥ 2.00), giving statistical evidence that the contributions of these variables towards overall supply chain management construct are significant and positive (, , and are supported). The examination of residuals also reveals that variances among variables are perfectly explained by the respective constructs. Overall, we can suggest that a manufacturing company can improve its performances by integrating and adopting TQM programs. The result highlights the unique contribution of TQM and supports the notion that the structural model has a satisfactory fit. We can obviously suggest that TQM programs can be adopted or implemented by Malaysian manufacturing companies in order to enhance production performance and customer related performance

5. CONCLUSION AND IMPLICATIONS

To meet the increasing demands of high-quality goods from sophisticated local and overseas markets, manufacturing companies must continuously improve their efforts in quality operations. TQM provides a vision that focuses everyone in an organization on product, production and quality improvements. The pursuit of these improvements is not only requested by the market but also driven by the need to survive. In short, the findings of this study suggest that TQM would be able to support and accentuate production performance as well as increase the level of customer-related performance. TQM would no doubt enhance the processes of producing value added products. This subsequently would lead to better customer-related performance in catering the changing customers' needs (Gaither & Frazier, 2002).

Total Quality Management (TQM) has become, ‘as pervasive a part of business thinking as quarterly financial results,’ and yet TQM's role as a strategic resource remains virtually unexamined in strategic management research. Drawing on the resource approach and other theoretical perspectives, this paper examines TQM as a potential source of sustainable competitive advantage, reviews existing empirical evidence, and report findings from a new empirical study of TQM's performance consequences. The conclusion emerging from this study is that TQM would ultimately result in positive gains. The results validate some of the key linkages and support beliefs and evidences by researchers regarding the relationships between TQM, production performance and customer-related performance. It is also important to note that this study attempts to enrich the literature review and make a contribution in TQM-related studies. This study to some extent helps in resolving controversy about the magnitude and measurements of performance gains from adopting TQM. By strengthening TQM processes, improved performance will likely to occur. The study will be of particular interest to practicing production managers or TQM managers as it suggests what TQM factors that should be emphasized or prioritized to stimulate performances. The result indicates that manufacturing companies should emphasize greater attention to both TQM processes and a greater degree of management support for TQM enhancement initiatives. Moving the firm toward TQM culture requires top management leadership and changes in strategic direction and planning (Powell, 1995). Malaysian firms should also develop strategic management techniques to compete in open market economy, which is the thrust of Malaysia's economic transformation plan under Malaysia's new economic model.. Once the strategies are appropriate, business can maintain sustainable competitive advantage and further enhance the wide area of TQM devices towards the customer's goals achievement.

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