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Supply Chain Management and Competitive Differentiation

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Abstract: An effective Supply Chain Management (SCM) has been increasingly recognized as critical factors in gaining competitive differentiation and enhancing SCM performance. More and more firms are increasingly implementing SCM to improve their competitive performance. In order to understand the connection of SCM and the performance of an organization, this study looks into consideration of many arguments from various research papers. This study presents, the findings of a research which examines the relationship between SCM, product quality and competitive differentiation determinants of the manufacturing companies in Malaysia. The study measures perception of senior management regarding the SCM practices and the level of product quality and competitive differentiation measurements in their companies. The associations between SCM, product quality measurements and competitive differentiation dimensions are analyzed through methods such as Pearson's correlations and Smart Partial Least Square (Smart PLS) using 126 respondents' data. The correlation results demonstrate that SCM practices have significant correlations with product quality measurements (comprises of product conformance, product durability, product performance and product reliability). The findings also suggest that SCM practices have significant correlations with competitive differentiation determinants (comprises of factors such as employee differentiation, price differentiation, product differentiation and service differentiation). Specifically, both product quality measurements and competitive differentiations have high correlations with SCM practices, namely 'strategic supplier partnership', 'lean production' and 'postponement concept' and 'new technology and innovation'. The Smart PLS result also reveals that SCM practices exhibit significant direct impact on both product quality measurements and competitive differentiation indicators. The findings of the study provide a demonstration of the importance of SCM practices in enhancing competitive performances in Malaysian manufacturing companies. This study contributes to the literature of supply chain management by exploring the critical SCM variables and also investigating the relationship between the SCM and performances in manufacturing companies.

Key words: Manufacturing companies, critical SCM variables, innovation, performances, SCM practices

INTRODUCTION

Today's global marketplace offers tremendous opportunities in achieving strategic competitiveness through effective Supply Chain Management (SCM). The process of manufacturing and distributing products and services to customers is becoming the most effective and efficient way for businesses to stay successful and is central to the practice of supply chain management. A successful SCM implementation is expected to enhance coordination and integration of supply chain process between upstream suppliers and downstream customers in order to make value added products available in an efficient and effective manner (Forker *et al*., 1997). The environment in which firms operate, today, has changed drastically with the growth in collaboration between competitors as well as business partners, outsourcing and also integrated supply chain systems. To compete successfully in today's challenging business environment, manufacturing companies should be able to effectively integrate the internal functions within a company and effectively linking them with the external operations of suppliers and supply chain members. They need to focus on supply chain management practices that have an impact on enhancing SCM activities such as where materials come from, how their suppliers' products are designed and assembled, how products are transported and stored and what consumers really wants. Many researchers claim that supply chain management can result in better supply chain performance (Christopher, 1998; Christiansee and Kumar, 2000). But, very few empirical studies have been carried to investigate the magnitude of the relationships between SCM and performances. Hence, an interesting and important issue to investigate is how SCM affects company performance.

With the increasing trend of business globalization, how a manufacturing company gains and retains its competitive differentiation while facing domestic and international challenges is the main focus of this study.

Empirically, the purpose of this study is to present an explicit result of the relationship between SCM, product quality measurements and competitive differentiation indicators. There are studies which suggest that SCM improves performance but with a few exceptions, rarely support it with statistical evidence. This study is one of few attempts to estimate the effect of implementing SCM programs on product quality and competitive differentiation. It fills a gap that exists in the literature on SCM from competitive differentiation perspectives in the manufacturing industry in Malaysia.

Since, the purpose of this study is to enhance managerial understanding of supply chain management, product quality and competitive differentiation in relation to SCM implementations, the main objectives of this study are:

- To empirically investigate relationships between Supply Chain Management (SCM) practices, product quality measurements and competitive differentiation indicators
- To investigate whether product quality mediate the relationship between SCM and competitive differentiation
- To empirically assess the contributions of each SCM practice

This study explores the possibility of adopting SCM as the basis for enhancing product quality, competitive differentiation in the Malaysian manufacturing companies. First, this study proceeds with an introduction, the objectives of the study and the test conducted to obtain the reliable measures of the variables. Secondly, it continues with a brief explanation of the SCM principles and literature review. Thirdly, it describes the conceptual framework consisting of the conceptual model and hypotheses. Fourthly, it discusses the methodology adopted; Fifth, it highlights the results of Pearson Correlations and Smart PLS. Finally, the results are then discussed and implications highlighted.

Supply chain management (literature review): A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products and the distribution of these finished products to customers (Ganeshan *et al*., 1999). Supply Chain Management (SCM) is "the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole" (Christopher, 1998). SCM involves integration, coordination and collaboration between customers and suppliers as well as across organizations and throughout the supply chain. SCM comprises determinants such as strategic supplier partnership, lean production, postponement concept and new technology and innovation. SCM has the potential to assist the organisation in achieving both cost and competitive advantage (Christopher, 1998). To gain competitive differentiation, organisations have to effectively adopt SCM approach and enhance the supply chain as a whole.

Conceptual framework and hypotheses: This study explores, the conceptual model which highlights the linkages between the constructs and well as variables within the context of the Malaysian manufacturing industry. In addition, hypotheses of the study are also discussed.

The conceptual model: This study explores, the relationships between SCM, product quality and competitive differentiation within the context of the Malaysian manufacturing industry. The conceptualization in this paper involves three tasks:

- Preparing a diagram (conceptual model) that visually represents the theoretical basis of the relationships in the study
- Identifying the variables and constructs
- Specifying hypotheses and relationships

The proposed conceptual model as depicted in Fig. 1, is based on three main constructs which are investigated in this study, namely:

- Supply Chain Management (SCM)
- Product Quality (PRODQUAL)
- Competitive Differentiation (CDIFF)

The hypothesized model in the present study demonstrates that SCM is important in enhancing performances and it is the duty of managers to utilize and make the best use of them. The framework consists of four manifest variables of SCM, four variables of product quality and four indicators of competitive differentiation.

The explanation of the constructs and variables

Supply Chain Management (SCM) variables: In this study, SCM practices represent a manager's assessment of the overall level of SCM practices. In addition to improving levels of performance, SCM has also been shown to provide benefits in terms of outcomes. The model proposed here uses SCM dimensions derived from

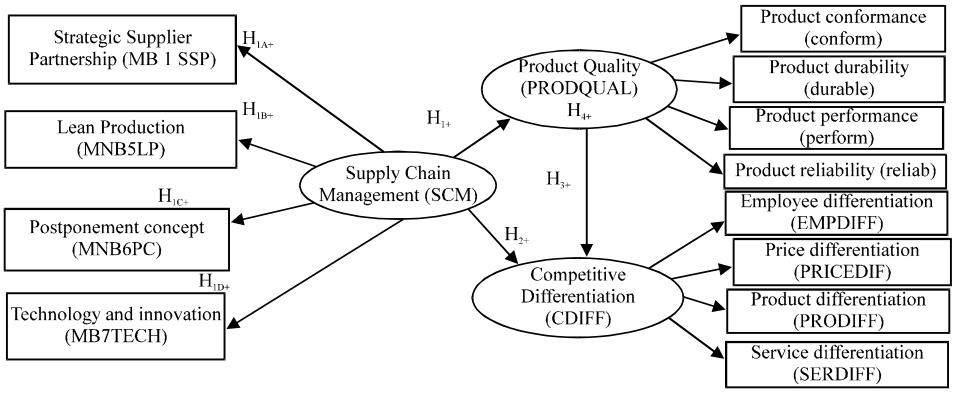

Fig. 1: The conceptual model linking SCM, product quality and competitive differentiation

prominent studies and documented references which are considered to relate to distinctive features of SCM and are therefore incorporated in the present conceptual model. Incorporating ideas, theories and studies from the literature, four main SCM dimensions included in the study are.

Strategic Supplier Partnership (MB1SSP): Developing trust and collaboration among supply chain partners as well as customers (Li *et al*., 2002; Agus, 2008).

Lean Production (MNB5LP): Lean production is associated with the continuous pursuit of improving the processes, a philosophy of eliminating all non-value adding activities and reducing waste within an organization (Agus and Arawati, 2000).

Postponement Concept (MNB6PC): Postponement involves the process of delaying final product configuration until the actual order requirement is specified by the customer. Keeping products in semi-finished would allow more flexibility and customization in completing the final products and also enables a company to respond more quickly to market demand (Agus, 2009).

New Technology and Innovation (MB7TECH): Tremendous change in the technological developments and globalization has formed significant impact on the nature of work where the advanced use of technology is a necessity in order to compete in the global arena.

New technology and innovation in SCM refers to the application of the latest scientific or engineering discoveries to the design of operations and production processes (Agus, 2008).

Product quality performance variables: In this study, the product quality comprises of elements or attributes such as product performance, product conformance, product reliability and product durability. Brief description of these attributes follows.

Product Performance (PERFORM): Performance quality is the primary product characteristics Performance quality refers to the levels at which the product's primary characteristics operate. Buyers will pay more for better performance as long as the higher price does not exceed the higher perceived value (Kotler, 1994).

Product Conformance (CONFORM): Conformance quality is the degree to which a product's design and operating characteristics meet established standards. It reflects whether the various produced units are identically made and meet the specifications (Kotler, 1994).

Product Reliability (RELIAB): Reliability is a measure of the probability that a product will not malfunction or will operate properly within a specified time period or the consistency of performance over time during which it is subjected to a given set of environment (temperature, humidity, corrosive agents, etc.) and/or mechanical (vibration, shock, abrasion, etc.) stress (Pascucci, 1998).

Product Durability (DURABLE): Durability is a measure of the product's expected operating life before it physically deteriorates or until a replacement is preferable. Buyers will pay more for a more durable product but this is subject to some qualifications (Kotler, 1994).

Competitive differentiations variables: Competitive differentiation construct is manifested by several variables such as product, personnel, services and price differentiation.

Product Differentiation (PRODIFF): Product differentiation on the basis of quality creates a defensible competitive position and insulates a firm against inroads of rival firms. The uniqueness associated with quality forms a difficult barrier for new competing firms to surmount. Research suggests that product differentiation is important for gaining competitive differentiation in many international and global markets (Franko, 1989). Inevitably, competition has shifted to new product development because customers now expect high quality and low costs in global markets (Prahalad, 1990; Erramilli *et al*., 1997).

Personnel differentiation/employee differentiation (EMPDIFF): Another key to gaining a competitive differentiation is the ability to tap into the productive energy of a firm's workforce (Marshall, 1998). A company's workforce, represents the intellectual capital the brainpower and the creative energy of the company that is the company's competitive differentiation. Without them, a firm's productive engine growth will become idle. Without their full commitment, we risk sub optimizing our competitive potential (Read and De Fillipi, 1990). Hofer and Schendel (1978) suggest a direct relationship between distinctive personnel differentiation and competitive differentiation through the ability of the firm to use competencies of their personnel to create major competitive differentiations.

Service Differentiation (SERDIFF): Some firms are able to service niche customers with a premium price product that enables them to secure a competitive differentiation. The fundamental element in service differentiation is to know what customers want and what meets that expectation. It is not sufficient to ask them what they want. This must be assessed in conjunction with what they receive (Haskett, 1986). Firms need to identify possible service strategies by starting with their customers and suppliers. If consumers see the service as differentiated, they are willing to pay a premium for it (Brooks, 1996).

Price Factor (Price differentiation/Cost advantage) (PRICEDIF): An offering can be positioned according to price compared with the prices of competing offerings (Mathur, 1992). Price can only be derived after considering several factors and usually termed as the cost advantage of a certain industry. The ability to establish a cost advantage over a competitor rests upon the possession of elements such as scale-efficient plant, superior process technology and ownership of low-cost sources of raw materials (Grant, 1991). Lower cost is the ability of a firm to design, produce and market a comparable product more efficiently than its competitors. At prices almost similar to competitors, lower cost translates into superior returns. Through lower cost, we gain the flexibility to respond to pricing challenges in the market. Many must have realized that price factor can help companies to enhance and capitalize on competitive differentiation and help them protect areas of vulnerability. Price too can bring about beneficial changes in the behavior of competitors. Compared to other strategic actions, price generally requires limited investment, is easily implemented and generates rapid results. Effective customer-oriented pricing involves the understanding of how much value consumers place on the benefits they receive from a product and subsequently set a price that fits this value.

In conclusion, competitive differentiation creates brand loyalty for consumers that, once established can take on the characteristics of a durable asset. Therefore, because differentiation is based upon firm-specific skills and creates a durable asset, it is more difficult to imitate. Hence, competitive differentiation can form the basis of a sustainable competitive advantage when all significant cost economies have been exhausted. Competitive differentiation may become the way a firm maintains its scale economies and safeguards its market share. The simultaneous pursuit of product differentiation, price differentiation, employee differentiation and service differentiation will be necessary for a firm to establish and then maintain a sustained competitive advantage (Hill and Charles, 1988; Kotler, 1994).

The hypotheses

The effect of SCM on product quality (H_1): In investigating, the influence of SCM on product quality and competitive differentiation, the Smart PLS is utilized to evaluate and analyze the magnitude and direction of the linkages between those constructs. The study proposes that SCM has an important influence on performance results. Firstly, the study attempts to investigate the main research hypotheses regarding associations between SCM, production. The goal of SCM processes is specified as adding value for customers at reduced overall costs. The value added should first be reflected in product quality such as in the form of product performance, conformance, durability and reliability. Based on the theoretical justification and supporting empirical evidence, the first hypothesis proposes that SCM has a positive structural effect on product quality.

H_1: SCM is positively related to product quality

The effect of SCM on competitive differentiation (H_2): Logically, it makes sense that with effective implementation of SCM; the overall competitive

differentiation performance would be enhanced. In addition, Bowersox *et al.* (2000) highlighted in their study that high SCM and SCM processes implementers exhibited significantly higher scores for performance. Therefore, the second hypothesis suggests that SCM has a positive impact on competitive differentiation.

H_2: SCM is positively related to competitive differentiation

The effect of product quality on competitive differentiation (H_3): Finally, the third research proposition suggests that improving product quality would have a positive effect on competitive differentiation. Justification for the hypothesis was based on the argument that product quality as a result of SCM processes will become closely linked to enhanced competitive differentiation (Carter *et al.*, 1994).

H_3: Product quality performance is positively related to competitive differentiation

The mediating effect of product quality in the linkage between SCM and competitive differentiation (H_4): In addition, this study also tries to test (fourth hypothesis) whether there is a mediating effect of product quality on the linkage between SCM and competitive differentiation.

H_4: Roduct quality mediates the linkage between SCM and competitive differentiation

In investigating the structural effect of supply chain management on performance, it is also pertinent to determine the structural loadings of each supply chain management dimension, namely "strategic supplier partnership", "Lean production", "Postpnomemt concept" and "New technology and innovation" (H_{1A}, H_{1B}, H_{1C} and H_{1D}).

MATERIALS AND METHODS

Research design and sample: This study was part of a larger study. The instrument used in this study was a structured survey questionnaire which was designed to assess the companies in term of the described dimensions. The instrument developed in this study consisted of three major parts. The first part comprised several variables measuring SCM practices and the second part consisted of statements to measure product quality, the third part comprised competitive differentiation measurements. To enable respondents to indicate their answers, seven-point interval scales were used in the questionnaire. Several SCM practices which have been widely referred were extracted. Similarly, the dependent variables, namely product quality and competitive differentiation also used a seven-point interval scale, representing a range of agreement with the statements whether over the past 3 years these measurements were high relative to competitors after implementing SCM practices. The goal was to understand and determine measures of SCM that can enhance competitive differentiation. Face to face interviews with production managers were carried out to ensure the information accuracy, validating the outcome of the analysis and developing an understanding of the practical aspects of SCM principles adoption. Sample companies were chosen from manufacturing in Malaysia (the sampling frame was derived from the Federation of Malaysian Manufacturers Directory-FMM). The 126 responses were received and analyzed. The primary purpose of the research was to measure senior production managers and SCM managers or perception of SCM and to gain insight into the benefits of implementing SCM in the manufacturing industry.

Reliability and validity: Validity and reliability tests were used to select and assess the final items of the independent constructs that were used for statistical testing. Since, data for the study were generated using multi-scaled responses, it was deemed necessary to test for reliability (Frohlich and Westbrook, 2001; Agus, 2008). The internal consistency of each factor was examined using Cronbach Alpha.

The reliability analysis was conducted by calculating the Cronbach's alphas for the main constructs in the study. Items that did not significantly contribute to the reliability were eliminated for parsimony purpose. The result indicated that the Cronbach's alpha measures for the two main constructs exceeded the threshold point of 0.70 suggested by Nunnally (1967). Alpha coefficients for supply chain management and product quality ranged between 0.85 and 0.90 after the alpha maximization process were carried out (Table 1), indicating internal consistency. As a result, nine items for the three constructs were retained for the confirmatory phase.

In addition, face-content validity was also ensured for this study. Content validity represented the sufficiency with which a specific domain of content (construct) was sampled (Nunnally, 1967; Ahire *et al.*, 1996). The critical variables of SCM in this study had content validity because an extensive review of the literature was conducted in selecting the measurement items and the critical constructs and all the items and factors had been evaluated and validated by professionals in the area of operation management/SCM. In addition, the draft questionnaire was pre tested with academics to check its content/face validity and terminology and modified accordingly (Agus, 2011).

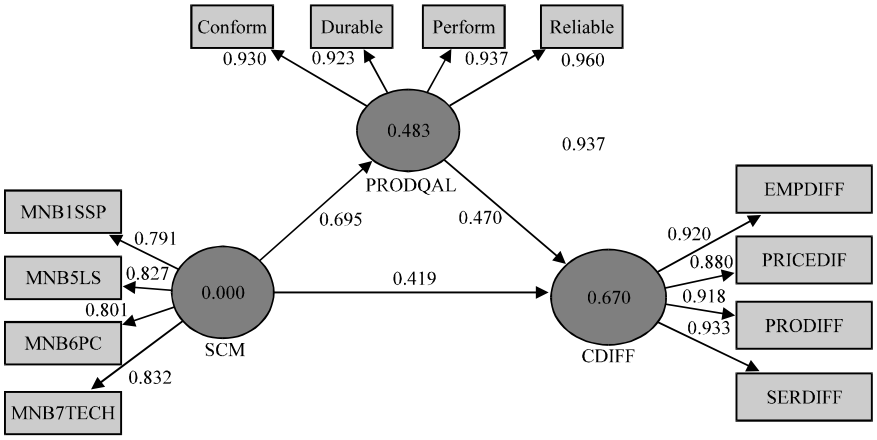

Fig. 2: The smart PLS (algorithm) Model showing the mediating effect of product quality in the linkage between SCM and product quality performance

Table 1: Model reliability and validity through smart PLS

Latent SCM and Performance Constructs	Cronbach's Alpha	Average Variance Extracted (AVE)	Composite Reliability (CR)	SD loadings (range)	R^2
Supply chain Management (SCM)	0.829	0.661	0.886	0.791-0.832	-
Product Quality (PPERF)	0.954	0.890	0.967	0.923-0.980	0.483
Competitive Differentiation (CDIFF)	0.935	0.838	0.954	0.880-0.933	0.670

Convergent validity can also be demonstrated when different methods used to measure the same construct produced similar results (Litwin, 1995). These constructs/factors were explained based on the measured variables' loadings (>0.70) and can be labeled as follows: "SCM", "Product Quality" (PRODQUAL)" and "Competitive Differentiations" (CDIFF)". This model was confirmed through the confirmatory factor analysis (Table 1 and Fig. 1). From Fig. 2, we observe that all of the standardized regression weights/loadings are above 0.70 and the respective squared multiple correlations are satisfactorily high. This means that the loadings are satisfactorily high and that a high amount of measured variable's variance is explained by a latent construct/factor (factor loadings >0.700, t>2.00, AVE >0.800, composite reliability >0.900) (Hair *et al*., 2006; Agus, 2008).

In addition, discriminant validity refers to the extent to which a certain construct is different from other constructs. The constructs in the study needed to be tested for discriminant validity, so that it can verify that the scales developed to measure constructs were indeed measuring different constructs (Garver and Mentzer, 1999). In addition, according to Fornell and Larcker (1981), the Average Variance Extracted (AVE) must be greater than squared correlations between constructs (AVE>corr 2) to achieve discriminant validity (Table 2). Discriminant validity was confirmed, through the result of the confirmatory factor analysis (AVE>corr 2) for the unconstrained model (Hair *et al*., 2006; Agus, 2008).

Table 2: The correlation between latent constructs and square root of the average variance extracted (diagonal)

Latent constructs	1	2	3
Supply Chain Management (SCM)	0.813		
Product Quality (PPERF)	0.695	0.938	
Competitive Differentiation (CDIFF)	0.746	0.761	0.915

RESULTS AND DISCUSSION

Correlations: As a preliminary analysis, Pearson's correlation analysis was conducted to establish associations between SCM practices, product quality and competitive differentiation. Table 3 highlighted correlations among SCM practices and multicollinearity statistics. The result indicated that the SCM practices had significant correlations with one another and also with competitive differentiation determinants. In addition, it suggested that those SCM practices complement each other and need to be implemented in a holistic manner. Furthermore, the collinearity test did not indicate any multicollinerity problem (Agus and Arawati, 2000).

The results (Table 4 and 5) indicated that most of the SCM variables specifically "strategic supplier partnership", "lean production", "postponement concept" and "Technology and Innovation" had high and significant correlations with product quality and competitive differentiation variables. These findings were

Table 3: Pearson's correlation among variables and collinearity statistics

SCM variables	1	2	3	4	Collinearity statistics	
					Tolerance	VIF
Strategic supplier partnership	1	0.488 (**)	0.526 (**)	0.580 (**)	0.587	1.704
Lean production	0.488 (**)	1	0.603 (**)	0.580 (**)	0.532	1.879
Postponement concept	0.526 (**)	0.603 (**)	1	0.515 (**)	0.556	1.799
Technology and innovation	0.580 (**)	0.580 (**)	0.515 (**)	1	0.538	1.859

Table 4: Pearson's correlations between SCM and product quality

SCM practices	Product conformance	Product durability	Product performance	Product reliability
Strategic Supplier Partnership (MNB1SSP)	0.471**	0.482**	0.438**	0.498**
Lean Production (MNB5LS)	0.547**	0.558**	0.568**	0.584**
Postponement Concept (MNB6PC)	0.505**	0.513**	0.436**	0.515**
Technology and Innovation (MNB7TECH)	0.564**	0.538**	0.541**	0.598**

Table 5: Pearson's correlations between SCM and competitive differentiation

SCM practices	Differentiation			
	Employee	Price	Product	Service
Strategic Supplier Partnership (MNB1SSP)	0.583**	0.525**	0.553**	0.542**
Lean Production (MNB5LS)	0.535**	0.619**	0.544**	0.571**
Postponement concept (MNB6PC)	0.488**	0.465**	0.542**	0.539**
Technology and Innovation (MNB7TECH)	0.488**	0.465**	0.542**	0.539**

*p = 0.05; **p = 0.01 (all t-tests are one-tailed)

consistent with several previous studies that proclaimed better organizational transformations as a result of SCM initiatives (Lee and Peccei, 2008; Inman, 1999; Arnheiter and Maleyeff, 2005).

Smart PLS: The Smart PLS was employed to investigate simultaneous linkages that allow a researcher to determine the relative strength of the relationships between variables. The linkages between SCM practices, product quality and competitive differentiation were depicted in the model (Fig. 2). Observing the overall result in Table 6, the result demonstrated that among SCM dimensions, lean production had the highest mean (5.389), followed by strategic supplier partnership (5.320), postponement concept (5.258) and lastly new technology and innovation (4.883). The result suggested that the adoption of SCM should be enhanced to keep abreast with global manufacturing practices and business. As for product quality dimensions, product performance (5.704) demonstrated the highest mean, followed by product effectiveness (5.698), product durability (5.672) and product conformance (5.698). Although, the means of product quality levels were considered quite high, manufacturing companies in Malaysia need to improve on the aspects of product durability for enhancement of long lasting products and product conformance for better adherement to standards and specifications. On the other hand, among competitive differentiation measures; product differentiation (5.190) exhibited the highest mean followed by service differentiation (5.175), employee differentiation (5.0952) and price differentiation (4.984).

In addition, the findings (Fig. 2 and 3 and Table 6 of the Smart PLS results) indicated that the path from SCM to product quality was relatively high with the loading of 0.695 and a significant bootstrapping t = 13.061. Thus, Hypothesis 1 was fully supported. The path of the Smart PLS algorithm model also showed that the impact of SCM on competitive differentiation was significant with a loading of 0.419 and a significant bootstrapping t-value of 3.861. The direct structural effects of SCM on these constructs were considered high given the complex causal linkages, suggesting the importance of SCM in improving product quality and competitive differentiation in the Malaysian manufacturing industry. Therefore, we had enough evidence to accept Hypothesis 1 and 2. The results also illustrated that product quality had a positive (loading = 0.470) and significant effect (t = 3.909) on competitive differentiation. Hence the result strongly supported Hypothesis 3.

Further to identify, the extent to which product quality mediated the linkage of between SCM and competitive differentiation an additional direct model that links SCM and competitive differentiation was estimated without the inclusion of the mediator (product quality). In this model, the direct linkage between SCM and competitive differentiation was found to be significant. On the other hand, the results of the PLS mediated model (as illustrated in Fig. 2, 3 and Table 6) demonstrated that SCM had a significant impact on competitive differentiation with the inclusion product quality as the mediator but the loading effect was slightly subsided. Hence, we can establish that product quality partially mediated the effect of SCM on competitive differentiation. To further validate,

Table 6: Structural and measurement results of the smart PLS

Constructs and indicators	Loadings	Mean	SE	t-stat (bootstrapping)
Supply chain management (SCM)				
Strategic supplier partnership (MB1SSP)	0.791	5.3203	0.0450	17.570*
Lean production (MNB5LS)	0.827	5.3892	0.0370	22.586*
Postponement Concept (MNB6PC)	0.802	5.2582	0.0560	14.322*
New Technology and Innovation (MNB7TECH)	0.831	4.8828	0.0320	26.265*
Product Quality: (PQUAL)				
Product conformance (CONFORM)	0.930	5.6640	0.0250	37.022*
Product Durability (DURABLE)	0.923	5.6720	0.0290	32.027*
Product performance (PERFORM)	0.987	5.7040	0.0190	48.181*
Product Reliability (RELIAB)	0.960	5.6984	0.0126	75.843*
Competitive Differentiation: (CDIFF)				
Employee Differentiation (EMPDIFF)	0.929	5.0952	0.0190	47.731*
Price Differentiation (PRICEDIF)	0.880	4.9841	0.0320	27.127*
Product Differentiation (PRODIFF)	0.918	5.1905	0.0230	40.585*
Service Differentiation (SERDIFF)	0.933	5.1746	0.0190	46.828*
Exogenous/endogenous path				
SCM? PQUAL [H_1 is supported]	0.695	-	0.0540	13.061*
SCM? CDIFF [H_2 is supported]	0.419	-	0.0440	3.861*
PQUAL? CDIFF [H_3 is supported]	0.470	-	0.1200	3.909*
SCM? PQUAL? CDIFF	Indirect effect = (0.695x0.470) 0.327			3.752*
[H 4 is supported partial mediation]	Total effect (0.419+0.327) = 0.746			

*Significant t-statistics>1.96 at 95% level of confidence

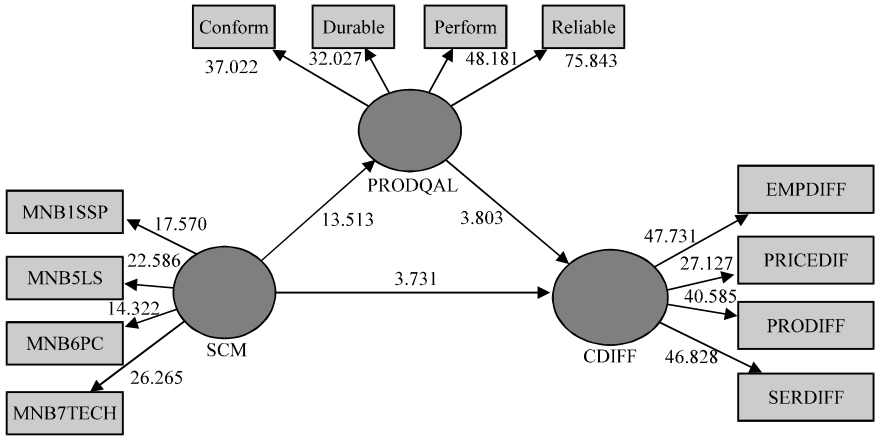

Fig. 3: The smart PLS (bootstrapping) model showing the mediating effect of product quality in the linkage between SCM and product quality performance

the relationship, the Sobel test was conducted to directly examine the significance of the mediation effect of product quality, since suggest that the Sobel test is superior in terms of power and intuitive appeal. The Sobel test lends additional support for the mediated relationship hypothesized through a change in the significance of the direct effect. The result of the Sobel test (Sobel t = 3.752 with a significant probability of 0.001) provided a significant support for the partial mediating effect of product quality on the relationship between SCM and competitive differentiation. Therefore, Hypothesis 4 was supported.

The magnitude and importance of the SCM variables were also investigated (Fig. 3 and Table 6). New technology and innovation (loading = 0.831) had the highest contribution towards SCM implementation. This was followed by lean production (structural loading = 0.827), postponement concept (loading = 0.802) and lastly strategic supplier partnership (loading = 0.791). All of these indicators had significant values 1.96) giving statistical evidence that the contributions of these variables towards overall SCM were significant and positive (H_{1A}, H_{1B}, H_{1C} and H_{1D} were supported). The findings also highlighted that SCM had high influences on product quality determinants specifically 'product performance' (loading = 0.987), 'product reliability' (loading = 0.960), 'product conformance' (loading = 0.930) and 'product durability' (loading = 0.923). The Smart PLS result also demonstrated the SCM measurements had

significant contributions toward competitive differentiation namely 'service differentiation' (loading = 0.933), 'employee differentiation' (loading = 0.929), 'product differentiation' (loading = 0.918) and 'price differentiation' (loading = 0.880). The examination of residuals also revealed that variances among variables were perfectly explained by the respective constructs. Therefore, a manufacturing company can enhance its product quality and competitive differentiation by integrating and implementing SCM strategies and practices.probability values.

CONCLUSION

Many manufacturing companies have fought the global pressures of competition by becoming increasingly technologically advanced, moving up-market to more value-added products and upgrading the skills of their domestic workforce. SCM provides a vision that focuses everyone in an organization on better improvement. The pursuit of improvement is not only requested by the market, but also driven by the need to survive. This study tries to investigate the relationships between SCM, product quality and competitive advantage in Malaysian manufacturing companies. On the whole, we can suggest that SCM has a positive impact on product quality and competitive advantage. SCM practices provide a vision that focuses everyone in an organization on SCM improvement. The pursuit of better improvement is not only requested by the market but also driven by the need to survive. This study tries to investigate the relationships between SCM, product quality and competitive differentiation in the Malaysian manufacturing industry. The associations and effects of the SCM variables were evaluated using correlations and Smart PLS. The results of the study assist in understandings on how SCM practices influence product quality and competitive differentiation. This study leads to several main conclusions. First, evidences suggested that:

- Technology and innovation, lean production, strategic supplier partnership and postponement concept have positive and direct effects on competitive differentiation
- SCM practices have positive and significant direct effects on product quality specifically product performance, product reliability, product durability and product conformance
- SCM practices have positive and significant direct effects on competitive differentiation specifically product differentiation, employee differentiation, service differentiation and price differentiation

The conclusion emerging from this study is that SCM will ultimately result in positive gains. The results validate some of the key linkages and support the beliefs and evidence by researchers of the relationship between SCM, product quality and competitive advantage. It is also important to note that this study attempts to enrich the literature review and make a contribution in SCM-related studies. Obviously, its purpose has been to make explicit what other researchers, perhaps knew implicitly with solid measurements. The empirical results support long-standing beliefs and anecdotal evidence by researchers about the relationships between the exogenous (SCM) and endogenous results (product quality and competitive advantage) and lend credibility to causal hypotheses that improving internal process leads to improvements in external performance results. This study to some extent helps in resolving the controversy about the magnitude and measurements of performance gains from implementing SCM. By strengthening SCM practices, improved performance will likely to occur. This result provides evidence that improving internal practices will positively impact the most important performance measures.

IMPLICATIONS

This study is relevant to practitioners because the findings may reveal important aspects in the implementation of SCM practices which may provide significant information managers can use to solve implementation challenges and perhaps to improve performance. The study would be of particular interest to practicing production managers or SCM managers as it suggest what factors should be emphasized to stimulate the adoption of SCM concepts in the Malaysian manufacturing industry. Moreover, the findings may provide support for continued implementation of SCM practices. The result indicates that manufacturing companies should emphasize greater attention to the technology and innovation adoption, providing semi-ready stocks (postponement concept), waste reduction aspects through lean production and strategic partnership of the SCM practices as well as a greater degree of management support for SCM programs. Thus, a manufacturing company can enhance its product quality and competitive differentiation by integrating and implementing SCM strategies and practices. The result highlights the unique contribution of SCM practices on product quality and competitive differentiation. We can obviously suggest that SCM practices can help manufacturing companies improve their product quality

and in the long run, it is safe to state that SCM can ultimately enhance competitive differentiation of manufacturing industry in Malaysia.

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