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Full Length Research Paper

Supply chain management: success factors from the Malaysian manufacturer's perspective

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The purpose of this paper is to shed the light on the critical success factors that lead to high supply chain performance outcomes in a Malaysian manufacturing company. The critical success factors consist of relationship with customer and supplier, information communication and technology (ICT), material flow management, corporate culture and performance measurement. Questionnaire was the main instrument for the study and it was distributed to 84 staff from departments of purchasing, planning, logistics and operation. Data analysis was conducted by employing descriptive analysis (mean and standard deviation), reliability analysis, Pearson correlation analysis and multiple regression. The findings show that there are relationships exist between relationship with customer and supplier, ICT, material flow management, performance measurement and supply chain management (SCM) performance, but not for corporate culture. Forming a good customer and supplier relationship is the main predictor of SCM performance, followed by performance measurement, material flow management and ICT. It is recommended that future study to determine additional success factors that are pertinent to firms' current SCM strategies and directions, competitive advantages and missions. Logic suggests that further study to include more geographical data coverage, other nature of businesses and research instruments.

Key words: Supply chain management, critical success factor.

INTRODUCTION

Back in the 1960s, the cornerstone to every successful company is to make customers, keep customers, and maximise customer profitability. Later, the focus moved away from low costs and low quality product markets to high quality products markets at lower costs with greater responsiveness (Chin et al., 2004). Numerous quality initiatives were initiated by many companies, including total quality management (TQM), international organisation for standardisation (ISO) and just-in-time (JIT) for quality assurance and measurement (Chandra and Kumar, 2000). By the early 1990s, intense competition and global markets forced organisations to get a product and service to the right customer, at the most opportune time and at the lowest cost (Altekar, 2005; Li et al., 2003). More and more organisations are promoting supply chain competitiveness to attain organisational efficiency, as present competition is between effective supply networks rather than individual organisations.

In the 21st century, supply chain management (SCM) shapes a new manufacturing paradigm of organisational sustainability and competitiveness (Gunasekaran, 2004). SCM is progressively recognised as a key and vital corporate strategy, which links both suppliers and customers in order to enhance overall manufacturing flexibility. Besides, successful SCM is a prominent tool to reduce cost of operation by eliminating all non value added activities in the flow of various kinds of materials from supplier to end customer (Chan and Lee, 2005).

Statement of the problem

Enhancing superior supply chain performance has

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become one of the critical approaches for sustaining competitive advantages for companies (Cai et al., 2009). This manufacturing company is truly striving hard to achieve superior supply chain performance in order to outperform its competitors. However, the problem the company is faced with is what to do with supply chain inefficiency under its organisational control.

A key problem for this manufacturing company is the management of customer relationship. Customers demand faster and timelier delivery of orders. The company is in the high levels of demand variation that causes the demand changes are always hard to anticipate (Lummus and Vokurka, 1999). Failure to meet customers demand could result in lost revenues, lower customer satisfaction and potential claims for late delivery. In addition, the company finds itself locked-in to its supplier. This lock-in is dominated by the suppliers by imposing restricted terms and conditions to the company order. The order is non-cancellable, non-returnable and cannot be rescheduled to a later date. For an example, if customer cancels demand not fulfilled on time, it may lead to high inventory carrying costs and high material exposure. Another problem is the relative lack of information communication and technology (ICT), both inside and outside the company (Ayers, 2001). Substantial ICT differences between the company and its suppliers can hinder the coordination activities for transactions, the quality of information sharing and information visibility. As a result, supplier response time for a purchase order is increased.

Besides, there is a problem on the raw material flow or raw material availability, the delivery reliability of the supplier (Van Weele, 2005). Supplier fails to deliver raw materials at the required time to meet production schedule. Because the company relies on its supplier for on time shipments, the late deliveries can result in shipment delay to its customers. As a consequence, customers can decrease or cancel orders. Each functional department is well aware of the requirements of customers and makes cooperative contributions to achieve higher profitability. But there is a lack of commitment and cooperative efforts between departments. Issues of materials default location, identification, traceability and the inaccurate records on the actual amount and value of inventories (Altekar, 2005) have direct impact on the timely production and performance of others in the organisation.

The company seldom undertakes ways to improve its supply chain performance and measures whether or not they have been successful. Basically, supply chain measurements consist of four main activities namely plan, source, make and delivery (Gunasekaran et al., 2001). Supply chain metrics such as capacity utilisation, human resource productivity, percentage of defects, supplier delivery performance and delivery reliability performance are not being deployed to track supply chain performance (Gunasekaran et al., 2004) in the company.

Measurement is helpful and is the only way to understand whether process performance is improving or worsening and whether or not correction action is required urgently (Roussel and Cohen, 2005).

Background of the study

Electronic manufacturing services (EMS) industry is one of the industries that require SCM to optimise both operations and profits. EMS provides electronics manufacturing services to other electronic companies. EMS focuses on printed circuit board fabrication, electronic design, assembly and testing. EMS industry aims to achieve a large economy of scale, make the fullest use of capital-intensive manufacturing equipment, source raw materials and pool together resources, and provide post-manufacturing services including warranty and repairs.

The objective of SCM in the manufacturing company is to deliver high customer service at minimal inventory and low unit cost by synchronising the customers need with a smooth flow of material from suppliers. The structure of supply chain in this manufacturing company is driven by the design, planning and operation of four key drivers: the physical network, inventory management, transportation management and information systems. These four major drivers manage the flows of material and enhance cost efficiency of the entire supply chain.

Objective of the study

This paper seeks to explore the relationship between relationship with customer and supplier, information and communication technology (ICT), material flow management, corporate culture, performance measurement and its SCM performance of an established manufacturing company.

LITERATURE REVIEW

Supply chain performance measurement approach

Performance measurement is described as “a parameter used to quantify the effectiveness and efficiency of action” (Neely et al., 1995). Effectiveness is to measure how a customer's need is fulfilled and efficiency is to measure how an organisation's resources are exploited in order to increase customer value. Performance measurement systems are defined as a complete set of approaches applied to measure the “efficiency and effectiveness of action” (Neely et al., 1995; Shepherd and Gunter, 2006).

Balanced scorecard

The balanced scorecard is a company performance measurement tool and this framework was introduced by Robert S. Kaplan and David P. Norton in 1992 (Kaplan

and Norton, 1996). Four major categories are identified including financial measurement, customer services measurement, internal company performance measurement and learning.

Supply-chain operations reference (SCOR) model

The supply-chain operations reference (SCOR) model was developed by the supply-chain council (SCC) to help organisations to improve the efficiencies and competitiveness of their supply chains (Stewart, 1997). According to Christopher (1998), the objectives of SCOR include a standardised approach to measure supply chain performance and apply a set of metrics to benchmark against other organisations. The SCOR model is categorised by four management processes:

(1) Plan: match supply and demand
(2) Source: procurement of raw materials
(3) Make: transformation of the raw materials into finished goods
(4) Deliver: delivery of products or services

Benchmarking

Benchmarking is a systematic process of determining and implementing best practices in strategic planning and operational improvement. Benchmarking is a technique for comparing a firm's business processes against the best practices of other firms (Camp, 1989). Benchmarking is important for the firms to compare similar performance metrics. As suggested by Splendolini (1992), benchmarking process consists of five fundamental purposes:

(1) Strategy: short and long term planning execution
(2) Forecasting: predict trends
(3) New ideas: suggest new insight
(4) Compare processes
(5) Objectives and goal-setting against best practices

Previous studies on relationship between SCM success factors and SCM performance

Relationship with customer and supplier

The foundation of a business alliance is the relationships between supply chain partners, that is, customer and supplier. Effective partnership is dependent upon an environment grounded in mutual trust, loyalty, positive sum game, fairness in negotiations, goal and intent revelation, and commitment among partners (Chandra and Kumar, 2000). Spekman et al. (1998) claimed that sustainable business success relates to the strength of the relationship between firm and its supply chain partners. Good partnerships have regarded as strategic decisions in expanding revenue and reducing cost. Therefore, a company's long-term success is primarily dependent on customer satisfaction and the supplier reliability (Chandra and Kumar, 2000; Choy et al., 2003). Various studies (Fearne and Hughes, 1999; Humphreys et al., 2001; Valsamakis and Sprague, 2001; Vereecke and Muylle, 2006; Bartlett et al., 2007; Ounna et al., 2007) have addressed the needs of close collaborative linkages through the entire supply chain. According to Alfred Wong (2002), firms with a high supplier satisfaction and contribution achieve a higher level of customer satisfaction and SCM performance outcomes than those that show weaker supplier value focus.

Information and communication technology (ICT)

ICT is an enabling strategic vehicle for supply chain performance that facilitates inter- and intra organisational communications (Boubekri, 2001; Yu et al., 2001; Jonsson and Gunnarsson, 2005). Information technology (IT) is seen as the key ingredient to business survival and information quality (Gunasekaran and Ngai, 2004; Auramo et al., 2005). Dawson (2002) found that a seamless supply chain network demonstrates high productivity and high customer satisfaction, also allow firms to communicate with other partners, with online and timing information to improve visibility to orders. Being able to adopt new IT in SCM is a strategic imperative for all successful businesses (McLaughlin et al., 2003). The right SCM information system can enhance firms' operational efficiency and operational flexibility (McLaren et al., 2004).

Material flow management

Effective logistics network is the crucial link between market and production. The implementation of material flow management aims at reducing costs of non-value-adding efforts and the stocks while simultaneously achieving long-term sustainability (Spath and Baumeister, 2001). Childerhouse et al. (2003) studied the best practices on how to re-engineering a construction supply chain by using material flow control system, providing examples of nine different companies. Therefore, the development of creative solutions to material flow offers firms a high potential for realising new economic competitive advantages. In this context, logistic capability is expected to result in improved supply chain efficiency. The capabilities include timely materials delivery, global delivery capabilities, shipments accuracy and good knowledge of logistics (Meier et al., 2004).

Corporate culture

Corporate culture is defined as common expectations,

practices and goals that are shared by the majority of the organisation (Deresky, 2008). Management support has become a critical factor for successful supply chain performance (Van Hoek et al., 2002). Meier et al. (2004) supported the importance of management support and pointed out that leadership management is an important element in the SCM. Leadership management requires shared culture, privacy protection, accountability, high management expertise, good mindset and professional, decisive in decision making, ethical and continuous performance measurement. Mello and Stank (2005) found that firms have inappropriate or inadequate cultural elements (for example, shared assumptions, values and artifacts) are inclined to fail when adopting SCM practices. According to Fawcett et al. (2006), a successful supply chain is driven by organisational commitment and governance. There are four types of managerial support required to achieve high supply chain performance: from upper management support to departmental support, channel support and infrastructural support.

Performance measurement

Gunasekaran et al. (2001) stressed the importance of supply chain performance measurement for a successful SCM. Using customer satisfaction measurement has enabled a business to compete more effectively in its targeted mission. Customer feedback provides a platform for the strategic alignment of organisational resources to meet customer expectations (Swinehart and Smith, 2005). In addition, as suggested by Liang et al. (2006), suitable supply chain performance metrics are important for a successful company. Shepherd and Gunter (2006) reviewed numerous literatures of supply chain performance measurement techniques and suggested several issues that further studies should address. The issues include success factors that influence the actual implementation of supply chain performance measurement metrics, the forces shaping their evolution over time and problems related to their continuous improvement.

RESEARCH METHODOLOGY

Sample

The study included four manufacturing departments: purchasing, planning, logistics and operation. The total population comprised 84 persons in the company. According to Issac and Michael (1995), with a confidence level of 95%, the sample size would be 80 respondents. Evidently, the sample size was too small, so researcher included the entire population in the study. Out of 84 questionnaires distributed to the respondents, 100% completed questionnaires were collected successfully via e-mail. Profile of respondents is shown in Table 1. The majority of respondents were in the 21 to 30 age band (58.3%), female (60.7%) and Chinese (46.4%). They had a degree qualification (46.4%), worked in this company for less than 5 years, but more than a year (46.4%). Most of them were officer or executive position (81.0%) and from purchasing department (45.2%).

Measurement

The instrument used in this study was adapted from the studies of Chin et al. (2004), Tumala et al. (2006), Davis et al. (1989) and Huan et al. (2004). Respondents were asked to rate their agreement to statements regarding critical success factors - SCM performance relationships on a 5-point Likert scale (1 = “Strongly Disagree” to 5 = “Strongly Agree”) and (1 = “Decrease” to 5 = “Increase”). The reliability test was assessed in the study, and the alpha scores were more than 0.65 as shown in Table 2. In this sense, the scales used were reliable and consistent.

RESULTS

A descriptive analysis (means) of relations between critical success factors and supply chain performance was carried out in the manufacturing company. The average distribution of scores was slanted toward agreement. Participants in the survey rated that the factor of performance measurement had the most influence on supply chain performance.

The Pearson’s correlation was used to explore a correlation between SCM performance and critical success factors. As shown in Table 3, the results indicated a significant positive correlation between SCM performance and critical success factors. The value ranges from +0.4 to +0.7.

The multiple regression analysis was employed to test hypotheses and to examine the strength of relationships between SCM performance and critical success factors. The result is summarised in Table 4, the final model accounted for 70.1 % of the variance (Adjusted R^2 = 0.701). The factor of relationship with customer and supplier demonstrated the greatest impact on SCM performance, followed by performance measurement, material flow management and ICT.

Table 5 presented the results of hypotheses testing. The results indicate that relationship with customer and supplier, information communication technology, material flow management and performance measurement are imperative for overall SCM performance in the company. In this study, four hypotheses are accepted and only one hypothesis is rejected.

DISSCUSSION AND IMPLICATIONS

The findings of this study validate the research of Tumala et al. (2006) and Chin et al. (2004), it is noted that SCM critical success factors help manufacturing companies to maximise efficiency, reduce operational cost, build stronger supplier and customer relationships, improve profitability and lead times, increase system flexibility and firm competitiveness. The study results are consistent with the findings of previous similar research. Because

Table 1. Profile of respondents.

Demographic variable	Frequency	Percentage
Age		
2 1to 30	49	58.3
31 to 40	28	33.3
41 to 50	5	6.0
51 and above	2	2.4
Gender		
Female	51	60.7
Male	33	39.3
Race		
Malay	31	36.9
Chinese	39	46.4
Indian	12	14.3
Others	2	2.4
Highest academic qualification		
SPM/STPM	10	11.9
Diploma	31	36.9
Degree	39	46.4
Master	2	2.4
PhD/DBA	1	1.2
Others	1	1.2
Years of working experience		
Less than 1 year	2	2.4
1 to 5 years	39	46.4
6 to10 years	28	33.3
11 to15 years	11	13.1
16 years and above	4	4.8
Position		
Officer/executive	68	81.0
Manager/supervisor	16	19.0
Department		
Purchasing	38	45.2
Planning	10	11.9
Logistics	21	25.0
Operation	15	17.9

Source: Field survey, (2009).

the study shows that the studied companies have operational focus in the manufacturing.

The results from multiple regression analysis demonstrate that four predictors influence the SCM performance, except for the corporate culture. It found that relationship with customer and supplier had the highest beta value (0.455) that would impact the criterion variable the most. It is notable that strong corporate culture can improve firm performance, but not for weak corporate culture (Gordon and DiTomaso, 1992; Kotter and Heskett, 1992). A later study by Siew and Kelvin (2004) advanced the view that strong culture can affect the success of the business in some cases. In contrast, weak culture can lead to employee feelings of separateness

Table 2. Cronbach's alpha scores for variables.

No.	Variable	No. of Item	Cronbach's alpha
1	Relationship with customer and supplier	13	0.698
2	Information and communication technology (ICT)	9	0.712
3	Material flow management	9	0.673
4	Corporate culture	16	0.732
5	Performance measurement	11	0.712
6	Supply chain management performance	9	0.773

Source: Field survey, (2009).

Table 3. Correlation coefficient for critical success factors-SCM performance.

		SCM performance	Relationship with customer and supplier	ICT	Material flow management	Corporate culture	Performance measurement
SCM performance	Pearson correlation	1	0.735**	0.428**	0.527**	0.369**	0.569**
	Sig. (2 tailed)		0.000	0.000		0.001	0.000
	N	84	84	84	84	84	84

** Correlation is significant at the 0.05 level (2-tailed). Source: Field survey, (2009).

Table 4. Regression result for critical success factors – SCM performance.

Critical success factors	SCM performance
	Beta (β) +
Relationship with customer and supplier	0.455**
Information and communication technology (ICT)	0.184**
Material flow management	0.234**
Corporate culture	0.070
Performance measurement	0.276**
Adjusted R^2	0.701
F Statistic	40.01
Sig. F	0.000

** p-value < 0.05
** Correlation is significant at the 0.05 level (2-tailed).

Source: Field survey, (2009).

from the organisation; hence it can impair organisational performance (Smircich, 1983).

The result shows that corporate culture is not significantly related with SCM performance in the manufacturing company. Cultural traits such as empowerment, constantly changing environment, management style and work flexibility are not correlated with SCM performance indicators. A potential reason for this may be due to the manufacturing company has many subcultures and they vary by divisions or by departments. Each department has a unique set of culture and its own personality. Therefore, respective department has its own folklore to run its operation, solve problems, make decisions and communicate with each others (Ross, 2000). As a result, the company with numerous subcultures which lack of cooperative efforts is difficult to pursue the success of the overall SCM implementation process.

The finding of the study has been proven that building a good relationship with customer and supplier is very important to a successful SCM implementation. The

Table 5. Summary of research hypotheses result.

Research hypotheses	Results
H_1: There is a significant positive relationship between relationship with customer and supplier and SCM performance.	Accepted
H_2: There is a significant positive relationship between information and communication technology and SCM performance.	Accepted
H_3: There is a significant positive relationship between material flow management and SCM performance.	Accepted
H_4: There is a significant positive relationship between corporate culture and SCM performance.	Rejected
H_5: There is a significant positive relationship between performance measurement and SCM performance.	Accepted

Source: Field survey, (2009).

success or failure of SCM hinges on a company's ability to integrate its key supply chain partners. The company should develop a trust-based relationship with customer and supplier, in order to improve visibility to orders which generated by time-phased demand and supply planning.

Besides this, supply chain performance measurement plays an important role in increasing supply chain efficiency. Therefore, the company should develop supply chain performance measures on a timely basis. Of course, it requires commitment and cooperative efforts from managers of different functional areas such as planning, purchasing, operation and logistics. An effective supply chain network is also characterised by a good flow of materials and products. Applying good inventory management can yield significant improvements in both inventory cost and customer satisfaction level. Finally, scalable technology is a key component in propelling company into new directions in the demand and supply process linkages. In fact, a good quality of information sharing with suppliers helps to create the best material and products flows (Lambert and Cooper, 2000). Thus, it can be said that an efficient synchronisation of information and material flows directly affect the performance of the company and its supply chain.

Limitations and suggestions for future research

This study implies some limitations and scarcity, logic suggests that future researchers include more geographical data coverage, because small sample size makes it very difficult to generalise the result to manufacturing sector. Therefore, it is of great importance to include more manufacturing companies in future research. The result would be much better if it can represent the full picture of Malaysia manufacturing industry. In addition, the other nature of businesses including food industry and cosmetic industry should be examined in determining the success factors of supply chain performance. Apart from the five critical success factors in this study, it is recommended that future study to determine additional success factors that are pertinent to firms' current SCM strategies and directions, competitive advantages and missions. Future researchers should also extend their research by investigating actual SCM strategies implementation. The strategies include leagile supply chains, web-based supply and demand integration, supplier partnership and logistic strategy. Further study could be conducted to identify the measurement of supply chain effectiveness before and after the SCM strategies implementation.

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