A Literature Review for Identification of Performance Measures for Establishing a Framework for Performance Measurement in Supply Chains

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Abstract

Supply Chain Management (SCM) has gained significance as one of the 21st century manufacturing paradigms for improving organizational competitiveness. Supply chain ensures improved efficiency and effectiveness of not only product transfer, but also information sharing between the complex hierarchies of all the tiers. The literature on SCM that deals with strategies and technologies for effectively managing a supply chain is quite vast. In recent years, organizational performance measurement (PM) and metrics have received much attention from researchers and practitioners. Performance measurement and metrics have an important role to play in setting objectives, evaluating performance, and determining future courses of actions. Performance measurement and metrics pertaining to SCM have not received adequate attention from researchers or practitioners. There is no systematic grouping of the different performance measures in the existing literature. The development of a framework for PM in supply chains requires generalised performance measures. This paper seeks to provide an extensive literature review for identification of performance measures, which in turn forms a basis for establishing a framework for performance measurements in supply chains.

Keywords

Supply chain; Supply chain management; Performance measurement

Introduction

The development of economy of any country is supported by growth of its manufacturing industries. Currently, the manufacturing industries are passing through a phase of very tough competition. The economic environment is becoming harsh. In order to survive, every industry has to strive to improve productivity in all spheres of activity. What is required is to devise new ways of improving manufacturing performance by optimally utilizing the resources. In this context, effective supply chain management is vital to the competitiveness of manufacturing enterprises, as it directly impacts their ability to meet changing market demands in a timely and cost effective manner. Figure1 shows the typical supply chain consisting of different levels e.g. supplier, manufacturer, distributor and consumer, who work together in an effort to acquire raw materials, convert these raw materials into specified final products and deliver these final products to retailers Beamon (1998). So, it is a network of companies which influence each other. The complexity and the large network affect one another's performance. In this context, Chan (2003) highlighted some important issues like, how would the supply chain perform? How can the managers choose the most optimum supply chain best suited for its particular industry? Karthik (2006) observed that the objective of the supply chain was to maximize the difference between worth of the final product to the customer and the effort the supply chain expended in fulfilling the customer needs.

Fig.1 A typical Supply Chain

The aim of supply chain management is to gain an advantage in terms of customer service and cost over competitors. Therefore it is desirable to assess the company's performance by benchmarking. Given the inherent complexity of the typical supply chain, selecting appropriate performance measures for supply chain analysis is particularly critical, since the system of interest is generally large and complex. The purpose of this research is to present an extensive literature review, so as to develop a basis for establishing a framework for performance measurement in supply chains. Though the purpose of this work is not aimed at giving a complete discussion on each measurement and its suitability for application to each industry, however definitions of each performance measure have been given.

Background of Research

With annual worldwide supply chain transactions leading to trillions of dollars, the potential impact of performance improvements is tremendous. In this context, adopting or implementing an appropriate performance measurement system with proper performance measures is imperative. According to Beamon (1999), one of the most difficult areas of performance measure selection is the development of performance measurement systems. This involves the methods by which an organization creates its measurement system. Important questions must be addressed here: What to measure? How are multiple individual measures integrated into a measurement system? How often to measure? How and when are measures re-evaluated? Although all of the ideas important to examining measurement

systems are already in place, the problem is more difficult since the 'slate is blank' and the goal is to create the best possible measurement system for the supply chain or chains of interest.

Traditionally, performance measurement is defined as the process of quantifying the effectiveness and efficiency of action (Neely et al. 1995). In modern business management, performance measurement goes well beyond merely quantification and accounting. It is supposed to contribute much more to business management and performance improvement in the industries. Sink and Tuttle (1989) claim that you cannot manage what you cannot measure. From the management perspective, performance measurement provides the necessary information for management feedback for decision makers and process managers. It plays a critical role in monitoring performance, enhancing motivation and communication and diagnosing problems Waggoner et al. (1999) and Rolstands (1995). Furthermore, performance measurement provides an approach to identifying the success and potential management strategies, and facilitating the understanding of the situation. It assists in directing management attention, revising company goals, and re-engineering business processes (Van Hoek 1998, Bourne et al. 2000. and Kuwaiti and Kay 2000). Henceforth, accurate performance measurement is helpful in the improvement of SCM. Many firms look to continuous improvement as a tool to enhance their core competitiveness using SCM. Many companies have not succeeded in maximizing their supply chains potential, because they have often failed to develop the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency. Lee and Billington (1992) observed that the discrete sites in a supply chain do not maximize efficiency, if each pursues goals independently. They point to incomplete performance measures existing among

industries for assessment of the entire supply chain. Measurements should be understandable by all supply chain members and should offer minimum opportunity for manipulation (Schroeder et al. 1986). Performance studies and models should be created, so that, organizational goals and achievement of those goals can be measured, thus allowing the effectiveness of the strategy or techniques employed to be accessed.

Most companies realize the importance of financial and non-financial performance measures; however they have failed to represent them in a balanced framework. According to Kaplan and Norton (1992), while some companies and researchers have concentrated on financial performance measure, others have concentrated on operational measures. Such an inequality does not lead to metrics that can present a clear picture of organizational performance. For a balanced approach, Maskell (1991) suggested that companies should understand that, while financial performance measurements are important for strategic decisions and external reporting, day to day control of manufacturing and distribution operations is often handled better with non-financial measures.

The metrics that are used in performance measurement and improvement should be those that truly capture the essence of organizational performance. A measurement system should facilitate the assignment of metrics to where they would be most appropriate. For effective performance measurement and improvement, measurement goals must represent organizational goals and metrics selected should reflect a balance between financial and non-financial measures.

According to Beamon (1999), very little literature on performance measurement systems (PMSs) design and performance measures was available. Three types of performance measures that are necessary components in any supply chain performance

measurement system i.e. resource, output and flexibility have been identified. Beamon (1998) categorised the existing performance measures into two groups: qualitative and quantitative, involving customer satisfaction, and customer responsiveness, flexibility, supplier performance, costs and those used in supply chain modeling. Gunasekaran et al. (2004) developed a framework for measuring the strategic, tactical, and operational level of performance in a supply chain, which deals mainly with supplier, delivery, customer service and inventory and logistics costs. Chan (2003) mentioned that there was no systematic grouping of the different performance measures in the literature. Some common criteria such as cost, quality, resource utilization, flexibility, visibility, trust and innovativeness have been categorised in Chan's (2003) work. Bhatnagar and Sohal (2005) proposed a framework which included qualitative factors concerning plant location decisions, supply chain uncertainty, and manufacturing practices. They argued that a joint consideration of such factors helps in explaining supply chain competitiveness. They discussed about 06 criteria and 30 sub criteria, divided into three parts like plant location factor, supply chain uncertainty and manufacturing practices. Gaiardelli et al. (2007) observed that since many actors are involved along the service chain, an integrated, multi-attribute and consistent set of measures needs to be properly designed at every level of the after-sales supply chain.

Li et al. (2006) conceptualized and developed five dimensions of SCM practice (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) and tested the relationships between SCM practices, competitive advantage, and organizational performance. Their research indicated that higher levels of SCM practice can lead to enhanced competitive advantage and improved

organizational performance. Jammernegga and Reiner (2007) discussed the opportunities and challenges for improving the performance of supply chain processes by coordinated application of inventory management and capacity management. Gruat La Forme et al. (2007) proposed a general framework characterizing the performance of the collaboration in supply chains based on two models: collaboration characterization model and a collaboration-oriented performance model, both based on main supply chain business processes. Zhou and Benton Jr. (2007) investigated the integration of information sharing and supply chain practice in supply chain management. Their findings reflected that both effective information sharing and effective supply chain practice were critical in achieving good supply chain performance. Bhagwat and Sharma 92007) developed a balanced scorecard for supply chain management for measuring and evaluating day-to-day business operations in the context of four perspectives: finance, customer, internal business process, and learning and growth.

The Supply Chain Council's SCOR-model (2008) is an international standard for process description and reorganization, and considers five main supply chain processes: planning, sourcing, production, delivering, and return activities. Through a common set of definitions, performance indicators and best practices, the SCOR-model is a framework for a common language between supply chain partners concerning its five management processes (Gruat La et al.2007, Zhou and Benton 2007).

Identification of Performance Measures

Although managers attempt to build new measures and metrics for SCM, most of the current PMSs for the supply chain have lack of a balanced approach to integrating financial and non-financial measures. Besides this, there is a lack of system thinking, in which a supply chain

must be viewed as a whole entity and the measurement system should span the entire supply chain. Further, through in-depth literature survey, more performance measures are examined and they were grouped as qualitative and quantitative, as mentioned in Table 1. Qualitative performance measures are those measures for which there is no single direct numerical measurement, although some aspects of them may be quantified. Quantitative performance measures are those measures that may be directly described numerically. The definitions for all these measures are provided in Table 2, whereas a detailed discussion on these measures is provided in Sec. 3.

Table 1 Performance measures derived from research

Performance Measures	Type	Literature relevance
Quality	Qualitative	[6] [7] [8] [9] [14] [16][17] [34] [35] [36] [37] [60] [71] [82] [83] [85] [89] [100] [103] [105] [109]
Visibility	Qualitative	[14]
Trust	Qualitative	[14] [40] [63] [90]
Innovativeness	Qualitative	[14] [51]
Delivery Reliability	Quantitative	[1] [4] [5] [7] [9] [11] [12] [13] [17] [20] [31] [33] [37] [38] [39] [41] [44] [45] [46] [51] [57] [58] [59] [60] [65] [66] [67] [70] [71] [73] [82] [83] [93] [96] [98] [100] [103] [106] [108] [109] [112]
Flexibility and Responsiveness	Quantitative	[1] [4] [5] [7] [8] [9] [11] [14] [15] [27] [28] [30] [33] [37] [38] [39] [41] [44] [45] [51] [60] [62] [65] [66] [83] [88] [92] [98] [100] [103] [105] [109] [112]
Resou	Q	[9] [14] [63] [103]

rce Utilization	uantitat ive	
Cost	Q uantitat ive	[13] [14] [21] [22] [23] [24] [25] [26] [33] [36] [40] [44] [45] [47] [55] [56] [64] [66] [71] [74] [79] [80] [89] [92] [96] [98] [99] [101] [103] [108] [109] [110] [111] [112]
Assets	Q uantitat ive	[33] [37] [45] [46] [98] [109] [112]
Techn ological Capability	Q uantitat ive	[3] [13] [17] [19] [40] [42] [54] [61] [68] [71] [72] [78] [81] [86] [95] [97] [109]
Servic e	Q uantitat ive	[2] [8] [32] [36] [66] [71] [75] [76] [77] [109]
Time to market	Q uantitat ive	[8] [43] [52] [60] [94] [103]

Table 1 Performance measures derived from research

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It is very interesting to note from the bar chart (figure 2) that the performance measure, Delivery Reliability, has been cited in forty one research papers, while Visibility, been cited by only one paper.

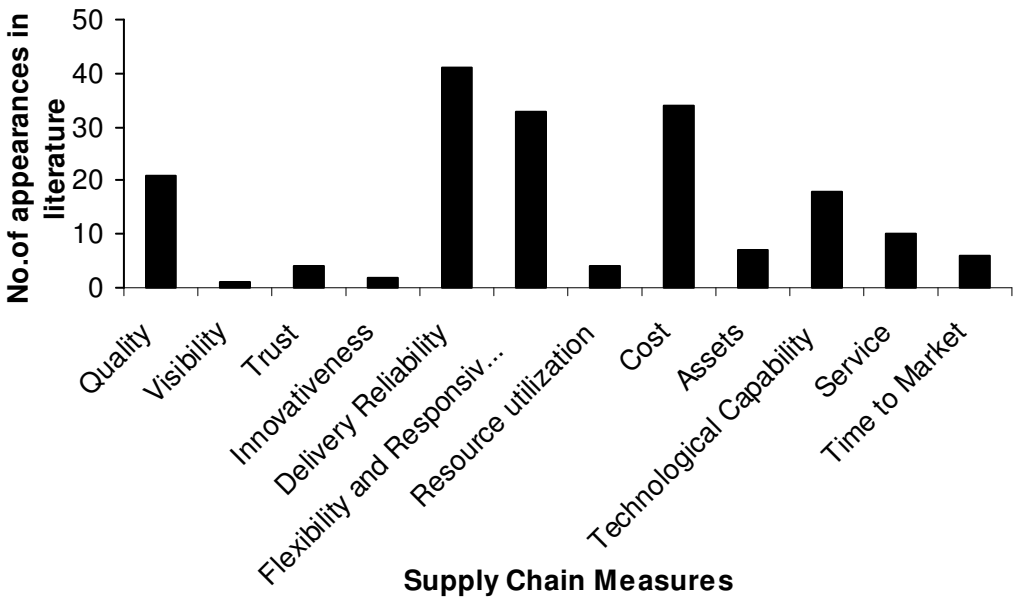

Fig.2 Citation of performance measures in literature

Table 2 Definitions of Supply Chain performance measures

Performance Measures	Definitions
Quality	Quality is customer satisfaction or fitness for use
Visibility	To improve the quality of information transfer by having a more visible information sharing system. Visibility for a supply chain is important for accurate and fast delivery of information.
Trust	Trust is the reliability and consistency between different levels of the supply chain and enhances the long-term relationship between them.

Innovativeness	To encourage new ideas, processes and solutions by all employees of a firm.
Delivery Reliability	The correct product, to the correct place, and to correct customer/manufacturer at the correct time, in perfect condition and packaging, in the correct quantity with the correct documentation, to the correct customer.
Flexibility and Responsiveness	How quickly a supply chain delivers the product to the customer/manufacturer. Or Flexibility is the organizational ability to meet an increasing variety of customer expectations without excessive cost, time, disruption or loss-increasing the range of products available and improving performance and response.
Resource Utilization	To obtain the best performance by using all resources, in a well-organised and optimum way.
Cost	The Cost associated with the operating the supply chain.
Assets	How efficiently a company manages assets to satisfy demand. Include fixed asset and working capital.
Technological Capability	The ability of the organization to handle or use technology or Technology can be defined simply as knowledge.
Service	Providing and meeting customer expectations with

	regard to time.
Time to market	An organization is capable of introducing new products faster than major competitors.

Table 2 Definitions of Supply Chain performance measures

Also, the twelve performance measures evolved fifty eight sub-measures, which are listed in table 3 below.

Table 3 Identification of Sub-measures

Sr. No.	Performance Measures	Sub-measures
1	Quality	Customer satisfaction [14] Customer response time [14] Lead time [7] [8] [14] [33] [48] On- time delivery [14] Fill rate [14] [33]

		Stock-out probability [14] Accuracy [14] Base of communication [36] Process flexibility [36] Percentage rejections [36] [66] Inspection methods and plans [66] Warranty claims [66] Availability of test equipment [66] Adherence of total quality management concept [66]
2	Visibility	Time [14] Accuracy [14]
3	Trust	Consistency [14]
4	Innovativeness	New launch of product [14] [51] New use of technology [14] [51]
5	Delivery Reliability	Delivery performance [7] [9] [33][37] [38] [39] [44] [45] [46] [48] [51] [58] [59] [65] [83] [98] [100] [103] [108] [112] Fill rate [11] [37] [44] [45] [66] [98][108] [112] Order fulfillment lead time [9] [11] [37] [44] [45] [98] [103] [108] [112] Perfect order fulfillment [11] [44] [45] [66] [98][108] [112]
6	Flexibili	Supply chain response time [4][5] [9] [11] [33]

	ty and Responsiveness	[37] [44] [45] [51] [65] [66] [83] [98] [100] [103] [112] Production flexibility [4] [5] [9] [11] [33][37] [44][45] [51] [65] [66] [83] [98] [100] [103] [112]
7	Resource Utilization	Manufacturing resources [9] [14] [103] Storage resources [9] [14] [103] Logistics resources [9] [14] [103] Human resources [9] [14] [103] Financial resources [9] [14] [103]
8	Cost	Total logistics management cost [11] [44] [45] [66] [65] [100] [108] Process capability [36] [58] [59] Defects [36] [58] [59] Distribution cost [14] Manufacturing cost [14] Inventory cost [14] Warehouse cost [14] Incentive cost and subsidies [14] Intangible cost [14] Overhead cost [14] Sensitivity to long-term cost [14]
9	Assets	Cash-to-cash cycle time [11] [37] [44] [45] [46] [98] [108] [112] Inventory days of supply [11] [37] [44] [45]

		[46] [98] [108] [112] Asset turns [11][37] [44] [45] [46] [66] [98] [108] [112]
10	Technological Capability	Product and process facilities [13] [71] Skill and manpower [13] [71] Customised services [13] [71] Cost evaluation [3] [13] [71] [86] [109] New item development [03] [13] [71] [86] [109]
11	Service	On-time delivery [36] [71] Base of communication [36] [71] Response to changes [36] [71] Process flexibility [36] [71] Customer satisfaction [36] [71]
12	Time to market	Deliver product to market quickly [60] First in the market in introducing new product [60] Time to market lower than industry average [60] Fast development cycle [60]

Table 3 Identification of Sub-measures

Description of Measures of Supply Chain

An in-depth literature review could reveal total twelve performance measures, which are described in detail below.

Quality

There is much published work on quality as a performance measure in supply chains Beamon (1999). Generally speaking, quality is the standard of a product which is related to the customer satisfaction level or fitness for use Juran (1978). In manufacturing or service, the term quality usually means conformance to predefined product requirements (Schniederjans 1997). Any late deliveries can be regarded as bad for the customers. Thus, quality is related not only to a product but also to the services provided. Therefore, those outcomes resulting in customer satisfaction are all important. High customer satisfaction is very important, as it is a key indicator of success Chan (2003).

Visibility

A supply chain consists of suppliers, manufacturers, distributors and customers, which may consist of more than one tier at each level. Therefore, once a customer wants to change some specifications or the design of the product, it takes a long time to transmit the message to the end of the supply chain. This not only wastes time, but the accuracy of the message can be distorted. Thus, it is important to improve the quality of information transfer by having a more visible information sharing system. It is now common to have an electronic data interchange (EDI) system within a supply chain. Thus, direct transfer of any amendment

from one end to another is feasible. This shows that new information technology is very important in the development of supply chains. Visibility for a supply chain is important for accurate and fast delivery of information. It is clear that measurement of visibility is the time and accuracy of information transfer (Chan 2003).

Trust

Trust is the reliability and consistency between different levels of the supply chain, which enhances the long-term relationship between them. Supply chain is a transmission of information and product making, which links up a number of companies for the successful manufacturer of a product. It is important to keep a good relationship between each level or tier, as they are dependent on each other. The supplier has to give qualified raw materials to the manufacturer, who in turn processes them to become standardised goods and passes them through distributors to the end users. They have to provide consistent and reliable services for the entire process.

When an action is consistent and predictable over an extended period, it is considered to be reliable. The relationship between two parties should be based on this integrity or honesty. Trust is a conceptual idea. According to Shin et al. (2000), to enhance the reliability of two parties and their long-term relationship, an important approach is sharing. This includes risk sharing and information sharing, i.e. through compromise they will inform each other of any urgent issues or problems, so that they can solve the problem as quickly as possible and minimize any risk. Team building and industrial alliances are commonly adopted strategies now-a-days by the practitioners concerned.

Innovativeness

In the ever-changing environment, innovativeness is important because the competition within industries is strong and it is important to have a particular competitive advantage, which can be recognised easily by the customers. Both for a stagnant market, which does not have any growth in market, or a high-technology market, such as the computer or automobile industry, innovativeness is the only way for a company to specialize. Even in a supply chain, with many levels of manufacturers or distributors within, once an innovative product or service is created, it can help the whole chain to be more specific and even explore a new area (Chan 2003).

Delivery Reliability

Delivery performance has two basic characteristics, speed and reliability. Delivery speed is the elapsed time from the receipt of an order to final delivery. A firm with superior delivery speed can "deliver more quickly than its competitors or meet a required delivery date when only some or even none of the competition can do so". Typical strategies for improving delivery speed include streamlining the order entry process, holding inventory at key points in the supply chain (in stores or regional warehouses), maintain excess capacity with which to meet 'rush orders', and using faster transportation. Delivery reliability refers to the ability to deliver products or services on time. A firm can have long lead times yet still maintain a high degree of delivery reliability. Typical measures of delivery reliability include the percentage of orders that is delivered by the promised time and the average tardiness of late orders. Delivery reliability is especially important to companies that are linked together in a supply chain (Mohanty and Deshmukh 2006).

According to Stewart (1995) and Gunasekaran et al. (2004), an increase in delivery performance is possible through a reduction in lead time attributes. Another important aspect of delivery performance is on-time delivery. On-time delivery reflects whether perfect delivery has taken place or otherwise and is also a measure of customer service level. A similar concept, on time order fill, was used by Christopher (1994), describing it as a combination of delivery reliability and order completeness. Another aspect of delivery is the percentage of finished goods in transit, which if high, signifies low inventory turns, leading to unnecessary increases in tied up capital. Various factors that can influence delivery speed include vehicle speed, driver reliability, frequency of delivery, and location of depots. An increase in efficiency in these areas can lead to a decrease in the inventory levels Novich (1990).

Flexibility and Responsiveness

Flexibility is about the ability or the adaptability of the company to respond to diversity or change. Flexibility, which is seldom used in supply chain analysis, can measure a system's ability to accommodate volume and schedule fluctuations from suppliers, manufacturers, and customers. A flexible system is important for responding to special service requirements and for achieving a variety of operating attributes. A flexible system is required to support the new introduction of a product and is focused on this change of innovative services to target customers.

The development of flexible logistics systems is the main method for handling variability (Beamon 1998, Chandra and Kumar 2000). Variability cannot be ignored, owing to the ever-changing environment. It does not only apply to product design changes in dimensions or the volume of an order, but to sudden phenomenon, such as breakdown of

machines, late arrivals of raw materials, or even new competitors which have a large effect on the market.

Slack (1983) identified two types of flexibilities: range flexibility and response flexibility. Range flexibility is defined as to what extent the operation can be changed. Response flexibility is defined as the ease (in terms of cost, time, or both) with which the operation can be changed. Although there will be a limit to the range and response flexibility of a supply chain, the chain can be designed to adequately adapt to the uncertain environment (Beamon 1999).

However, it is not complete, and cannot cover all types of flexibilities. Mix flexibility cannot fit into either of the types as it is measuring the variety of products, which can be produced without incurring high transition penalties or large changes in performance outcomes. In some cases, some measurements overlap both types. Modification flexibility can be measured by the time required for a new modification to take place (which is the response flexibility) and also the new range that can be reached by a particular change in design, i.e. range flexibility.

Instead, flexibility can be categorised simply by input, processes, output, and its improvement within the chain. It is easier to look at each category more carefully and measure its performance in a more comprehensive way (Chan 2003).

Cost

The profit of an enterprise is directly affected by the cost of its operations. Thus, many people understand its importance and influence to the whole performance. Indeed, it is the most significant direct kind of measurement (Chan 2003).

Total cost is a sum of all its complex attributes. For different industries, the contribution of each attribute may be different. For a delivery service company, it should deliver its goods within the shortest time. Some may think that cost should be mostly a function of distribution and inventory cost, but a heavy contribution from inventory cost may in fact indicate a poor performance as the goods are always kept for a long time. A manager should investigate carefully each sub cost contribution to the performance.

Apart from the domestic supply chain, there is an international supply chain that may entail great geographical distance and time differences. The complication in a global supply chain may consist of multiple national markets which increase the costs, especially the incentive costs and subsidies or the sensitivity to long-term costs.

Resource utilization

A supply chain network uses resources of various kinds, like, manufacturing resources (machines, material handlers, tools etc), storage resources (warehouses, automated storage and retrieval systems), logistics resources (trucks, rail transport, air-cargo carriers, etc), human resources (labors, scientific and technical personnel) and financial resources (working capital, stocks, etc). The objective is to utilize these assets or resources efficiently, so as to maximize customer service levels, minimize lead times, and optimize inventory levels.

The performance of a supply chain cannot be focused only on its output. A manufacturing process includes the input, the process, and the output. Thus, the input to the supply chain demands a further investigation. The inputs to a manufacturer include raw materials, the equipment or machines, human resources, energy resources, warehouse space, etc. The best performance is obtained by using all these resources in a well-organised and optimum way. It may lead to a long delay in finishing time, and most severely, loss of the

contract or customer, and even to the loss of company's reputation in the long term owing to the poor service performance. Many people think that the best use of raw materials is to have no surplus at the end of the manufacturing process. However, this is not completely true. Safety stock is necessary, as there may be sudden increase in orders or other interruptions can occur (which should be kept as low as possible) during the manufacture. Both lack of and excess of resources is a waste of time and money. It is important for the manager to determine the optimum resources necessary for every order. Most companies are now recruiting professionals in the relevant areas to ensure optimum use of resources.

Assets

The effectiveness of an organization is managing assets to support demand satisfaction. This includes the management of all assets; fixed and working capital. The efficiency of a company or a supply chain refers to the ability to use their assets as profitably as possible. Assets include anything of tangible value such as plant, equipment, inventory, and cash.

Technological capability

Technological capabilities are directly related to the ability of the organization or members of the organization, to handle or use technology. Technology can be defined simply as knowledge. Steele (1983), defined technology as any tool or technique, any product or process, any physical equipment or method of doing or making, through which the capability of an individual is extended. Christensen and Bower (1996) stated, "Technology is the process by which an organization transforms labor, capital, materials, and information into products or services". Firms use technology in their day-to-day operations regardless of the type of industry they are involved in. Technology has revolutionised the corporate business

world by introducing new industries and causing others to become obsolete (North and Pyke 1969).

Porter (1985) remarked that technological change in one part of the value chain impacts other part of the chain. Any change in technological application by one of the member of a supply chain, the entire chain will face the implications. The firms technological capability and the knowledge that is the foundation for its technological capability, is an intangible asset of the firm (Schoenecker and Swanson 2002).

Service

Providing and meeting customer expectations with regard to time and place performance that is consistent, through better sales, attention to buyer's complaints and requests, and after-sales support (Parasuraman et al. 1985, Berry and Parasuraman 1991). Service gives a feeling of satisfaction when performed successfully and is one of the hardest characteristics to define. Manufacturing has become competitive because the companies are keenly aware of the need to offer superior service.

Time to market

Time to market is the competitive advantage to which organization is able to create a defensible position over its competitors. It comprises capabilities that allow an organization to differentiate itself from its competitors; an organization is capable of introducing new products faster than major competitors (Li et al.2006).

Conclusion

An attempt has been made to present a comprehensive review of the SCM literature that aims at different performance measures. In all twelve performance measures, namely quality; visibility; trust; innovativeness; delivery reliability; flexibility and responsiveness; resource utilization; cost; asset; technological capability, service and time to market, have been identified. There are reported fifty eight sub-measures. The work also presents systematic grouping of performance measures and sub-measures. This review leads to the identification of the domain of SCM that in turn provides a basis for developing a framework for performance measurement. The future scope of this research is to establish a generalized framework for the performance measurement in supply chains.

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