

IMPROVING FIRM PERFORMANCE THROUGH LOGISTICS ACTIVITIES: A RESEARCH FRAMEWORK

Rameshwar Dubey,
Head-Centre of Supply Chain Excellence
University of Petroleum & Energy Studies,
Dehradun, India

ABSTRACT

The scope of present research paper is to propose a simplistic framework to understand how logistics performance of company/firm can be measured. The essence of logistics management as proposed by council of logistics management is referring to efficient and effective movement and storage of goods, services and its related information's from point of origin to point of consumption. However, the critical question that every firm aims to answer is that how to evaluate effective and efficient movement and storage of goods/services/information. Keeping this broad objective in mind here researcher aims to develop a framework based upon secondary literature survey and logistics expert opinion that how storage of goods can affect the performance. This framework further provides scope for readers to test it empirically in their geographical limit to understand how identified independent variables affect performance variable.

Keywords : Logistics activities, Performance measurement & Firm performance.

INTRODUCTION

In recent times a lot of literature highlight the importance of logistics either as a source of competitive advantage (Bowersox, 1990; Williamson, Spitzer and Bloomberg, 1990; Christopher, 1998; Carvalho and Dias, 2000; Lai *et al.*, 2006; West and Bengtsson, 2007; Sharma *et al.*, 2007), or as a determinant for the success of firms (Bowersox, 1990; Post *et al.*, 2002; Sadler and Sohal, 2005; Feng and Yuan, 2006). Some of those changes are: (i) the globalization of businesses (Christopher, 1998; HIDC, 1998; Evans, 2000); (ii) Shortening of Product life cycle (iii) Industrial competition (NEVEM-workgroup, 1989); and (iv) the appearance of new competitive priorities (Wheelwright, 1978). The appearance of those changes has highlighted the logistics importance since it makes possible that firms becomes more competitive than their competitors (Skinner, 1969). This is because through logistics firms reach easier the new competitive priority and agility (Wheelwright, 1978; Carvalho *et al.*, 2001). The main objective of this paper is to analyze the impact of a set of logistics activities on firms' performance. To attain this, we propose a performance measurement system in a logistics context and test some linkages between logistics activities and some performance measures. The paper is structured as follows. First, some theoretical background and state hypotheses for proposed research framework.

LITERATURE REVIEW

Various research articles published in peer reviewed journals are reviewed to understand the variables used for measuring performance of the firm and various logistics and supply chain activities which enhances the performance of the firm. Over time, the same measures of performance have been changed as per the objectives of measurements. In the past, greater emphasis was given to financial measures, such as: profitability, return on investment (ROI)/return on capital employee (ROCE), productivity (Ghalayini and Noble, 1996), variation of purchasing prices and sales per employee (Drucker, 1990), are among leading metrics used for measuring performance. However it has observed in most cases that financial measures has its own serious limitations (Tatikonda and Tatikonda, 1998). There is common myopic understanding among practiconers and researchers that higher the inventory turnover ratio, better the firm is performing which is not always true. In many case it has been seen that in spite of lower inventory turnover, the firm has shown higher profitability and sales revenue. More, Bromwich and Bhimani (1989) reported that management accounting systems had a myopic orientation, lacked a strategic focus, relied on baseless assumptions and were too often used to provide data for external financial reporting rather than which was necessary for managing the business. Apart from this, they were found in aggregated form, which causes difficulties of control and decision making (Mentzer and Konrad, 1991). In logistics context, traditional performance measures are also considered inadequate (Rathore and Andrabi, 2004). This is because the grouping of costs in aggregated categories does not allow neither a detailed analysis none the disclosure of *trade-offs* that may exist within logistic system (Christopher, 1998) that adopt a cross-functional nature of logistics (Rathore and Andrabi, 2004). Furthermore, in this new economic and global context much more competitive, the performance indicators such as investment, variation in purchasing prices, sales per employee, profit per unit of production, and also productivity (Drucker, 1990) start to become obsolete. To overcome shortcomings of existing performance management system (Chen *et al.*, 2006; Gomes *et al.*, 2007), Kaplan and Norton (1992) created the *Balanced Scorecard*, instrument which allows analysing and measuring the firm performance, in strategic, operational, and financial way. Keegan *et al.* (1989) proposed a similar, but lesser known performance measurement framework - the performance measurement matrix. As with the balanced scorecard, its strength lies in the way it seeks to integrate different dimensions of performance, and the fact that it employs the generic terms "internal", "external", "cost" and "non-cost" as a way of enhancing its flexibility. Ferdows and De Meyer's model, named *Sandcone Model* (Ferdows and De Meyer, 1990)

defend that it is because improvements in quality precede successive improvements in dependability, speed of response, and cost, that all these improvements can last.

PERFORMANCE MEASURING TOOL IN LOGISTICS

The reasons which have lead firms to invest in a logistics performance measuring tool are the following:

(i) Obtaining a holistic view of the logistics process; (ii) accompanying the development of logistics activities along time (TRILOG, 1999); (iii) a better understanding of what is happening; (iv) the possibility of influencing behaviours; (v) obtaining competitive results (Fawcett and Cooper, 1998); (vi) understanding firms' unique competences (Clinton, *et al.*, 1996); (vii) a better allocation and control of resources (Bowersox and Closs, 1996); (viii) identification of inefficiencies and reduction of costs; (ix) improvement of customer service; (x) discovery of services of added-value for which the customers would be willing to pay for; and (xi) improvement of processes (Keebler, *et al.*, 1999). Two theoretical perspectives of approaching logistics performance measurement systems are referred in literature: (i) functional perspective (Mentzer and Konrad, 1991; Pohlen and LaLonde, 1994; Davis and Drumm, 1997); and (ii) processual perspective (Carvalho, 1995; Bowersox and Closs, 1996; Keebler, *et al.*, 1999; Carvalho *et al.*, 2001). The main difference between these two perspectives lays on the incidence of PMS. According to the functional perspective, logistics PMS should fall upon a determined function or activity, considering this as an isolated entity. However, this perspective has raised some criticism, mainly from followers of the processual approach, under the argument that efficiency and effectiveness of a determined action does not allow measuring the performance of all the process, obtaining in this case only a biased performance measurement (Keebler, *et al.*, 1999). In contrast, the processual perspective defends that PMS should fall on the whole process. When choosing the performance measures, firms must decide between general performance measures, which are financial-accounting nature (sales, profit, return on investments), and measures directly related to the logistics process, in other words operational ones (White, 1996). Several authors defend that, independently of the function or the business area, measures of operational nature should be used (Kaplan and Norton, 1992; Gerwin, 2005; Cassab and Maclachlan, 2006). This is because, on one hand firms more than ever highlight competences and qualifications (not measured by aggregated measures of financial-accounting nature), and on the other hand, because the connection between operational improvements and financial success are almost of the time tenuous and uncertain. Barker (1995) also argues that financial measures being short term control mechanisms, they become almost of the time inadequate in the analysis of long term improvements. Apart from these limitations, Ghalayini and Noble (1996) point out some disadvantages associated with financial-accounting measures such as: (i) a lack of flexibility; (ii) high cost; (iii) inadequacy to the new competitive environment; (iv) more probability to become out-of-date quickly; and (v) the difficulty of quantifying improvements in monetary terms. Thus, it is reasonable to conclude that measures of operational nature should prevail in a logistics' PMS.

LEADING CRITERIA IN THE SELECTION OF PERFORMANCE MEASURES

Performance can be considered in a context where one intends to measure the firms' capability in reaching certain targets or objectives, previously defined. Being so, targets and objectives should be previously established and measures and indicators that allow a better performance measurement of the firm should be chosen. In this circumstance, some targets or objectives appear as leading factors in the selection of performance measures. Kellen (1992) and Carvalho *et al.* (2001) defend the connection between the strategic planning of the firm and the measurement system, in order to guarantee a suitability of the logistics processes and specific objectives of the firm. In the literature it is frequently argued that performance measures should be derived from strategy; that is, they should be used to reinforce the importance of certain strategic variables (Skinner, 1969; Fombrun and Wally, 1989; Zahra, 1993;

Chandler and Hanks, 1994). Other criterion used in the selection process is the one related with the logistics priorities. For Fawcett and Smith (1995) the main logistics priorities in the logistics PMS are the following: (i) order fulfilment; (ii) quality of customer service; (iii) flexibility and responsiveness; (iv) service innovation; and (v) cost. Wheelwright (1978) and also Carvalho *et al.* (2001) defend that firms can only follow the performance of logistics practices, if they have implemented a PMS which reflects the firms' competitive priorities. These competitive priorities are: cost, service/quality, productivity, and time, that is, agility. Fitzgerald *et al.* (1991) have a different way of facing this question. They suggest that there are two basic types of performance measures in any organization those related with results (competitiveness, financial performance), and those that focus on the determinants of the results (quality, flexibility, resource utilization and innovation). This suggests that it should be possible to build a performance measurement framework around the concepts of results and determinants. In sum, there exists a great variety of proposed solutions in what refers to the factors that should be considered when selecting performance measures. For a faster and easier analysis of them, we present it in the table 1 below.

Table 1. Leading factors in the selection of performance measures

Factors	Performance Measures	Authors
Key success factors	Delivery fulfillment, No damages in the order of the customer Time of order confirmation, Responsiveness to urgent orders Responsiveness to claims	Cavaco and Themido (2000)
Strategy	Availability and reliability of the customer service, Acceptable costs for the level of foreseen service, Investment and financial control, Productivity and operational improvement, Projects with customers and suppliers	Carvalho <i>et al.</i> (2001) Kellen (1992)
Logistics objectives	Delivery lead time	Van Amstel and D'Hert (1996)
	Trust deliveries	Bowersox and Closs (1996)
	Flexibility	NEVEM-workgroup (1989)
	Stock level	
Organizational way of Production	Delivery lead time	NEVEM-workgroup (1989)
Logistics priorities	Fast and reliable deliveries, Customer service quality, Flexibility Responsiveness, Service innovation, Cost	Fawcett and Smith (1995)
Competitive priorities of Firms	Cost, Service/quality, Productivity, Time	Carvalho <i>et al.</i> (2001)
Results/determinants of results	Measures related with results: competitiveness, financial performance	Fitzgerald <i>et al.</i> (1991)
	Measures related with determinants of the results: quality, flexibility, resource utilization and innovation.	

Source :Adapted from Ferreira, Joao *et.al* (2007)

PERFORMANCE MEASUREMENT SYSTEM IN A LOGISTICS CONTEXT

Given the panoply of proposed measures, what matters is to respond to the question: which measures to adopt in practice? To assist in responding to this question, Keebler *et al.* (1999) adopted a processual perspective and propose a set of measures considered as basic and fundamental, independently of the firm and the logistics strategy considered (low cost, product innovation, leader in customer service). Those measures are: time, cost, and quality. Adopting a very similar position, Christopher (1998) considers time, cost and quality as three key performance measures which should form part of any logistics PMS. This is because these measures contribute more than proportionally to the success or failure of a firm.

Leong *et al.* (1990) claim that it is widely accepted that the manufacturing task, and hence the key dimensions of manufacturing's performance, can be defined in terms of quality, delivery speed, delivery reliability, price (cost), and flexibility. They are in fact, the expression of the philosophy with regards to performance, above all set on: "Better, Quicker and Cheaper", in other words, superior quality of service, in times, even more shorter and with lower costs. In this context, the performance measures proposed in this research are: cost, quality, time and flexibility. These four measures are also proposed by Keebler *et al.* (1999). Garvin (1987), Slack (1987), Stalk (1988) and Neely and Wilson (1992) pointed out that the generic terms quality, time, cost and flexibility encompass a variety of different dimensions. Slack (1987) identifies range and response, as dimensions of flexibility, where range refers to the issue of how far the manufacturing system can change and response focuses on the question of how rapidly and cheaply it can change. The main motivation to select measures that reflect the new competitive priority of firms, that is agility, is because through the utilization of these four measures (cost, quality, time and flexibility) we can assess the logistics response capability of firms to the new environment faced by firms and also to the levels of wastes (in terms of time, resources, and quality) that exist all over the firms. After chosen the performance measures, it is important to select the respective performance indicators associated (Table 2).

Table 2. Measures and indicators of logistical performance

Measures	Indicators	References
Cost	Cost to satisfy customer requirements	Keebler <i>et al.</i> , 1999
	Cost with continuous improvement philosophy.	Keebler <i>et al.</i> , 1999
	Cost with safety stocks	Lambert and Stock, 1999
	Cost with reverse logistics	Bloemen and Petrov, 1994
Flexibility	Number of modifications accepted by order	Neven-workgroup, 1989
	Responsiveness to customer requirements	Fawcett and Smith, 1995
	Logistics systems responsiveness to especial orders	Beamon, 1999
	Logistics systems responsiveness to environmental changes	Beamon, 1999
Quality	Customer satisfaction available	Chow <i>et al.</i> , 1994; Keebler, <i>et al.</i> , 1999
	Rigorousness of information	Fawcett and Cooper, 1998; Bowersox, <i>et al.</i> , 1999; Sohal, <i>et al.</i> , 1999; Garver and Mentzer, 1999
	Level of stock out	Sohal, <i>et al.</i> , 1999, Garver and Mentzer, 1999
	Percentage of orders fulfilment	Bowersox and Closs, 1996
Time	Percentage of orders without quality problems	Sohal, <i>et al.</i> , 1999
	Good invoicing	Garver and Mentzer, 1999
	Delivery lead time	Fawcett and Cooper, 1998; Bowersox, <i>et al.</i> , 1999; Dias, 1999; Carvalho <i>et al.</i> , 2001)
	Order cycle-time	Keebler, <i>et al.</i> , 1999

Source: Adapted from Ferreira, Joao *et.al* (2007)

In the present research the following logistics activities were chosen: warehousing, handling, picking, packaging, and inventory control. Warehousing seems to have an impact on the following performance measures: time, flexibility and cost. An impact on time, because, according to Kaplan (1983) regular availability of stocks on warehouses allows firms to decrease their lead times. The consequence of this is an increase on customer satisfaction. Warehousing is also associated with flexibility since the storage of products allows firms not only to increase their operational flexibility but also its responsiveness to costumers' requirements. However, from the point of view of Prince (1998) the way warehouses are managed will contribute to a decrease on costs and time. As such, these authors defend the

use of integrated warehousing management systems as a way of increasing the rigor and speed of information flows.

Inventory control seems to influence the following performance measures: cost, flexibility, time and quality. According to Burman (1995) this activity influences costs because inventory control contributes not only to keep a low level of products but also to remove all sources of waste, contributing to a decrease on costs. Moreover, a good inventory control allows firms to keep an adequate level of inventory in order to: (i) increase its responsiveness to the market; (ii) exceed the gap of time between suppliers and consumers; and (iii) support Just-in-time programs between suppliers, sellers, and customers (Lambert and Stock, 1999). Beyond the impact of this activity on costs, flexibility and time, the quality of logistics service seems also to be influenced by inventory control and, more exactly, by the level of inventory (Closs and Thompson, 1992). This happens because, according to the same authors, the delivery of products and services to customers, when, where and how they want them depend on the inventory level.

As regards handling, the way this activity is performed seems to have an impact on costs, time, and quality. Some authors (Tersine, 1985; Goldratt and Cox, 1993) consider handling as a non added-value activity that should be kept at a minimum. In this perspective and according to Tersine (1985), firms should adopt the following behaviour in order to decrease costs associated with handlings: (i) eliminate handlings not necessary; (ii) minimize distances; (iii) set up a uniform flow of products. These types of behaviors will contribute to a decrease on losses and consequently to increase the speed and the quality of customer service. As regards packaging, and according to the literature, it seems to impact quality and time. Packaging is very important because it could make it easier to handle products and also to protect them against damage (Bowersox, 1978; Johnson and Wood, 1993). Thus, and according to Tracey (1998), this activity contributes to increase the quality of the logistics service since products are delivered in the best conditions and consequently customers will be more satisfied (Lancioni and Chandran, 1990). From Bowersox's (1978) point of view, the kind of package used should conform not only to the handling equipment but also to the trucks' characteristics; otherwise it will contribute to an increase in time. In order to overcome this possible problem Bowersox and Closs (1996) suggest the use of packages with the same height, width and depth.

As regards picking the way this activity is performed, seems to have an impact on time. From Coyle *et al.* (1996) standpoint, the picking activity, when performed with automatic and adequate equipment, could contribute to a decrease in time.

RESEARCH DESIGN

Research hypotheses

In the present research the following logistics activities are chosen: warehousing, handling, picking, packaging, and inventory control based upon secondary literature survey and logistics expert opinion. According to the literature review about logistics activities and firm performance a set of relationships and corresponding hypotheses are proposed.

The hypotheses proposed are:

H_{01 a)}: Performance of Warehousing function for logistics activities and supply chain management can be measured in terms of time function.

H_{01 b)}: Performance of Warehousing function for logistics activities and supply chain management can be measured in terms of flexibility of the system

H_{01 c)}: Performance of Warehousing function for logistics activities and supply chain management can be measured in terms of cost parameters.

Corresponding to inventory Control following hypotheses proposed:

H_{02a}): Performance of Inventory Control function for logistics activities and supply chain management can be measured in terms of cost parameters.

H_{02b}): Performance of Inventory Control function for logistics activities and supply chain management can be measured in terms of flexibility of the system.

H_{02c}): Performance of Inventory Control function for logistics activities and supply chain management can be measured in terms of time function.

H_{02d}): Performance of Inventory Control function for logistics activities and supply chain management can be measured in terms of Quality systems.

As regards to handling operations, the hypotheses proposed are:

H_{03a}): Performance of handling function for logistics activities and supply chain management can be measured in terms of cost parameters.

H_{03b}): Performance of handling function for logistics activities and supply chain management can be measured in terms of time function.

H_{03c}): Performance of handling function for logistics activities and supply chain management can be measured in terms of quality of the system.

Regarding Packaging following hypotheses are proposed:

H_{04a}): Performance of Packaging function for logistics activities and supply chain management can be measured in terms of time function.

H_{04b}): Performance of Packaging function for logistics activities and supply chain management can be measured in terms of time, and quality systems.

Regarding Picking following hypotheses are proposed:

H_{05a}): Performance of Picking function for logistics activities and supply chain management can be measured in terms of time function.

In order to illustrate the relationships between logistics activities and firms' performance we propose the following model:

Figure 3

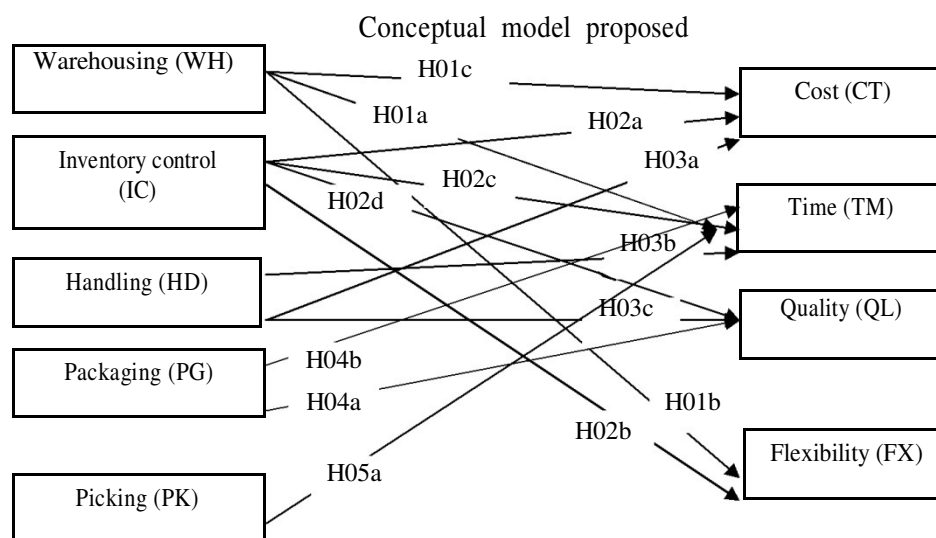


Fig.3.1

CONCLUSIONS

The main objective of this research paper is to propose a model which is to be tested empirically to understand the impact of a set of logistics activities on firm's performance. To reach this a conceptual model is proposed and it is proposed to be tested using the Partial Least Squares. It is well understood from literature review that logistics activities has positive impact on firm's performance. As future research line we would like to point out the following: (i) to identify and test other predictor variables of firms' performance beyond the logistics practices. Researcher believe that alternative theoretical model could be proposed considering the resources and capabilities of firms with a special highlight on information and communication resources and capabilities.

An organization must consider both financial and non-financial indicators in their performance management system

1. Depending upon the objectives, the performance indicators would be selected
2. Some of the major functions in Logistics & Supply Chain Management are warehousing, inventory control, handling, packaging and picking.
3. Cost, time, flexibility and Quality are identified as major performance indicators for selected Logistics activities & Supply Chain Management.
4. Performance of Warehousing function for logistics activities and supply chain management can be measured in terms of time, flexibility of the system and cost parameters.
5. Performance of Inventory Control function for logistics activities and supply chain management can be measured in terms of time, flexibility of the system, cost parameters and Quality systems.
6. Performance of handling function for logistics activities and supply chain management can be measured in terms of time, quality of the system and cost parameters.
7. Performance of Packaging function for logistics activities and supply chain management can be measured in terms of time, and quality systems.
8. Performance of Picking function for logistics activities and supply chain management can be measured in terms of time function

The present limitation(s) of the study is that it only focuses on warehousing activities. Such a proposed framework provides an important base for further study. The present study can be further tested empirically and validated. It is further recommended that manufacturing industries where the logistic activity and supply chain network is quite apparent can be used as a basis for study.

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