Research Paper Management

Performance Measurement in Dairy Supply Chain Management

Rajeev Kumar Senior Research Fellow (SRF-UGC), Faculty of Management Studies, Banaras Hindu University, Varanasi – 221005

ABSTRACT

Measurement of the performance of entire dairy supply chains is an important issue because it allows for "tracking and tracing" of efficacy and efficiency failures and leads to more informed decision making with regard to chain design. However, the choice of appropriate supply chain performance indicators is rather complicated due to the presence of multiple inputs and multiple outputs in the system. Therefore, this paper aims to evaluate the usefulness of a novel conceptual model for supply chain performance measurement in a dairy supply chain. A conceptual model for integrated supply chain performance measurement is proposed in a dairy supply chain by means of an extensive literature review. The proposed conceptual framework is found to be useful for measuring performance of the dairy supply chain. From the literature review it is concluded that four main categories of performance measures (i.e. efficiency, flexibility, responsiveness, and food quality) are identified as key performance components of the dairy supply chain performance measurement system. This research evaluates a novel concept for measuring the performance of dairy supply chains.

KEYWORDS Dairy Industry, Supply Chain Management, Performance Measurement

0.1. Introduction

The need for the supply chain management (SCM) has raised due to several business challenges including shrinking product lifecycle, mass customization, increasing outsourcing, and most importantly the process of globalization. Today's customer has become very much demanding. Business alliances have to be forged on a global basis to derive the optimum benefit from strategic location in terms of factors like cost, quality and proximity to raw material or markets so as to respond to the demanding class of customers. Supply chain management perspective provides opportunities for organization to meet the challenges. The challenges have led to the emergence of complex supply chain in all manufacturing sectors and industries including service sector. Competition between individual enterprises has been transformed to competition between their supply chains has emerged as the biggest differentiating factor between a successful and unsuccessful business. Typically, every organization has three types of flows: the material flows, the information flow and fund flow. While the material flows from the back end (supplier) of the supply chain to the front end (customer), money flows in the reverse direction. The information flows in both directions. SCM involves developing a set of management practice that will ensure that these three flows are smooth. Faster material flow will greatly improve responsiveness to customer requirements and will in turn ensure faster money flow back into the supply chain.

1. Critical Literature Review on role of Performance Measurement

Muhammad et al (2012) carried out a research work in order to find the impact supply chain on overall performance of an organization.

- Data was collected through questioners in the month of May 2012, Approximately 30 questioners was distributed among the managers of the two organizations which are expected to have a best knowledge about the supply chain operations and its impact on the overall performance of the organization, all of them responded positively.

Key Findings:

The key finding reveals various important dimensions which are associated with SCM methods as well as explains the connection amongst SCM methods, aggressive benefit, as well as organizational overall performance.

Gharakhani et al (2011) conceptualizes and develops five dimensions of SCM practice (strategic supplier partnership, customer relationship, information technology, information sharing, and Supply chain integration) and tests the relationships between SCM practices, innovation and organizational performance.

- Methodology includes a survey which is conducted on 186 Iranian managers. Data are analyzed using principal components analysis and relationships are tested using linear regression.

Key Findings

Key findings revealed that SCM practice has positive and significant effects on innovation and organizational performance. Also results show that innovation performance has positive and significant effects on organizational performance. These findings highlight the critical roles of SCM practice in the process of innovation and improve organizational performance.

Ou et al (2010) examined the relationships among supply chain management (SCM) practices and their impacts on firm financial and non-financial performance. This paper contributes to SCM literature by exploring a structural model connecting the relationships among external customer-firm-supplier integration, internal SCM contextual factors, and various dimensions of firm performance.

- In order to understand the interactions between SCM practices and firm performance, this paper considers four internal contextual factors, namely: human resource management, quality data and reporting, design management, and process management. Three levels of firm performance are also examined in this paper, including internal operational performance, external customer satisfaction, and firm financial performance.
- A structural model was further constructed by integrating external SCM, internal SCM contextual factors, and firm performance. The sample data were collected from Taiwan information-related industries, where firms are facing increased global competitive pressure and heavily utilize SCM to retain their competitive advantages.

Key Findings

The results presented in this paper show that external customer-firm-supplier relation management positively impacts firm internal contextual factors, which in turn have positive effects on firm performance. This finding suggests that a successful implementation of SCM not only directly improves operational

performance, but also indirectly enhances customer satisfaction and financial performance. In addition, higher financial performance is also attributable to better customer value resulting from the achievement of better customer satisfaction.

2. A Conceptual Framework

This section discuses a conceptual framework for measuring the performance of dairy supply chains. Based on a literature review of existing performance indicators for supply chains, a conceptual framework for measuring the performance of dairy supply chains has been developed Dairy supply chain performance indicators are grouped into three main categories:

1. Marketing Performance
2. Operational Performance
3. Flexibility

These three categories are the bottom line of the PMS. Each of these main categories contains more detailed performance indicators (Figure 1). The suggested performance indicators can be used at the organizational level as well as the supply chain level. This means that supply chain members, besides their own set of performance indicators, have a common set of performance indicators within four main categories that help them to evaluate their own performance and the performance of the chain. This common set of indicators for the complete supply chain can be identified as key performance indicators.

2.1. Marketing Performance

These measures can be explained with the some parameters members of item produced, time required to produce a particular item, on-time deliveries (Keebler et al, 1999; Forslund and Jonsson, 2007; PRTM consulting 1994; Keebler, Manrodt, Durtsche,Ledyard, 1999; Global logistic research, 1995; Bowersox et al, 1989; CLM 1985,1998) extent of product rejection, etc. more specifically sales (Keebler, Manrodt, Durtsche, Ledyard, 1999), profit, fill rate (Keebler, Manrodt, Durtsche, Ledyard, 1999), order capture/tracking time/order cycle time (Forslund and Jonsson, 2007; Kallio et al, 2000; Mattsson, 2004; Blackstone and Cox, 2005; Hopp and Spearman, 2001; Supply-chain Council, 2005; Keebler, Manrodt, Durtsche, Ledyard, 1999), customer response time (Keebler et al,1999; Forslund and Jonsson, 2007; PRTM consulting 1994; Kearney 1985; Keebler, Manrodt, Durtsche, Ledyard, 1999), customer complaints (Keebler, Manrodt, Durtsche, Ledyard, 1999) etc. are to name a few.

2.2. Operational Performance

These measures include, inventory requirement and levels, personnel requirement, equipment capability and capacity utilization, energy usages and most importantly, costs (total cost, distribution cost, manufacturing cost, inventory holding cost, (PRTM consulting 1994), (and return on investment (ROI) (Global logistic research, 1995; Li et al (2006); Mohammad et al, 2012.

2.3. Flexibility

Flexibility can be defined as the ability of the focal company to meet the rapidly changing customer, supplier and manufacturer requirement even during stiff competitive tornado in terms of time, volume, variety so as to ensure customer satisfaction. Flexibility indicates the degree to which the supply chain can respond to a changing environment and extraordinary customer service requests (Bowersox and Closs, 1996; Beamon, 1998). It may include customer satisfaction, volume flexibility, delivery flexibility, reduction in the number of backorders and lost sales. Responsiveness aims at providing the requested products with a short lead-time (Persson and Olhager, 2002). It may include fill rate, product lateness, customer response time, lead-time, shipping errors, and customer complaints. The specific characteristics of dairy supply chains are captured in the measurement framework in the category "food quality". The latter is based on the framework of food quality developed by Luning et al. (2002).

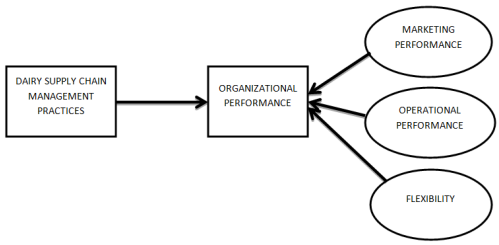

Figure 1: Conceptual framework of dairy supply chain performance categories

3. Conclusions

This research evaluated a conceptual framework for measuring performance of dairy supply chains. The framework is the first step to develop an integrated performance measurement system, which contains financial as well as non-financial indicators combined with the specific characteristics of dairy supply chains through extensive literature review. In this study we hypothesized that marketing performance, flexibility, operational performance are the key performance components that form base for a dairy supply chain performance measurement system. Literature suggest the necessity of these three categories within one integrated performance measurement framework and evaluated the framework as complete for measuring performance of an dairy supply chain. Some of the suggested indicators such as transaction costs, backorders or emissions are perceived to be unimportant for measuring the performance of the chain. However, these indicators can be used in measuring performance at the organizational level, if chain members perceive them important. The results show that many performance measurement indicators are measured in some links of the chain while they are not measured in others, given the different objectives in the chain. The most relevant indicators for measuring the performance of the entire supply chain appeared to be costs, profit, customer satisfaction, lead-time and the majority of the product quality indicators. Some of the indicators, though perceived to be important, are not measured by supply chain members (e.g. delivery flexibility, and marketing indicators). The major argument for not measuring these indicators lies in the difficulty of quantifying these measures. Based on these results, a condensed PMS framework for dairy supply chains has been suggested, where supply chain members, besides their own set of performance indicators, are suggested to have a common set of performance indicators within three main categories, which will help them to compare the performance within chain members and end performance of the chain.

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