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A FLEXIBLE FRAMEWORK TO EVALUATE SUPPLY CHAIN PERFORMANCE

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ABSTRACT

This paper addresses the issue of performance measurement system of the supply chain. The proposed framework captures the KPIs from the Kaplan Norton's Balanced Scorecard and integrates for performance evaluation. The proposed methodology enables the organization have a holistic perspective of the extended supply chain. The framework also enables the extension of the supply chain business model vertically in terms of the management and support functions, and horizontally in terms of the information to operate processes. The proposed model can be applied to any of the referred configurations discussed and the extended supply chain, thereby making the framework flexible in terms of application and execution.

Keywords: Performance evaluation; extended supply chain; Balanced Scorecard

Introduction

An organization may be directly or indirectly part of a major supply chain network. Evaluation of a supply chain might help evaluating the performance of an employee, and measuring the degree to which the firms have attained its strategic goals. Usually, the performance can be evaluated based on the operational costs of the supply chain, though most often, this does not suit to the requirements. Therefore, there is a necessity of considering other types of the costs as well. Beamon and Chen (2001) explain a regression analysis methodology to evaluate the supply chain on the basis of average inventory cost, average transportation cost, etc. Many more supply chain evaluation parameters can be found in Taylor (2004), Mohanty and Deshmukh (2004) and Bowersox and Closs (2000).

Despite the recent phenomena of more attention on supply chain management and business collaboration, studies in the area of performance management still look narrowly at the single enterprise and its 'within-enterprise' process. This does not seem to be in coalition with the present scenario. A paradigm shift can easily be cited from the early 1980's in this regard. Whereas in 1980's, the cost financials, quality and time were of prime importance; in 1990's, flexibility, environmental safety, and integration of various tools were the mantras. The present situation pertains to efficiency, customer satisfaction and collaboration with the stakeholders of the whole supply chain (Patterson *et. al, 2003*). If performance evaluation of such a supply chain is to be studied; it is rather essential to have a complete or holistic approach. Such kind of approach seems to be possible with the help of the Balanced Scorecard Methodology.

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Before looking into the integration of balanced scorecard methodology, it is worthwhile to have a quick glance at the present lacunas identified.

Lacunas identified in the present literature

Despite the vast amount of literature available on the performance evaluation of supply chain systems, the works seem to give an emphasis on performance measurement within one organization (Schmitz and Platts, 2004). Another review noted that there is a need to design a 'dynamic' process of managing the strategy and the performance that continuously monitors internal and external operational environment (Bititci *et. al.* 2003). The present work addresses the former issues of supply chain. However we enlist some of the issues for further study in this area:

1. Encourage short-term-ism
2. Lack strategic focus and fail to provide data on quality, responsiveness and flexibility
3. Encourage local optimism
4. Do not encourage continuous improvement
5. Strategy and measurement not connected
6. Over-rely on financial aspects
7. Do not accurately reflect the interest of the stake holders
8. Lack of structured framework
9. Does not measure the value create; and so on.

Considering these lacunas, one can carve the scope of integration of balanced scorecard methodology in supply chain performance measurement system in the form of Key Performance Indexes (KPIs).

In section 2, the classification of the supply chain is discussed. Section 3 summarizes the Balanced Scorecard methodology. Proposed SIRSEE framework is explained in section 4; and summary and the findings are summarized in section 5 of this paper.

Classification of Supply Chain

Supply chains are predominantly classified based on the 'structure' of the supply chain. The classification is as follows:

1. Assembly supply chain,
2. Divergent supply chain,
3. Conjoined supply chain, and
4. General supply chain.

These are briefly explained in the following:

Assembly Supply Chain

Each station in such supply chain has at most one successor, but may have any number of predecessors.

Divergent Supply Chain

The station of such supply chains has at most one predecessor, but any number of successors. Thus this chain is exactly the reverse of the assembly supply chain.

Conjoined Supply Chain

A conjoined supply chain has a structure that is a combination of assembly and divergent supply chain. Here each node may have many predecessors and successors. *2.4 General supply chain*

A supply chain that does not fall into all the above categories is a general supply chain. Such chains are also called as 'supply network'.

The present work encompasses the extended version (which considers all the stake holders) of the supply chain; needless to say about its applicability to any type of the supply chain.

The next section briefly touches upon the Balanced Scorecard methodology.

Balanced Scorecard Methodology

The Balanced scorecard (BSC) Method of Kaplan and Norton is a strategic approach and performance management system that enables organizations to translate a company's vision and strategy into implementation, working from four perspectives:

1. Financial perspective,
2. Customer perspective,
3. Business process perspective,
4. Learning and growth perspective.

The Financial Perspective: Kaplan and Norton do not disregard the traditional need for financial data. Timely and accurate funding data is a priority, and managers will do whatever necessary to provide it. In fact, often there is more than enough handling and processing of financial data. With the implementation of a corporate database, more of the processing may be centralized and automated. But the point is that the current emphasis on financials leads to the 'unbalanced' situation with regard to other perspectives.

The Customer Perspective: Recent management philosophy has shown an increasing realization of the importance of customer focus and customer satisfaction in any business. These are leading indicators: if customers are not satisfied, they will eventually find other suppliers that will meet their needs. Poor performance from this perspective is thus a leading indicator of future decline, even though the current financial picture may look good. In developing metrics for satisfaction, customers should be analyzed in terms of kinds of customers and the kinds of processes for which we are providing a product or service to those customer groups.

The Business Process Perspective: This perspective refers to internal business processes. Metrics based on this perspective allow the managers to know how well their business are running, and whether its products and services conform to customer requirements (the mission). These metrics have to be carefully designed by those who know these processes most intimately. In addition to the strategic management process, two kinds of business processes may be identified: a) mission-oriented processes, and b) support processes. Mission-oriented processes are the special functions of government offices, and many unique problems are encountered in these processes. The support processes are more repetitive in nature, and hence, easier to measure and benchmark using generic metrics.

The Learning and Growth Perspective: It includes employee training and corporate cultural attitudes related to both individual and corporate self-improvement. In a knowledge-worker organization, people are the main resource. In the current climate of rapid technological change, it is becoming necessary for knowledge workers to be in a continuous learning mode. Kaplan

and Norton emphasize that 'learning' is more than 'training'; it also includes things like mentors and tutors within the organization, as well as that ease of communication among workers that allows them to readily get help on a problem when it is needed.

The application of balanced scorecard method helps to

- Align the strategic views of the supply chain with the tactical needs.
- Consider the holistic view of the supply chain and most importantly
- Considers the 'extended' supply chain.

Once the KPIs are decided it becomes essential to allocate or assign these KPIs to the respective links along with their appropriate weights (If necessary). The weights can be assigned just to figure out the importance of the KPIs. These weights can be assigned to the KPIs by using multi-criteria decision-making techniques such as Analytic Hierarchy Process (AHP) (Saaty 1980; Vaidya and Kumar 2006).

The Performance Evaluation Framework

This section presents the performance evaluation framework 'SIRSEE'. Each letter in the word 'SIRSEE' is an acronym derived from the first letter of the legend of the steps in the evaluation framework.

The following describes the SIRSEE framework:

Step 1: S: Set performance evaluation parameters.

In this step the evaluator identifies the performance evaluation parameters or the KPIs for the different links in the supply chain. The evaluator can select the parameters suitable for a particular link (or the extended supply chain) from the Balanced Scorecard Perspectives. This necessitates with the performance requirements of the supply chain and hence the selection of a particular "Perspective or KPI" might vary in accordance with the supply chain structure.

Step 2: I: Identify the measurement process in each link.

Here the measurement process for each of the link is identified. This is confirmed with the perspective/KPIs that were set initially. The areas and scope of the measurement is also identified and confirmed.

Step 3: R: Revisit the present status with respect to the perspectives/KPI.

Probably, this is the most important step in the supply chain performance evaluation. In this step the present status of each of the supply link is revisited with respect to the set KPIs.

Step 4: S: Suggest changes

In this step the evaluator analyses the results obtained from step 3 and suggests improvements for performance improvement. A common consensus is arrived at between the evaluator and the supplier/customer for actual implementations.

Step 5: E: Education to the personal involved

Based on the findings of the Step 4 an analysis is carried out for 'what can be implemented without/with major modifications?' Educating/ training of the persons involved in the supply link and up gradation of the equipments/machinery might be necessary in order to achieve the desired KPI.

Step 6: E: Execute

The actual execution of the modifications is then carried out.

Step 7: Once the process has been stabilized the benchmark/ KPIs are updated and the evaluation scheme reapplied for continual improvement.

Conclusions

This paper presents a SIRSEE framework for performance evaluation of the supply chain based on the balanced score card methodology. Here the framework captures the KPIs from the Kaplan Norton's Balanced Scorecard and integrates the same for performance evaluation. This, therefore, enables the organization have a holistic perspective of the extended supply chain. This model also enables the extension of the supply chain business model, the management and support functions extend the chain vertically. This means that these processes are carried out at both the single node and the supply chain level; information related to the management and the support process flows from the single nodes upwards to the supply chain level. Operational process on the other hand may be extended horizontally. This means that these processes are carried out at each single node level and extended to the other nodes in the supply chain. In this case, information related to operate process flows from the very first supplier to the very last customer and vice versa, prompting for the flexibility of the methodology.

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