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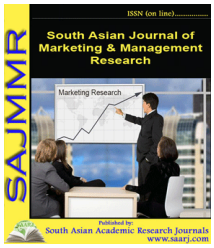

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AN OVERVIEW FOR SUSTAINABLE PERFORMANCE ASSESSMENT OF SUPPLY CHAIN MANAGEMENT PRACTICES

Navneet Kumar Vishnoi*

*Faculty of Engineering, Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id: navneet.computers@tmu.ac.in

ABSTRACT

The integration of the idea of sustainable development into supply chain management has indeed been recognized as a limitation as well as a method to enhance performance, affecting a company's and its supply chain organization's competitiveness. We offer a framework for sustainable performance characterisation and an analytical model for sustainable performance evaluation to examine and analyze the possible connections between conventional supply chain management techniques and their effect on performance. The framework is used to describe a company's long-term economic, environmental, and social performance. The analytical evaluation model, which is based on the connections between a supply chain management practice and the three areas of sustainable development, is used to generate the triad's sustainable performance profile. The application of this profile to two well-known supply chain management best practices enables us to assess their effectiveness in terms of sustainable development. Depending on their goals, practitioners may simply utilize the suggested framework to highlight SCM techniques that have a beneficial effect on long-term performance.

KEYWORDS: *Assessment method, management practices, Performance evaluation, Supply chain management, Sustainability, Sustainable development.*

1. INTRODUCTION

The Brundtland Report of the World Commission on Environment and Development defines sustainable development as "development that satisfies current demands without jeopardizing future generations' capacity to satisfy their own needs." This idea is very essential in 21st-century companies and supply networks[1]. The management of material and information exchanges in the logistics process extending from the purchase of raw materials to the delivery of end-products to end consumers is known as supply chain management (SCM). As a result, SCM is in charge of material flows within human civilization as well as material and energy exchanges with the environment[2]. Environmental performance, social responsibility, and economic contribution are the three major elements of sustainability that should be considered when

determining the effects of SCM. However, today's emphasis is mostly on the economic aspect, as shown by the assessment of certain well-known or best practices. "Any technique or experience that has shown its worth or is utilized in an effective manner in an organization, and may be used in other organizations," according to the APQC2. The control of the movement of products and services is known as supply chain management (SCM)[3]. The movement and storage of raw materials, work-in-process inventories, and the transit of products from point of origin to site of consumption are all part of the supply chain. The optimization of the supply chain may result in substantial energy savings and a decrease in carbon emissions. Supply chain management concepts are used by businesses from manufacturers, wholesalers, and retailers to warehouses, healthcare providers, and government agencies to plan, assemble, store, distribute, and monitor goods from the beginning to the conclusion of the supply chain. The specifics are as follows: SCM focuses on supplier selection, sourcing cost optimization, and sourcing risk management in procurement. SCM focuses on production planning and control, production R&D, maintenance and diagnostics, and quality management in the manufacturing industry. SCM focuses on logistics planning, in-transit inventory, and management in the logistics and transportation industry. SCM focuses on storage assignment, order selection, and inventory management in warehousing. SCM focuses on detecting present demand, influencing future demand, and predicting demand in the demand management domain[4]. SCM is heavily using a wide range of technologies, including as sensors, barcodes, and the internet of things, to integrate and coordinate every connection of the chain. Advanced analytics methods are being used to extract useful information from big data, enabling data-driven decision-making. Support vector machine in classification models; heuristic approaches along with spatial/temporal-based visual analysis, which are key approaches in the development of optimization models; and K-means clustering algorithm in clustering, classification, forecasting, and simulation models are some of the main big data techniques used in SCM[4]. Big data analytics in SCM has clear benefits in terms of lowering operating costs, enhancing supply chain agility, and increasing customer happiness, according to empirical research. SCM's graphical categorization framework is divided into four levels:Procurement, manufacturing, logistics/transportation, warehousing, and demand management are all included in the first layer. The second layer divides data analytics into three categories: descriptive analytics, predictive analytics, and prescriptive analytics, with descriptive analytics describing past events, predictive analytics predicting future events, and prescriptive analytics referring to decision-making mechanisms and tools. The most widely used descriptive analytics method is association, which has been used at every step of the SC process, from procurement through production, warehousing, and logistics/transportation to demand management. In descriptive analytics, visualization is the least utilized model. Classification is the most often used model in predictive analytics because it can categorize a large number of data items into preset categories, resulting in high-accuracy predictions. Semantic and forecasting models are two more prominent predictive analytics methods[5]. The most common models for prescriptive analytics are the optimization and simulation models, which are used to aid decision-making.

1.1 Tools to assess SCM practice :

There are a variety of methods for evaluating SCM processes; in this article, we'll focus on evaluation audits. Odette EVALOG, Efficient Consumer Response, the Oliver Wight Class a Checklist, and the SCOR model are four worldwide instruments for supply chain auditing. On the market, none of them are really necessary. Odette International Limited and the Automotive Industry Action Group collaborated to create the Odette EVALOG standard, which is based on the Odette Logistics Evaluation (OLE) and Materials Management Operations Guidelines

(MMOG), which are used in Europe and North America, respectively. The goal of these two organizations was to create the Worldwide Material Management Operations Standards - Logistics Evaluation, a set of global guidelines for materials operations that would help suppliers and customers operate more efficiently[6]. The Odette EVALOG standard, which was established in 1999 to offer companies with an uniform supply chain evaluation tool, is extensively used throughout Europe.It was conceived and developed for the automotive industry, but it is now utilized in a variety of other sectors. It looks at six areas: four are processes (customer relations, supplier relations, manufacturing, and product development), while the other two are research subjects (corporate strategy and corporate structure)[7]. About sixty best practices are evaluated using this criteria. Based on the organization's compliance with the standards, the updated assessment score sheet assigns suppliers a "A," "B," or "C" rating. The Efficient Consumer Response (ECR, 2008) is a tool consisting of a collection of best practices in sustainable transportation that is specific to the retail sector. Companies of any size may use this SCM performance evaluation tool to self-assess against a reference list. It contains thirteen best practices for loading, delivery, driver participation, technology, and the business network[8]. These practices are graded on a five-point scale, from the most fundamental to the most advanced. After the assessment is done, the results are represented in a network strategy that highlights the areas where the business needs to focus. The Class a Checklist for Business Excellence was created by Oliver Wight as a tool to evaluate processes and practices that allow the business to achieve excellence. Strategic Planning, Managing and Leading People, Driving Business Improvement and Integrated Business Management, Products & Services, Demand, Supply Chain, Internal Supply, and External Sourcing are the processes in question. Each exercise is graded on a four-point scale, ranging from 0 – Nothing de facto (this practice is required but has yet to be implemented) to 4 – Excellent (this practice has been perfected and yields the greatest anticipated benefits). The Supply Chain Council (SCC, 2000) developed the SCOR model in 1996 as a common framework for businesses. It establishes a framework for representing, assessing, and diagnosing the supply chain, as well as reference procedures, key indicators, and best practices. For evaluating SCM methods, the SCOR model offers five families of metrics: dependability, responsiveness, flexibility, costs, and asset management. The GREENSCOR is included in the eighth edition of the SCOR model (SCC, 2008). This new module emphasizes best practices such as "installation of an Environmental Management System," "creation of supplier relationships," "identifying green products," "maximization loadings," and so on. The best practices are related to five environmental indicators: carbon emissions, air pollutant emissions, liquid waste generation, solid waste generation, and recycled waste percentage. As the 800 or so participating businesses testify, the SCOR model is undoubtedly the most important global reference for supply chain evaluation. It acts as a benchmark for determining where the supply chain is located, how it is organized, and what kind of operation it employs.

1.2 The sustainability in performance assessment standards;

Several new standards and scientific contributions have recently been released to assist businesses in evaluating their long-term success. We observe that commitment standards like the Global Compact offer certain important concepts but no evaluation mechanism, and that certification standards are, unfortunately, extremely specialized. In fact, SA8000 (SAI, 2008) is focused on the social component and is seldom relevant to businesses, while EMAS (European Commission, 2009) solely offers an environmental assessment instrument. Note that ISO 26000 (ISO, 2010) proposes an evaluation methodology for environmental and social performance that is relevant to businesses, and GRI, a reporting standard for businesses, incorporates three aspects

of sustainable performance. These two criteria, however, do not cover all aspects of sustainable development and therefore are not comprehensive. In terms of scholarly contributions, the earliest conceptual models defined the notion of social responsibility by demonstrating its roots and first evaluation criteria. More recent conceptual models define long-term performance and highlight the main factors to consider when evaluating it. Castka and Balzarova (2008), Jash (2000), Krajnc and. The majority of contributions in mathematical models are focused on one dimension: the economic component. Multi-criteria methods and composite sustainable indices have captured our interest and impacted our work. Until now, multi-criteria approaches incorporating at least two sustainable dimensions have been rare, and none have addressed all three dimensions. The second method involves combining sustainable indicators into a composite index. This level-based approach is intriguing, but the actual models in Krajnc and Glavic (2005), Singh, Murty, Gupta, and Dikshit (2007), Siracusa, La Rosa, and Sterlini (2004), and Jung, Kim, and Rhee (2001) allow for compensations between dimensions, which do not appear to be consistent with the concept of sustainable development in our opinion.

1.3 Needs for framework for sustainable performance assessment of SCM practices:

Although several of the world's top international organizations provide methods for auditing SCM processes, only a few have progressed to the point of assessing sustainability. The SCOR model, with the addition of the GREENSCOR additional model, is the most sustainability-oriented instrument. It does not, however, combine the three. Although several of the world's top international organizations provide methods for auditing SCM processes, only a few have progressed to the point of assessing sustainability. The SCOR model, with the addition of the GREENSCOR additional model, is the most sustainability-oriented instrument. It does not, however, combine the three.

1.4 An analytical model for assessment of SCM practice sustainable performance :

We offer a three-level analytical evaluation methodology for long-term performance that may be used to evaluate any SCM processes. Because the degree to which a business adopts a practice may vary greatly, from very little to complete adoption, the importance of its effect cannot be considered in all instances in the same manner. To account for this variation, we weight the effects of SCM practices according to a maturity level, which reflects the degree to which the SCM practice W(Pk) has been implemented[9].We suggest that a practice's maturity be measured in terms of two characteristics: stability and scope. The consistency with which a practice is implemented by a business shows how often it is done; it may be sporadic (depending on opportunities) or systematic[10]. The perimeter of a practice's implementation is defined by the scope of the practice's implementation. It may be limited to a few products/services or all of them. The following is a breakdown of the four levels of maturity:

Degree 0: The practice is only partially or not at all applied. As a result, its adoption will have no major effect on the fields.

Degree 1: This technique is used on a limited basis for certain supply chain products/services.

Degree 2: The business implements this technique on a regular basis for a subset of the supply chain's products/services, or on an ad hoc basis for all products/services.

Degree 3: The business implements this procedure consistently across all goods and services.

The sub-fields are aggregated into three sustainable indices in our three-level analytical approach for evaluating the long-term success of SCM processes. The idea of a composite index is a novel method that is well-suited to evaluating the socioeconomic application of sustainable

development. It allows businesses to convert their various accessible data into words that correlate to economic, environmental, or social benefits. These indices are becoming more widely acknowledged as useful instruments for strategy adjustments and communication. The sustainable indexes simplify, measure, evaluate, and convey information that would otherwise be complex and difficult to understand by displaying events and underlying patterns.

2. DISCUSSION

The literature on buying and supply management, as well as transportation and logistics, has influenced the creation and evolution of supply chain management. As a result, the phrase "supply chain management" is employed in a variety of contexts, although three different definitions predominate in the previous literature. To begin, supply chain management may be used as a convenient synonym to describe a manufacturer's buying and supply operations. Second, it may be used to define merchants' and retailers' transportation and logistical activities. Finally, it may be used to define all value-adding operations, including recycling, from the raw materials extractor to the end consumers. It should come as no surprise, however, that the different descriptions sometimes overlap.Genuinely integrated supply chain management requires a huge investment from all value chain participants. For example, a buyer's buying process may need to be overhauled in order to include a supplier's technical teams and product designers directly into their own decision-making process. Because changing partners may be costly, the buying " "m has the potential to become a slave to its suppliers. The purchaser must be concerned not just about poor supplier performance, but also about the potential of a supplier leaking trade secrets to rivals or striking out on its own with its newfound skills. While trusting suppliers makes excellent economic sense, antagonism may be more pro"table in the long term for many "rms. There are many additional supply chain management problems, such as conflicting goals and missions, insufficient decentralization, and so on "Customer service is defined as the separation of supply chain design from operational choices.

3. CONCLUSION

We have provided a framework to describe a company's sustainable performance in terms of the effects of its SCM practices, as well as a methodology to evaluate its sustainable performance uniformly in this article. This contribution responds to the original issue of how to evaluate the long-term effectiveness of SCM methods. The concept is based on the identification of a collection of sustainable sectors that may be affected by SCM techniques. Reliability, responsiveness, adaptability, financial performance, quality, environmental management, resource usage, pollution, dangerousness, natural environment protection, labor conditions, human rights, social commitment, consumer problems, and business practices are all represented in these areas. We developed a framework for sustainable performance characterization and an analytical model for sustainable performance evaluation to discover, quantify, and aggregate the connections between supply chain management strategies and their effect on performance. The framework is used to describe a company's long-term economic, environmental, and social performance. We used the framework to describe two well-known methods that are regarded "excellent" from an economic standpoint, from the viewpoint of the other two aspects of sustainable development. We were able to determine if a best economic practice is also a best sustainable practice as a result of this. This approach may be readily adapted to any SCM technique that is now regarded a best practice in a business or that a company plans to adopt. The suggested framework may also be used by a business to emphasize those SCM practices that have a beneficial effect on its long-term performance, depending on its goals. The application of multi-criteria methods on the framework may help one select the best SCM practices for a

particular situation, or categorize SCM practices according to the circumstances and goals of businesses.

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