

Chapter 2

Assessment of Supply Chain Greenness: A Literature Review

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ABSTRACT

Having become conscious about the importance of the environment much more than past nowadays, the environmentally benign applications also called as green applications have increased tremendously in the recent years. Although there are specific and individual studies in various fields from design of product to final delivery of it, there is a need to handle the subject as a whole and construct green supply chains. Before constructing a green supply chain, the first step is to assess the existing structure from the viewpoint of greenness. Hence, it is important to develop a systematic assessment approach and this study aims to analyze the existing literature by mainly clarifying the criteria and methods used in such assessment systems and provide directions for future studies. Moreover, this study also aims to provide a base for the academics and practitioners that are willing to develop a greenness assessment methodology for supply chains. For this aim, numerous studies have been analyzed under a proposed structure including four sub-sections which consist of a green supply chain.

INTRODUCTION

Greenness which mainly reflects “the respect to the environment” is one of the most popular topics in the last decade. It requires the consideration of the environmental aspects from various points for all the systems including manufacturing and service sectors. Although there are individual applications to

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provide greenness, the topic is also handled as a whole under supply chain logic which starts from the supply of raw materials to final delivery of it and as van Hock and Erasmus (2000) state, in all phase of the life cycle of the finished goods, it is directly related to the environment. Depending on this relationship with the supply chain management, this concept is called as Green Supply Chain Management (GSCM). GSC have become an important model for the companies to stay in the market and make profit while respecting to environmental impacts. As a result, a large body of literature for GSCM have been published and the aim of this study is to review the related literature and to give an insight for the researchers and practitioners.

The study of Wilkerson (2005) is regarded as one of the first studies including “Green Supply Chain (GSC)” concept, but, actually before him, many researchers studied the topic under various parts of GSC. One of those studies was performed by Barnes (1982) and Pohlen (1992). They focused on the reverse logistics which is also one of the main parts of GSC. Afterwards, Murphy et al. (1994) and Szymankiewicz (1993) addressed firstly the logistics related Green Supply Chain. Then, Drumwright (1994) published an article about purchasing part of GSC. After these preliminary studies related to the different parts of GSC topic, Sarkis (1995) put the effort on the concept and systematical integration of them including purchasing, operations, marketing, logistics and reverse logistics with environmental aspects. As can be inferred from the studies, there are various parts of GSC that need to be considered for a good design. However, in this study, the first stage of GSC design which is the assessment of greenness is the main focus.

Performance assessment of a system for different indicators is one of the main and well known principles of management. Hence, to provide a green supply chain, an evaluation system is a requirement and as Theyel (2006) mentioned “environmental performance is a concern of managers due to reasons ranging from regulatory and contractual compliance, to public perception and competitive advantage” in “Greening the Supply Chain”. With this way of considering the green supply chain, measuring some of the processes by key performance indicators (KPI) is critical for the companies for different purposes. After checking the defined KPIs continuously, measuring the process or situation is another important factor for the companies if some of the environmental labels or certificates, like ISO 14000 series, are aimed to be gained and kept. These labels or certificates are considered as good indicators by the customers and the governments.

Many studies on performance related measurements have been published for the classic supply chains, nevertheless these key performance indicators are not capable of measuring the green supply chain. For this reason, different type of comprehensive KPIs are required to be developed for green supply chain performance measurement. Consequently, in this important area, many researchers cooperated with the business to measure the Green Supply Chain activities. First green supply chain performance measurement related investigation was performed by Sarkis et al. (2001) and it was related to the waste management which is a subdivision of Green Supply Chain. However, first study on the performance evaluation for the whole green supply chain was prepared by Lakhali et al. (2006) for lumber industry and by Zhu et al. (2004) in Chinese Manufacturing Enterprises in the same year. Similarly, Zhu et al. (2005) described GSCM drivers and evaluated the performance of a number of Chinese manufacturing organizations. Hervani et al. (2005) prepared an overview of the various issues related to environmental (green) supply chain management performance measurement. Tsai et al. (2009) and Büyüközkan et al. (2012) used different techniques to evaluate supplier selection and purchasing process for the green supply chain.

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