A theoretical framework for strategy development to introduce sustainable supply chain management

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Abstract

The paper discussed on the managerial and research implications of sustainable supply chain management. We analyzed current researches about the sustainability and its introduction into the supply chain. And then, based on the necessity and requirements of sustainable supply chain management, we argued about what kind of strategies the company should conduct to obtain the sustainability in its supply chain. Finally, from the viewpoint of the company having the not-sustainable supply chain, we established the framework for strategy development to construct the sustainable supply chain, which could help the company in making a practical application, as well as could be suggested as research directions of future works to support it.

1. Introduction

This paper presents a literature review and a theoretical framework for strategy development to adopt Sustainable Supply Chain Management (SSCM). Based on reviews on existing approaches that have been discussed research issues about the sustainability of supply chain, we aim at deriving what kind of procedure a company should conduct in order to integrate the sustainability with its operations in SCM.

In business environment, the Sustainability is mainly defined as a capability to have and hold a continuous competitiveness. After introducing its concept into the industries in the mid-90s, companies have adopted SSCM as their core business paradigm over the entire corporate management. Consequently, diverse strategies and frameworks have been developed to establish the sustainability on their supply chain. However, while it has been adopted by only a few leading companies, most of those, specifically small and medium-sized businesses, are merely concerned with it. Particularly, some of them adopted it institutionally by government-initiated policies with respect to the sociological, economic, and...
environmental aspect. Although there is much attention towards the adoption of SSCM, there is little research or guideline to understand how to adopt SSCM along with what kind of procedure. The introduction strategy is usually divided into following three perspectives. By investigating and analyzing previous researches about such the strategies, we propose directions of future researches about the implementation of the framework for strategy development to introduce SSCM.

- A strategy to correspond to the external factors of supply chain with respect to the social and environmental aspects
- A strategy to correspond to the internal factors of supply chain with respect to the variations of participations and their collaborations
- A strategy to implement the framework of SSCM to operate the process management system so as to perform the internal and external business processes more flexibly

2. Sustainable Supply Chain Management

SCM is ultimately a management methodology to improve an efficiency of tasks in supply chain by composing a chain with connections of traditional tasks of firms and developing the functions of individual firms participated in chain [1]. The objective is to generate values such as products or services for customers by interconnecting production and transportation components in the network [2]. The recent studies about SCM are approached in various ways such as design, planning, execution, control, and monitoring of the chain. These studies have been expanded to an approach to manage the globalized supply chain efficiently which is distributed and larger as growth of value creation, competency, management of supply and demand, performance evaluation, and inventory management.

The common standard to decide the function of traditional SCM is to achieve a profit through cost reduction. However, there have been various changes about customer demand and increase of environmental cost according to the trends of changing business. Therefore, the importance of sustainability has been highlighted as a standard of performance evaluation. The economic meaning of sustainability is that how consistently the profit generated from human, nature, and society could be kept. Therefore, the sustainability in supply chain can be defined as an efficiency of utilizing the limited sources to be flexible to changeable business environment and be agile to new customer demand. The firms and organizations are exposed to many elements of change and risk and these elements are categorized into economic, environmental, and social areas so that we discussed about the corresponding elements of SSCM in terms of following three aspects.

(Economic element) Single companies are hard to get their own competencies as the economy varies. In addition, acquired competencies are hard to keep consistently when they are exposed to natural disasters or management deterioration. To mitigate this, the collaboration between firms is getting important way to get their sustainability. The collaboration provides the firms an opportunity to be flexible to changes by sharing the cost and profit of supply chain.

(Environmental element) The problem of environmental cost has been highlighted with rapid changes all over the world. In addition, spread recognition about environmental protection has dominated whole society with paradigm of green growth and requested the eco-friendly sustainability to firms. The design of products and process to increase recycle can be an example of a sustainability approach to respond to these environmental elements. Government regulation about pollution also can be a threat to firms.

(Cultural element) Supply chain should be coexisted with the culture and regional society not for the goals of firms. Especially, it is responsible for balanced development of society through society welfare and return. In addition, the paradigm can be changed according to the change of social environment. Furthermore, requirements of participants in society can be a reason for supply chain because they are customer and participants. Especially, the elements of environment and society are linked to the firm’s responsibility. It was led by government or organizations according to social practices and paradigms in past, but currently, the firms have an initiative and lead the change.
As above, the supply chain has been exposed to various risks as the change of business environment and it leads to the company for requesting the sustainability. Furthermore, its necessity has been important in that the speed of change has been faster with the change of technical improvement and social practices. The studies about SCM were mostly mathematical approach started from academic business and engineering, and these focus on the maximization of profit through supply chain by satisfying both low cost and high quality with a design of supply chain, production, transportation management. After that, with the change of paradigm and environment, the concern about sustainable supply chain has been increased. However, the related studies are in the background of the concept of traditional supply chain.

3. Research Issues on SSCM

Current studies of SCM has been focused on a pursuit of low cost and high quality through the design of supply chain, production, transportation management and on maximization of profit through optimized SCM. On the other hand, the interest of SSCM is increased with respect to the changes of environment and social paradigm. SSCM researches began in the risk management of SCM, but the research ranges are expanded in large qualified SCM. And SSCM researches are the secure of sustainability to adapt and respond to quickly in social and environment changes. Fig. 1 illustrates the research scope about SSCM with a standard for supply Chain Operations Reference model (SCOR) by supply chain council [3].

The scope of SSCM corresponds to domains including Transportation Management, Supply Chain Configuration, Regulatory Configuration and Supply Chain Risk Process. The definition of Sustainability ranges from macro-ecological to micro-economic operations perspectives [4]. The point of view SCM, the goals of SSCM influence on supply chain component selection, supply materials, manufacturing, distribution and recycling decision. Therefore, in order for a company to apply a sustainability agenda to the market, they consider a wide range of marketing functions and focus on value among all the supply chain components interaction [5]. Closs et al. defined the range of sustainability depending on the company’s end-to-end value chain. And they evaluated how the initiatives of sustainability could be applied [5]. Company’s sustainability can be compared to the operational robustness in terms of probability and costs. Sustainability indicators were developed to measure the supply chain process, fragility, and so on [4]. Economic value of SSCM was measured by evaluating how sustainability could affect financial risk of customers and employees against lean production system [6].

There have been researches of SSCM that recognize the importance of strategic collaboration in inter-organization level, and apply this to the ways to take competitive advantage. The main strategies of...
SSCM can be divided into environmental lead, strategic purchasing and supply, supply chain capabilities, product-based green supply, and greening the supply process. And many researches focused on external elements rather than considering firm’s internal elements such as resources and capabilities [7]. Unique organizational capabilities emerge only when firms integrate social and environmental issues into their corporate behaviour. Effective sustainable supply chain management that can be managed the pressure of changes in the external environment, requires more flexible interaction between all firms involved. And also requires long-term and culturally grown partnerships between companies, mutually dependent on one another for much of their business [8,9]. Strategic purchasing and supply emphasize the cooperative relationships between the suppliers. And in order to solve the environment problem, it develops cross-organizational cooperation strategies such as environmental planning and cooperative problem solving [7].

Supply chain risk management system is developed to integrate risk dynamic model into a SSCM process framework. Risk dynamics model describes the dynamic behaviour of the system from the viewpoint of risk structure model. And the changes are the way to illustrate the relationships between state nodes of structure model and function of attributes [10]. Related to the partner selection and production planning, a robust supply chain network design problem is devised in an agile manufacturing setting. And for this problem, the optimization of logistics and production costs associated with the supply chain members is considered [11, 13]. For the automated industry, sustainable supply chain management strategy such as outsourcing to low cost country are developed and evaluated based on the theoretical model [12]. Applying the expansion sustainable supply chain of existing supply chain risk management techniques reaches the limits.

4. Directions for Future Research

Thus far, we discussed related works about SSCM and their implications with respect to the concept, research scopes, and approaches to strategy development. From these previous works, we derived the following framework for strategy development to introduce SSCM, which is illustrated in Fig. 2.

Fig. 2. Framework for strategy development to introduce SSCM

First of all, the definition and value of the sustainability should be analyzed from the internal and external contexts of the supply chain. From the both of business management and economical perspectives, the signification of sustainability should be derived. Then, by comparing research methodologies to measure the sustainability quantitatively and qualitatively, the indicators should be categorized into common index and respective index differentiated to industry sections and its own supply chain so that the economic value of sustainability could be evaluated. Introduction strategy also should be differentiated according to the characteristics of supply chain. To support the sustainability, the strategy should be derived to cope with internal and external environment, collaboration between
participants, and implementation of information technology system. Previous strategies to adopt sustainability can provide practical and applicable implications. It can be helpful for the company to derive its own introduction process by comparing best practices according to industrial sections.

The realization of SSCM should be conducted by considering the following five perspectives: Leadership for knowledge sharing, Innovation of product and process corresponding to the lifecycle of sustainable supply chain, Integration of operations by the supply chain and its components, Improvement along with the management lifecycle of process, Compliance of socioeconomic requirements and governmental regulations.

5. Concluding Remarks

This paper proposed the framework visualizing what kind of factors from SCM context the company should analyze and what kind of implementation strategies the company should enact and carry out, in order to establish SSCM by attaching the sustainability on the original supply chain of the company. A study on the research methodology corresponding to each scope in the framework also can be suggested as the directions for future works. We suggested implications about the strategy development for the supply chain to cope with the rapidly changing business environments.

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References


