

Modeling for Sustainable Supply Chain Management Level and its Impact on Company's Performance

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Abstract

Research in the field of sustainable supply chain management (SSCM) has grown rapidly but focuses mainly on the economic and environmental aspects and rarely considers the social aspect. This research will discuss recent literature review on SSCM and propose a model to measure the impact of institutional pressures on company's SSCM level and the influence of that level on company's performance. SSCM level will be measured from five variables: orientation, continuity, collaboration, risk management, and proactivity; whereas company's performance will be measured from three variables of sustainable development: economic, social, and environment. Furthermore, we propose seven indicators to assess institutional pressures, fourteen indicators to assess SSCM level, and nine indicators to assess company's performance.

Keywords

Sustainable supply chain management (SSCM); Performance measurement

1. Introduction

Awareness of sustainability issue has been increasing especially in the last five years (Beske-Janssen *et al.*, 2015). Sustainability is often regarded as a factor that signifies the modernization of a company, where companies that have given attention and engaged in sustainability activities would be seen as more forward-looking. One effect from this trend is the emergence of sustainable supply chain management (SSCM) concept as an extension from the conventional supply chain management (SCM). The major difference between SCM and SSCM lies in three main areas, i.e., dedication to the triple bottom line, stakeholder management, and life cycle assessment (Beske and Seuring, 2014). These areas are the main features of SSCM that are not available in SCM. By definition, SSCM is "the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental, and social" (Seuring and Muller, 2008a). The implementation of SSCM can depart from two different initiatives regardless of the SCM level in a company, i.e., from the development of supply chain systems or the adoption of sustainability in the company (Ashby *et al.*, 2012).

Companies with established SCM and growth mindset will naturally pay attention to SSCM and start concerning how to transform their old SCM model into SSCM (Seuring and Muller, 2008b; Pagell and Wu, 2009). Personal awareness of the companies is one of the internal factors that will encourage companies to transform SCM into SSCM, but the external factors are actually stronger drivers than the internal factors. External factors include government regulations, demand from suppliers and consumers, and the need to maintain the company's image (Hussain *et al.*, 2016; Vanalle *et al.*, 2017). The difficulty that usually arises is that companies often have difficulties

to distinguish between SCM and SSCM. In addition, the company also has difficulties to measure at which stage of and whether the SCM has transformed to SSCM. To guide the change progress, it is important to know where the goals of change are and where the company currently stands, or in other words, how far the company's SCM has transformed to SSCM and what SCM sustainability components that are still unrealized. Beske and Seuring (2014) have created a framework to distinguish SCM from SSCM. This framework consists of five categories: orientation, continuity, collaboration, risk management and proactivity. These five categories are further broken down into several practical factors. The framework, however, is still theoretical in nature and has not been tested empirically. Empirical testing of the variables in the framework is an important step to put the framework ready for implementation (Beske and Seuring, 2014).

The implementation and performance appraisal of SSCM still tend to focus on the economic and environmental aspects, leaving behind the important social aspect (Beske-Janssen *et al.*, 2015; Singh and Trivedi, 2016; Esfahbodi *et al.*, 2017). Vanalle *et al.* (2017) also reinforce this by modeling the impact of green supply chain management (GSCM) on the performance of automotive companies in Brazil and assessing the company's performance in economic, operational and environmental aspects, but not the social aspect. Several studies have been done before on SSCM modeling. Esfahbodi *et al.* (2017) discusses the influence of government pressure (coercive pressures) which will have an effect on the implementation of sustainable procurement, sustainable distribution, sustainable design and investment recovery. All the variables of this SSCM implementation are then seen as related to company's performance.

Given the recent development in SSCM studies as detailed above, this research will discuss the impact of institutional pressures to SSCM implementation and the influence of SSCM level on company's performance. Company's performance will be seen from three aspects of sustainable development: social, economic, and environment.

2. Literature review on SSCM

2.1 Institutional pressures as SSCM drivers

SSCM implementation is mainly driven by institutional pressures (Hines, 2004; Esfahbodi *et al.*, 2017; Vanalle *et al.*, 2017). The government will create rules and regulations for companies to be responsible for their environmental sustainability and social welfare. Institutional pressures generally can be described as the demands or pressures from pressure groups. Pressure groups are organizations that act as pressure groups exerting influence over organizational behavior and government (Hines, 2004). In SCM, pressure groups can be government, supplier and consumers. Some examples of pressure groups in the form of social organizations in Europe are as follows (Hines, 2004): (i) transnationale.org, a website that searches and publishes relevant information about companies, information on brands, political influence, factory locations, working conditions, global issues, social and financial strategies; (ii) nosweat.org.uk, a website that have an interactive online campaign that includes retailer surveys and opinion articles about current labor rights issues; (iii) cleanclothes.org, an international European network with the goal of improving the working conditions in the garment industry worldwide, which comprises a wide variety of organizations such as trade unions, consumer organizations, researchers, solidarity groups, women's organizations, church groups, youth movements and world shops.

Several studies have discussed the impact of institutional pressures on SSCM performance. Zeng *et al.* (2016) found that institutional pressures significantly affect supply chain relationship management (SCRM) and sustainable supply chain design (SSCD). This means institutional pressures significantly affect SSCM. Esfahbodi *et al.* (2017) examined the effect of coercive pressures on sustainable procurement, sustainable distribution, sustainable design and investment recovery. The finding was coercive pressures significantly affect all these variables which can also be concluded that coercive pressures significantly affect the implementation of SSCM. Coercive pressures here are the pressure from the government as illustrated in the indicators related to government regulations. On the other hand, institutional pressures significantly influence the implementation of GSCM in companies (Vanalle *et al.*, 2017), covering all elements of pressure groups, i.e., governments, suppliers, customers, and social organizations.

2.2 SSCM level development

Beske and Seuring (2014) have developed a framework to distinguish SCM and SSCM. This framework consists of five main categories, namely: orientation, continuity, collaboration, risk management and proactivity. Beske and Seuring (2014) suggested that the framework should be empirically tested. Before it can be used for empirical testing, the framework should be transformed to operational terms. In this section, the framework will be transformed to SSCM level construct along with the measuring indicators. Before developing the framework into

SSCM level construct, the following will explain the accuracy and understanding of each category of the framework. Beske and Seuring (2014) have stated that the five categories described have been able to divide the hierarchy of SCM and SSCM into three levels, where the focus and purpose of each category can be seen in each hierarchy. The division of the hierarchy is shown in Figure 1.

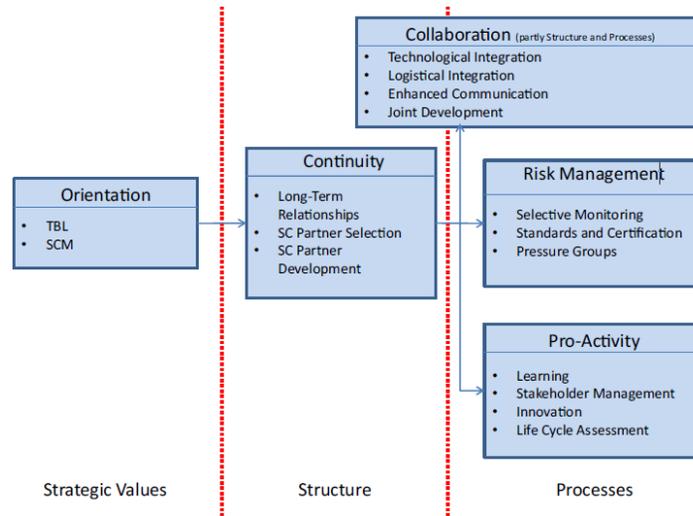


Figure 1. SSCM categories and practices (Beske and Seuring, 2014)

Table 1. Code description

Code	Code description	Code	Code description
IP1	Institutional pressures 1	RM1	Risk management 1
IP2	Institutional pressures 2	RM2	Risk management 2
IP3	Institutional pressures 3	RM3	Risk management 3
IP4	Institutional pressures 4	PA1	Proactivity 1
IP5	Institutional pressures 5	PA2	Proactivity 2
IP6	Institutional pressures 6	PA3	Proactivity 3
IP7	Institutional pressures 7	EcP1	Economic performance 1
OR1	Orientation 1	EcP2	Economic performance 2
OR2	Orientation 2	EcP3	Economic performance 3
CN1	Continuity 1	EvP1	Environmental performance 1
CN2	Continuity 2	EvP2	Environmental performance 2
CN3	Continuity 3	EvP3	Environmental performance 3
CL1	Collaboration 1	EvP4	Environmental performance 4
CL2	Collaboration 2	SP1	Social performance 1
CL3	Collaboration 3	SP2	Social performance 2

2.2.1 Orientation

Orientation discusses about how SSCM should establish the concept of sustainable development as the foundation of the company’s existing SCM (Pagell and Wu, 2009). The involvement of top management is essential to support the full application of SSCM. The role of top management is to integrate the goals and practices of sustainability aspects into daily SCM activities (Pagell and Wu, 2009). Holt and Ghobadian (2009) stated that the CEO and the company’s culture are the most important drivers for implementing environmental aspect of SCM.

CEO and top management will have different roles in managerial level. Holt and Ghobadian (2009) considered CEO as cultural influences on social, economic and environmental aspects. Focusing on three aspects at once is not easy as three different aspects require different decisions to reach the goal for each aspect. The main focus is to balance the trade-off (Beske and Seuring, 2014; Beske and Schaltegger, 2015). A simple example of trade-off is the purchase of “green” plastic bags that are easy to recycle and will increase the value on the environmental aspect but will reduce the value on economic aspect. To overcome this, managers must be able to decide which policy to choose. Trade-off conditions are often inevitable so it is decision-maker’s duty to deal with these conditions. The main consideration in orientation categories is therefore triple bottom line (OR1) and top management involvement (OR2). (For the code description, refer to Table 1.)

2.2.2 Continuity

Continuity means how to achieve the best performance, not just one company/ member of the supply chain but all companies involved in the supply chain (Gold *et al.*, 2010) while sharing risk and profit together (Mentzer *et al.*, 2001). In this case, each company is not just merged into a supply chain, but has a vision and purpose (Pagell and Wu, 2009). Each member must have a vision of joining the supply chain and a thorough vision for all companies incorporated in SCM should also exist. With a group vision, it will be easy to implement new initiatives in SCM. As all members have agreed to follow the vision, the application of sustainability concept should be the goal to achieve together. This will also make the implementation of SSCM not just being the demand of the company's partners in SCM (both suppliers and customers) but also a goal to reach. Members in a supply chain will tend to be reduced; hence the performance of an overall SCM will depend on the performance of the weakest member (Beske and Seuring, 2014). There is a positive correlation between SCM performance in environmental aspect with reduction of suppliers/ members in SCM (Vachon and Klassen, 2006). This is because reducing the supply chain point will reduce the process that generates carbon footprint, which is generated through transportation and storage of goods. The key to continuity is to apply long-term relationship with key partners in the SCM (CN1) (Mentzer *et al.*, 2001; Vachon and Klassen, 2006), quality of supply chain partner company (CN2) (Mentzer *et al.*, 2001) and improvement of supply chain partner in their specific business (CN3) (Pagell and Wu, 2009).

2.2.3 Collaboration

Collaboration can be structural or operational (Beske and Seuring, 2014). An example of structural collaboration is collaboration in IT infrastructure for information sharing (CL1), whereas an example of operational collaboration is regular meetings between two or more companies within the SSCM. Collaboration actually aims to improve intercompany communication within SSCM. Hence, increasing intensity of communication is one of the practices of collaboration. If examined further, collaborative implementation is one of the expected outcomes of integration of sustainability aspects with SCM (CL2) (Gimenez and Tachizawa, 2012). The main benefit of collaboration is to open up opportunities for cross-organizational learning in addition to reducing the uncertainty and cost from various aspects (Beske and Seuring, 2014). Collaboration is generally long-term and requires mutual trust (Walker *et al.*, 2008). One form of collaboration is known as the logistics integration where companies are directly involved in planning and forecasting with suppliers and customers (CL3). Company also has the opportunity to develop capabilities such as product development and partner integration (Golicic and Smith, 2013).

2.2.4 Risk management

SSCM sometimes tends to have a higher risk than conventional SCM (Walker *et al.*, 2008, Collichia and Strozzi, 2012; Miemczyk *et al.*, 2012). Such risk, for example, involves the lack of procurement capabilities due to fewer suppliers, higher costs because of waste processing, etc. Company’s efforts to reduce social and environmental risks are good drivers for guiding companies to focus on three aspects of sustainability equally (Srivastava, 2007; Holt and Ghobadian, 2009). Supplier reduction and increased cooperation and mutual trust are intended to reduce complexity and uncertainty whereby these all are directed at reducing risk in business processes. The most common way to reduce risk is to adopt management standards, e.g., ISO 9001, ISO 14001, OHSAS 18001. Informal supplier assessment needs to be done to see if the raw materials and the production process from suppliers are meeting the standard (RM1). Supplier assessment will require sharing of information which is not an easy agreement to reach. Standard and certification are possibilities to create more environmentally and socially responsible SCM systems (RM2). Implementation of standards is a requirement that must be met both in SCM and SSCM (Beske and Seuring, 2014). Moreover from using existing standards, companies can also create company’s own standard called Codes of Conduct (CoC). This CoC can then be used to ensure that partner companies in SC act in accordance with the principle of sustainability (RM3).

2.2.5 Proactivity

Companies with sustainability mindset should have a proactive attitude (Beske and Seuring, 2014) because they need to implement new systems, concepts and technologies. Innovation is a must for companies running SSCM. In SSCM, innovation has two meanings. Firstly, SSCM companies need to focus on developing sustainable products and services. Since most products today have a life cycle assessment and they can be recycled or re-used, good product design could help reducing environmental deterioration. Secondly, SSCM companies need to measure the sustainability performance of the already implemented SSCM, e.g., calculating and reducing the carbon footprint of the product during the distribution process. Supply chain partners and stakeholders should be part of the development phase of a product. They must also play a role and be proactive. What can be exploited from them is the knowledge of the supplier and customer needs, which can generally be expressed by the stakeholders. Another advantage of proactive companies is to create opportunities as a pioneer, developing new markets and approaching new customers (Beske and Seuring, 2014). The main consideration in proactivity categories are proactive communication with stakeholders (PA1), innovation in developing sustainable products/services (PA2) and stakeholder involvement (PA3).

2.3 Relationships between SSCM level and performance

Implementation of SSCM has been proven to improve company's performance (Varsei *et al.*, 2014; Beske-Janssen *et al.*, 2015). There are three areas of performance measurement for SSCM, i.e., economic, social and environmental (Beske and Seuring, 2014; Beske-Janssen *et al.*, 2015). Of the three aspects, the social aspect is the most rarely observed (Beske-Janssen *et al.*, 2015; Singh and Trivedi, 2016). Esfahbodi *et al.* (2017) measured performance only from two aspects, i.e., economic and environmental, whereas Vanalle *et al.* (2017) did on three aspects, i.e., economic, environmental and operational. Both authors disregard the social aspect. Measurements on the economic, environmental and social aspects appear in Varsei *et al.* (2014) and Hong *et al.* (2017). Vanalle *et al.* (2017) found that the implementation of SSCM significantly affects the company's performance in the economic and environmental aspects but not significant to the operational aspect. Esfahbodi *et al.* (2017) found that sustainable procurement, sustainable distribution, sustainable design, and investment recovery significantly affect the company's performance in the environmental aspect while only sustainable procurement and sustainable design significantly affect the company's performance in the economic aspect. Hong *et al.* (2017) sees SSCM from two aspects: SSCM practices and supply chain dynamic capabilities. Hong *et al.* (2017) found that SSCM practices significantly affect the company's performance in the economic, social, and environmental aspects, while supply chain dynamic capabilities were only significant for performance on the environmental aspect.

3. Research method

In the following sections, a model is proposed to measure the impact of institutional pressures on company's SSCM level and the influence of SSCM level on company's performance. The model is based on the theoretical framework of Beske and Seuring (2014) which will be converted into SSCM level constructs along with all the measuring indicators extracted from the framework. The model will be useful in future research to test empirically the framework of Beske and Seuring (2014).

4. Analysis and results

Modeling for SSCM level and performance measurement will be illustrated in cause-and-effect model. This section will explain the modeling of each construct based on the causal relationships described in the literature review section. Indicators to test each construct will also be explained.

4.1 Institutional pressures model

Institutional pressures can be categorized in three parts: coercive pressures, normative pressures and mimetic pressures (Zeng *et al.*, 2017). Some studies focus on partial aspect such as Vanalle *et al.* (2017) who focus on the influence of coercive pressures, so the construct in this research is also called coercive pressures. Zeng *et al.* (2017) focus on all components and the construct is called institutional pressures. Zeng *et al.* (2017) incorporates all indicators into the institutional pressures construct and do not group the indicators based on the type of each indicator (coercive, normative and mimetic). This study will follow the style of Zeng *et al.* (2017) and adopt indicators to measure institutional pressures from Zeng *et al.* (2017) and Vanalle *et al.* (2017). The indicators that will be used to measure institutional pressures are listed in Table 1.

Table 2. Institutional pressures indicators

Constructs	Code	Description
Economic performance (EcP)	EcP1	Decreased of cost for energy consumption
	EcP2	Decreased of cost for waste treatment
	EcP3	Decrease of fine for environmental accidents
Environmental performance (EvP)	EvP1	Reduction of air emission.
	EvP2	Reduction of waste emission.
	EvP3	Decrease of consumption for hazardous/harmful/toxic materials
	EvP4	Improvement of a company's environmental situation
Social performance (SP)	SP1	Labor practices and decent work
	SP2	Improvement of company's social responsibility program

4.2 SSCM level model

In this study, SSCM levels will be measured through five categories similar to those in the Beske and Seuring (2014). Many studies have examined SSCM and formulated SSCM in different forms such as Esfahbodi *et al.* (2017), Hong *et al.* (2017) and Zeng *et al.* (2017). This research will take the framework of Beske and Seuring (2014) on the practices that differentiate SCM and SSCM.

Table 3. SSCM level indicators

Constructs	Code	Description
Orientation (OR)	OR1	Triple bottom line is part of company's mission
	OR2	Top management involvement in SSCM implementation
Continuity (CN)	CN1	Long term and close relationships with supplier
	CN2	SC partner have a reasonable quality of life
	CN3	SC partner improve their performance in their specific business
Collaboration (CL)	CL1	Transparency and information sharing between companies in SC
	CL2	Collaboration to enhance sustainability performance
	CL3	Collaboration with companies in SC in planning and forecasting
Risk management (RM)	RM1	SC partner selection
	RM2	Standard requirement for companies in SC
	RM3	Codes of Conduct for ensure companies in SC behave according sustainability strategy
Proactivity (PA)	PA1	Communication proactively with stakeholders
	PA2	Innovation in development of sustainable products/services
	PA3	Stakeholder involvement in decision making

4.3 Performance measurement model

Measurements in the social aspect are rarely considered in SSCM (Beske-Janssen *et al.*, 2015; Hussain *et al.*, 2016; Singh and Trivedi, 2016). Table 3 presents the performance measurement indicators of all three aspects of sustainability adopted from Vanalle *et al.* (2017), Esfahbodi *et al.* (2017), Hong *et al.* (2017), and Varsei *et al.* (2017).

Table 4. Performance measurement indicators

Economic performance (EcP)	EcP1	Decreased of cost for energy consumption
	EcP2	Decreased of cost for waste treatment
	EcP3	Decrease of fine for environmental accidents
Environmental performance (EvP)	EvP1	Reduction of air emission.
	EvP2	Reduction of waste emission.
	EvP3	Decrease of consumption for hazardous/harmful/toxic materials
Social performance (SP)	SP1	Improvement of a company's environmental situation
	SP2	Labor practices and decent work
	SP3	Improvement of company's social responsibility program

4.4 Relationships between constructs

All the described constructs will be incorporated into causality modeling which aims to find a relationship between the constructs that consist of several indicators from the literature review. The model is presented in Figure 2.

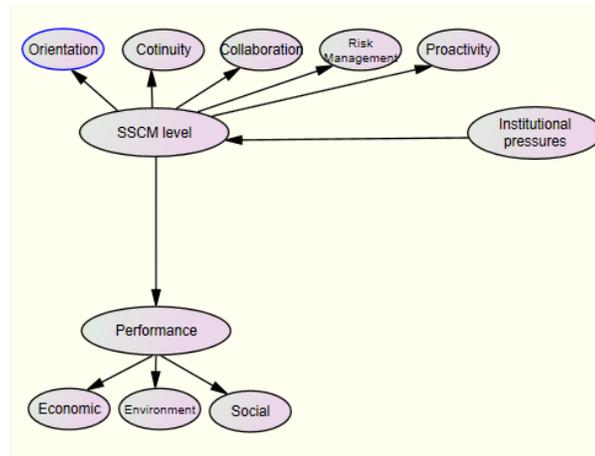


Figure 2. Concept modeling

5. Conclusions and further research

This study focuses on the influence of institutional pressures on a company's SSCM. Company's SSCM is assessed from SSCM level. Furthermore, the influence of SSCM level will be seen on company's performance in three aspects of sustainability. SSCM level measurements consist of 5 constructs and there are 14 indicators for measuring those constructs; 2 indicators to measure orientation constructs, 3 indicators to measure continuity constructs, 3 indicators to measure collaboration constructs, 3 indicators to measure risk management constructs and 3 indicators to measure proactivity constructs. For future research suggestion, the model should be empirically tested in a case study by distributing questionnaires to the company's stakeholders asking about all the indicators in the model and studying the construct relationship through multivariate analysis.

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