



A NOVEL TOLERANCE EVALUATION FRAMEWORK FOR GREEN SUPPLY CHAIN MANAGEMENT IMPLEMENTATION

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ABSTRACT

Organizations have the urge to to adopt green supply chain management practices since global warming is becoming a burning issue worldwide. Thereby carbon footprint can be reduced throughout the supply chain in an organization. The inception of Green Supply Chain Management (GSCM), conceptually taken its roots during the Industrial Revolution. An attempt is made to examine the scenario of adopting GSCM practices by considering institutional pressures. Efforts are taken to understand the connection between tolerance level of people and adoption of GSCM practices. Strategies are framed to relate the impacts of institutional pressures in adopting GSCM practices and thereby evaluating different tolerance indexes. A new framework is created inter relating GSCM practices, institutional pressures and tolerance indexes. This paper discusses a variety of institutional pressures including market, governmental and competitive sources. Because of a variety of institutional players including market, governmental and competitive sources, Indian industries are experiencing increasing pressures from the eco-system. Tolerance evaluation index is grouped into innovation & development, information sharing, environmental performance and customer service. Here strategies are discussed for improving tolerance evaluation indexes.

Key words: Green supply chain management; institutional pressures; tolerance index

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1. INTRODUCTION

Inclusion of green practices into the supply chain is the topic of interest these days. Governments and organizations around the world are taking efforts to minimize their impact on the environment. In previous works Zhu et al. (2005) completed investigations of relationships among various dimensions of environmental control strategies and after effects of implementation issues. Supply chains must be adapted by accommodating environmental concerns associated with minimization of waste and use of resources in order to create a green supply chain (Manimaran et.al, 2017). Whether the relationship between various dimensions of environmental control strategies and after effects of implementation issues may have been moderated by various institutional pressures were not evaluated. (Zhu et.al, 2007) There is a need for strong debate about the existence and response to various institutional pressures will cause the relationships between adoption of practices and tolerance indexes to vary. Production managers must understand environmental control strategies and relationships to strategically manage the tolerance index. Green supply chain is the embodiment of recycled economy at the microscopic level and can reduce the degree of environmental destruction and enhance the effective utilization of resources by making enterprises inside the supply chain reuse wastes from each other. (Feng Wei et.al, 2014) Economic performance, social performance, and environmental performance are to be considered for Sustainable supply chain management (Jeremy Meacham et.al, 2013). The change of climate and the escalation in global warming have driven increasing worldwide concern about the environmental protection. Firms have started to focus on the development of green products to satisfy customer, environmental needs and requirements so that they can have a leading edge in the global market. (Hsiu MeiWang Chen et.al, 2016).

Many researches were made on green effects in distribution networks and there is an observation that transportation of goods and supplies generates not only costs for the industry, but it also creates environmental costs for the society (Muhammed Kürşad Özlen et.al, 2013). Companies are reframing their transportation behaviors to make the activities more energy efficient and environment friendly (Kwok Hung Lau, 2011). Brands that take into consideration environmental and ethical principles are usually better valued by consumers. Therefore, manufacturers are consistently developing more sustainable goods (i.e. goods having a less negative environmental impact) in order to have a leading edge. (Lise Magnier et.al, 2015). Discussion on these lines is discussed in few papers (Benjamin T. Hazen et.al, 2011; Hae Jin Gam, 2011; Abhijeet K. Digalwar, 2013; Su-Yol Lee, 2015). A number of firms have introduced environmental audits by modifying their managerial behavior toward greener supply chains. (Wu et al., 2012; Caniato et al., 2012; Vachon and Klassen, 2006).

We examine how relationships differ between GSCM practice adoption and various tolerance evaluation indexes vary because of different isomorphic pressures – regulatory (coercive), market (normative) and competitive (mimetic). The investigation is completed by introducing GSCM tolerance evaluation framework in section 2, results & discussions in section 3 followed by conclusions and directions for future research in section 4.

2. GSCM TOLERANCE EVALUATION FRAMEWORK

A framework is made for the very first time linking GSCM practices and tolerance evaluation indexes. The “win-win” situation did not occur in the implementation of environmental practices and programs. Environmental performance can be improved by GSCM practices (Frosch 1994, Geffen and Rothenberg 2000). Three pressures namely normative, coercive and mimetic influence environmental alignment, according to institutional theory (DiMaggio and Powell 1983).

2.1. Institutional Pressures

First, external stakeholders exert normative pressures. Manufacturers implement GSCM because of customer requirements. Second, coercive pressures occur through influence exerted by those in power. Performance of an organization is influenced by Government agencies. In this paper, we define environmental regulations as the coercive pressures driving manufacturing managers to implement GSCM to improve their performance. Central and local governments in India have established many environmental regulations due to decreasing resource and increasing environmental problems. Higher pressures are experienced by manufacturers, who are the main polluters and resource consumers. Third, mimetic pressures occur when an organization follows the same actions of successful competitors in the industry. Organization's responsiveness can be influenced by all institutional pressures (normative, coercive, and mimetic) for the adoption of GSCM initiatives.

2.2. GSCM Practices

Let us go through GSCM practices in detail.

Internal environmental management

1. Commitment of senior managers towards GSCM
2. Support of mid-level managers towards GSCM
3. Cooperation for environmental improvements in all functions.
4. Total quality environmental management
5. Environmental compliance and auditing programs
6. ISO 14001 certification
7. Existence of Environmental Management Systems
8. Eco-labeling of products

Green Purchasing

9. Cooperation with suppliers for environmental objectives
10. Suppliers' internal management towards Environmental audit
11. ISO14000 certification system for suppliers
12. Evaluation of environment friendly practices for Second-tier supplier evaluation

Eco Design

13. Design of products for reduced consumption of material/energy
14. Design of products for reuse; recycle recovery of material, component parts
15. Design of products to avoid or reduce use of hazardous products and/or their manufacturing process

Cooperation with Customers

16. Cooperation with customer for eco-design
17. Cooperation with customers for cleaner production
18. Cooperation with customers for green packaging

Investment Recovery

19. Investment recovery (sale) of excess inventories/materials
20. Sale of scrap and used materials
21. Sale of excess machinery

2.3. Tolerance Evaluation Index

Tolerance evaluation index is the sum of innovation & development index, information sharing index, environmental performance index and customer service index.

2.3.1. Innovation & Development

Innovation and development refers to people's ability to utilize technical resources and capabilities to improve the level of product innovation and obtain the competitive advantages in the market. From the approach of quantitative analysis, two indexes are selected to reflect technical competitiveness, namely, rate of adapting to new research and flexibility rate to market products.

(1) Rate of adapting to new research

This index reflects a person's ability of constantly launching the products or services suitable for market needs through product innovation.

Rate of adapting to new research

= (number of new greener products developed / total number of products) x 100%

(2) Flexibility rate to market products

Flexibility rate to market products refers to the percentage of scientific research input in marketing products. This index reflects the degree of an individual's attention to innovation capability and also demonstrates senior managers' pursuit of the individual's tolerance development.

2.3.2. Information Sharing

Employees must have the skills to listen, observe and record the strategies for GSCM implementation. Then only exchange of information will be accurate and fast. Effective green supply chain management cannot be achieved without the reliable guarantee of information technology system. The operational efficiency of green supply chain management will be increased by molding the employees to have presence of mind.

(1) Information sharing rate

Information sharing rate of green supply chain reflects the degree of information shared in green supply chain. The overall performance of green supply chain is improved by faster information sharing rate, thereby resources can be utilized efficiently. Its formula of calculation is as follows:

Information Sharing Rate = (amount of information shared in green supply chain/ total amount of information in green supply chain) x 100%

(2) Utilization rate of information

This index reflects the presence of mind of an individual to effectively utilize information for environmental remedy. Its formula of calculation is as follows:

Utilization Rate of Information = (total amount of information utilized in green supply chain/ total amount of information in green supply chain) x 100%

2.3.3. Environmental Performance

Environmental performance index reflects the individual's tolerance to environment friendly practices.

(1) Reutilization rate of resources

Reutilization rate of resources refers to the percentage of the quantity of recycled resources in the total resources consumption.

Reutilization Rate of Resources = (expenses for reutilization of resources in the current year/ total expenses for resources consumption in the current year) x 100%

(2) Rate of waste discharging

It reflects the social responsibility of an individual. It tells us the amount of tolerance, an individual has for the enhancement of enterprise image. The degree of pollution-free waste discharging or reutilization of resources can reflect whether individuals follow the ideology of recycled economy.

Rate of Waste Discharging = (quantity of acceptable waste discharging / quantity of waste discharging) x 100%

2.3.4. Customer Service

As customer service is fulfilled through interaction between consumers and service provider, the quality of interaction can directly affect customers' comments on service as discussed by Su Qin, Li Zhao & Xu Yi (2007).

(1) Rate of satisfying customer

Kotler (1999) claims that customer's desire for a product results from comparing a product's appeal against one's expectations. Rate of satisfying customer is an index which portrays the individual's tolerance in satisfying a customer for purchasing a greener product.

Rate of satisfying customer = (amount of customers satisfied in buying green products / total amount of customers surveying the green products) x 100%

(2) Product acceptance %

Product Acceptance Percentage

= (number of accepted greener products/total number of greener products) x 100%

Figure 1 depicts GSCM tolerance evaluation framework for investigation of institutional pressures on relationships between GSCM practices and tolerance evaluation indexes.

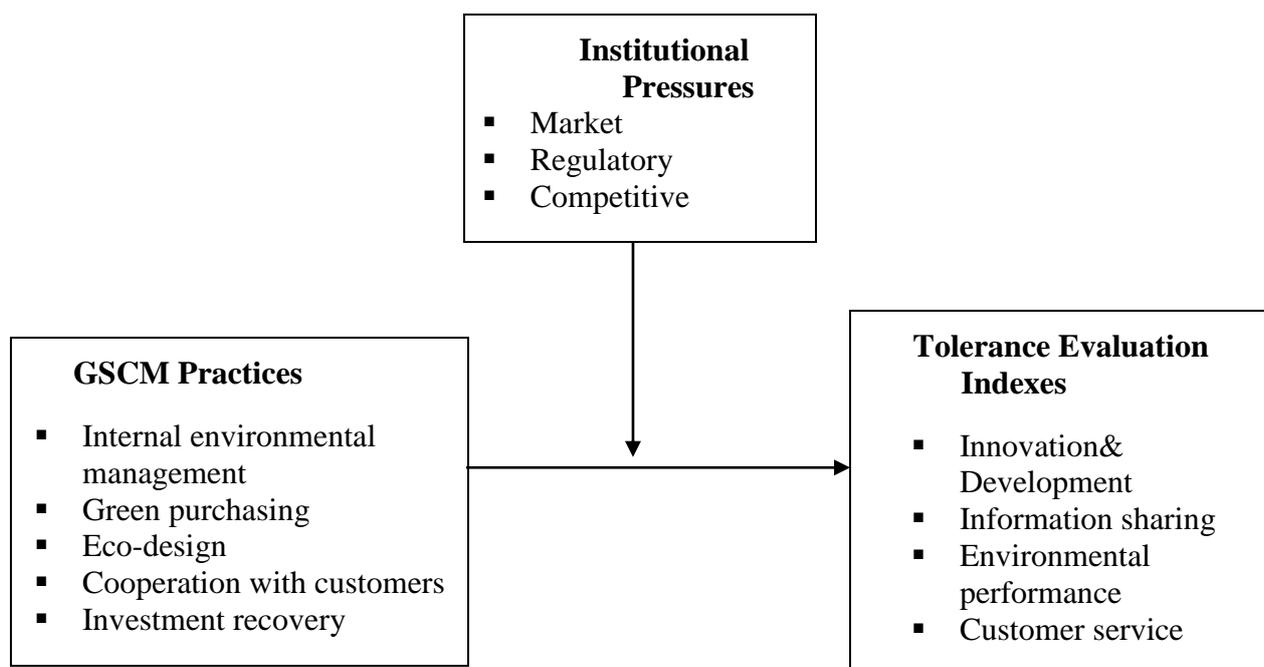


Figure 1 GSCM tolerance evaluation framework

3. RESULTS AND DISCUSSION

Senior level managers in an organization must adapt to the changes in market conditions. Managers must be aware of ISO 14001 certification systems. Senior level managers must understand the importance of total quality environmental management and Environmental compliance and auditing programs. Mid level managers must adapt themselves to the change in work atmosphere. Development of green products will be stimulated by market pressure. Thereby “rate of adapting to new research “index will show increment.

Scientific research input must be gathered in marketing products. Regulatory pressure forces the firm to choose suppliers with ISO14000 certification. Competitive pressure forces the products to be manufactured with less energy and less material. Plastic material to be developed from recycled plastic. Water conservation techniques are to be followed. Market pressure forces the firm to go for GSCM practices. Regulatory pressures forces the firm to go for cleaner production. Thereby information sharing index improves. Among the information in the green supply chain, almost full information must be shared and utilized.

Regulatory pressure incorporates firms to go for environment friendly practices. After material consumption in a particular process, waste material if any has to be re-utilized. Finally, the product made from environment friendly practices (greener products) must be sold to consumers in a convincing way. Marketing strategy must be formulated so that greener products developed are sold effectively. Industries who supply material for mass production / contract are not applicable for this discussion.

4. CONCLUSIONS

Thus the paper gives an overview of inter relationship between GSCM practices, institutional pressures and tolerance evaluation indexes. We come to know that environmental policies play a significant role in developing greener products. Different GSCM practices were discussed and its utilization with the impact of various institutional pressures was analyzed. Because of institutional pressures, greener products are developing progressively. Lot of research inputs must be collected in developing greener products. Environment friendly practices must be known to consumers so that they will have a leading edge on green products. Consumers must have self awareness in choosing a particular product. Technologies for cleaner production must be utilized and consistent performance is needed to ensure green supply chain management. Strategies must be framed for sustainable environment and greener products must be developed with proper vision and mission. The framework can be used for evaluating tolerance evaluation index for different sectors. Companies which are into original designing of products must be considered. Frame work can also be used for comparing two sectors. Even indexes can be computed by framing questions with a rating of one to five. Then average value can be taken. A table can be formed with number of greener products developed and number of greener products effectively sold.

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