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**REVIEW OF GSCM STUDIES RELATING TO GREEN
SUPPLY CHAIN MANAGEMENT PRACTICES AND
PERFORMANCE**

Dr. Anita Tomar¹ (Rana)

Associate Professor
Narmada College of Science and Commerce,
Bharuch, Gujarat, India
Email: anita.rana67@gmail.com

Dr. Heena Oza²

Associate professor
SPB English Medium College of Commerce,
Surat, Gujarat, India
Email: heenaOza@rediffmail.com

ABSTRACT

Green Supply Chain Management (GSCM) is regarded as an environmental innovation which integrates environmental concerns into supply chain management. GSCM is gaining popularity with both academicians and practitioners. The purpose of the paper is to briefly review the recent literatures of the GSCM practices and performance measures used to evaluate organizational performance and also determine the new direction area of this emerging field. A detailed review is used to sort out the literature and develop the research direction of the study. The review is focused on development of GSCM in India, including all those researches which is relevant to environmental sustainability towards operation management and the supply chain. It shows that there is a lack of researches to examine the adoption and implementation of GSCM practices especially in developing countries such as India. Thus, the authors bring forward a proposed research direction on GSCM adoption and implementation in India's manufacturing industries.

Keywords: Green Supply Chain Management, GSCM practices, performance measurement, ISO 14001 Certified Manufacturing Firms

INTRODUCTION

All the countries are in a race to become developed and for this they indulge into heavy manufacturing. The economic growth increases the level of energy and material consumption, which contribute to the environmental issues and problems related to depletion of resources. In order to maintain balance between environmental performance and economic growth organizations are facing continuous pressure, from regulatory authorities, competitors and other various stakeholders of business. Most of the organizations have started practicing green in their business as a concern to environmental sustainability. They have realized the greater benefit of the green technology adoption in business operation, which also affects suppliers and customers. As a result, Green Supply Chain Management (GSCM) emerges as a new systematic environmental approach in supply chain management and has been increasingly accepted and practiced by forward-thinking organization Zhu, Q. & Sarkis, J., (2004)¹. The current changes in environmental requirements that influenced manufacturing activities had increased attention in developing environmental management (EM)

strategies for the supply chain Beamon, B. M., (1999)² Thus, the concept of GSCM arises as a new systematic approach and has become an important factor for business activities today. Zhu et al. (2010)³ also claimed GSCM can be regarded as an environmental innovation. By integrating the green concept in to the supply chain,

it has created a new research agenda, where the supply chain will have a direct relation to the environment Fortes .J.(2009)⁴. Thus, it has become more of interest for the researchers because the past literatures showed these two paradigms were related to each other Srivastava, S.K., (2007)⁵. The purpose of this paper is to discuss an overview of the development of GSCM literature in last five years. This study is also performed to determine the new research area of issues related to GSCMs implementation. This paper will then provide a thorough review from previous studies. At the end, this paper will propose the research direction framework for the study.

OBJECTIVES OF THE STUDY

1. To review the existing literature on GSCM practices implementation and its relationship with Organizational performance in Indian context.
2. To provide a research direction to the new researchers in this area.

RESEARCH METHODOLOGY

SAMPLE OF THE STUDY

Sample of the study is Research studies related to manufacturing companies implementing GSCM practices in last five years in India.

DATA COLLECTION

Data for our research is collected from the various online studies from Journals.

LITERATURE REVIEW

The following is a review of previous literatures related to GSCM and has been summarized in the table below. Table shows the previous studies relating to GSCM implementation and its relationship with various performance measures, according to various industries in manufacturing sector. Most researchers used manufacturing industry as their sample of study in order to investigate the GSCM adoption and implementation either in developed and developing countries. Manufacturing is believed to be the main polluters of environment and is the main cause of emerging environmental problems due to its traditional business operations. Various companies in manufacturing industries such as pharmaceutical companies, textile and dyeing companies, chemical companies, plastics and rubbers; metals; machinery and equipment manufacturing; electronics; automobile; printing; construction and others are the sample of the study. Traditional polluting industries such as manufacturers in chemical, electrical and paper industries generally experience higher environmental pressure. Therefore, the manufacturing companies as traditional polluters tend to be the potential sample of our study as they tend to implement GSCM practices at-least to some extent to mitigate the effect of environmental pollution. The available literature is presented here to provide a more comprehensive view.

- A research study on the topic “the study of green supply chain management practices in the Indian manufacturing industries” was conducted by Sarabjit Singh (2011)⁶. The aim of the study was to study various activities of the supply chain processes of the various Indian manufacturing industries in i.e. both SMEs and large scale manufacturing enterprises and to find how much eco- friendly the six main activities are i.e. green sourcing ,green manufacturing, green warehousing, green distribution, green packaging, green transportation . The environmental factors affecting the manufacturing sectors were identified from the literature review. A survey questioner was designed with four main factors affecting sustainable supply chain further having various indicators and sub indicators The data was collected from 200 respondents from 100 small, large and medium enterprises. Respondents

were top organization executives, supervisors and co-workers. Five points likert's scale was used to answer the questions. Results showed that 40% of Indian manufacturing sectors use electronics processes to create efficiency, in sourcing and procurement. Cost and complexity are perceived as the biggest barriers to implement GSCM. It was found that brand building is one of the top incentives for green SCM. Recycling of raw materials and component parts are at the top priority of green manufacturers and production focused initiatives. Adoption of green practices is highest in those areas of the supply chain where there is a direct relation to cost saving and efficiency. This thus shows that economic benefits are the main motivation thus Indian companies have implemented green practice in those areas which results in positive effect on companies economic performance as well as environmental performance through improved efficiency. For e.g.- Reduction of inventory, recycling of raw materials etc.

- A research study was conducted in relation to supply chain management in Indian manufacturing industries by Ashish Kumar Bhatija, Rajesh Babbar, Sarabjit Singh and Anish Sechdeva (2011)⁷ to study the various activities of supply chain of Indian manufacturing companies to find how much eco friendly they are. The major six activities of the supply chain; namely Green Sourcing & Procurement, Green Manufacturing, Green Warehousing, Green Distribution, Green Packaging, Green Transportation are being covered throughout the research. From these above process activities they measured the performance of the various Indian manufacturing industries with the help of various crucial performance indicators & their sub-indicators. The results showed that cost associated with GSCM implementation is the main barrier in implementation and more over there are no clear cut evidence to prove that there is a positive relationship between GSCM implementation and cost benefits.
- A research study entitled "Green Supply Chain Management: A Case Study from Indian Electrical and Electronics Industry(2012)⁸" was conducted by Sanjeev Kumar, Somnath Chattopadhyaya, Vinay Sharma. This study investigated the green supply chain management practices likely to be implemented by the manufacturing industry of electrical and electronics products in India. The approach of the research included a literature review, in depth interviews and questionnaire surveys. The relationship between green supply chain management practices and environmental performance was studied. The industries in the electrical and electronics products industry in India were sampled for empirical study. The data were then analyzed using "mean score". Total 14 dimensions relating to green practices implementation and performances were identified namely Eco-Procurement, Eco-Accounting, Eco-Logistics Design, Eco-Product Design, Eco-Manufacturing, Marketing & Communication, Economic Performance, Environmental Performance, Customer Co-operation, Human and Technological Resources, Internal Environmental Management Performance, Operational Performance, Stakeholders, Vendor Management. The results indicate that performance of eco procurement, eco accounting, eco logistics design, eco product design, eco manufacturing, economic performance, etc are practiced in response to the current wave of national & international green issues and also influence the environmental performances of the electrical and electronics industry.
- A research study entitled "An empirical study of the investigation of green Supply chain management practices in the Pharmaceutical industry and their relation with drivers, Practices and performances (2012)⁹" was conducted by Ajay Verma, and Dr. Anshul Gangele. The aim of the study is to investigate Green Supply Chain management (GSCM) strategy. According to the study, GSCM can help to achieve economic, social, national security, and environmental goals. This study also investigated the green supply chain management practices likely to be adopted by the pharmaceutical industry in India. Which is dominated by reduces, reuse, and recycle, in manufacturing by manufacturers, after the implementation of the Restriction of Hazardous Substances and Waste pharmaceuticals material. The relationship between green supply chain management practices and environmental performance and operational

performance, as well as financial performance, was studied. The approach of the research included a literature review, in depth interviews and questionnaire surveys. The companies in the pharmaceutical industry approved by the International Organization for Standardization 14001 certification in India before January 2012 were sampled for empirical study. Based on a literature review, twelve propositions are put forward. The survey questionnaire was designed with 54 items using literature and industry expert input. The research variables included in the study for green practices and performance measures were Internal Management, Green Supply, Cooperation with Customers, Investment recovery, Eco-design and reverse logistics, Environment Performance, Operational Performance and Economical Performance). Seven point lickert scale was used to answer the questions ranging from (e.g.1 = Very Strongly Disagree; 2 = Strongly Disagree; 3 = Disagree; 4 = Neutral; 5 = Agree; 6 = Strongly Agree; 7 = Very Strongly Agree. An exploratory factor analysis was conducted to derive results from the survey data which included 27 responses. The data analyzed using statistical package for the social sciences (Predictive Analytics Soft-Ware-PASW) and LISREL (SIS Inc.), and structural equation modeling was used as a path analysis model to verify the hypothetical construction of the study. The results indicate that the pharmaceutical industry have adopted green supply chain practices in response to the current wave of international green issues and have generated favorable environmental, operational and financial performances for the respective companies.

- A research study related to “GSCM drivers practices and performances with reference to the pharmaceutical industries of Ankleshwar” was conducted by Pandya Amit .R. and Mavani Pratik. M (2012)¹⁰.to know about the relationship between GSCM practices and organisational performance in 14001 certified companies before 2010.Structural equation modelling method was used. Main objectives of his study are to find major external factors affecting GSCM practices adopted by the pharmaceutical companies in Ankleshwar; The GSCM practices adopted by the pharmaceutical companies in Ankleshwar in response to the green issue and; The relationship between the GSCM practices adopted by the pharmaceutical companies in Ankleshwar and organizational performance. Environmental regulations, market pressure, suppliers and internal drivers are four exogenous latent variables used in this study. The endogenous latent variables are divided into interpretative and outcome variables. Internal management, Green supply, cooperation with customers, investment recovery, eco deign and reverse logistics are variables which are defined as interpretative endogenous latent variables. Outcome endogenous latent variables include economic performance, environmental performance and operational performance. It was found that companies adopted GSCM in response to wave of international green issues they also studied the relationship between six green practices, Internal environment management, Green supply (purchasing), cooperation with customers, investment recovery, eco deign and reverse logistics and found that GSCM has positive relationship for financial and operational performance. Green practices were used as independent variables and performance indicators as dependent variables.
- A research study entitled “Effects of green supply chain management practices on Organizational performance, a study on Indian manufacturing Industries(2013)¹¹” was conducted by Dhar Rohan , Biswas mukesh and Anbanandam Ramesh. The study was conducted by taking into consideration the large, medium, and small industries covering variety of manufacturing sectors. GSCM practices were adopted from Zhu and Sarkis (2004), Which included internal environment management, green purchasing, customer cooperation, eco design and investment recovery with two more practices namely green manufacturing and environmental accounting were added as they were found to be valid in the Indian context. The performance measures used to see the effect of green practices implementation on organizational performance were in terms of Business value, financial performance Environmental performance and marketing system performance. The data was collected from 167 respondents in two rounds through convenience and random sampling methods to avoid

bias using seven point likert's scale. Structural equation modeling with path analysis was used to analyze the data. Results show that organizational performance had a significant relationship with Green practices implementation and had a positive impact on overall performance. Results also showed that there is a positive impact on economic and environmental benefits.

- A research study was conducted by Subrata Mitra and Partha Priya Datta “a survey of sustainable Supply chain Management Practices in Indian manufacturing Firms (2013)¹²” The study tried to find the relationship between voluntary adoption of GSCM practices and competitiveness and economic Performance. It also tried to find out the relationship between Sustainable purchasing, manufacturing, logistics practices and competitive and Economic performance. It was found that the state of adoption of SSCM practices by Indian firms was still in its infancy, the awareness of sustainability was quite low among consumers, and the regulatory framework was also lacking in terms of promoting sustainability. Results of data analysis showed that supplier collaboration for sustainability had a positive impact on sustainable product design and logistics, which in turn was positively related to competitiveness and economic performance of the firm. It was also observed that Indian subsidiaries of multi-national corporations (MNC) were more likely to adopt SSCM practices than non-MNC domestic firms.
- A research study entitled,” Environmental Sustainability through Green Supply chain management practices among Indian Manufacturing Firms with special reference to Tamilnadu” was conducted by B.L.Lakshmi Meera *, Dr.P.Chitramani(2014)¹³ . An empirical study was conducted through survey manufacturing method in 155 Industries in Tamilnadu, India. The study investigated the pressures for implementing GSCM practices and the relationship between GSCM practices and Environmental Performance. in manufacturing companies. Six external pressures on today's business organization relevant to India were considered for the study. GSCM practices include the Inbound/procurement practices, Design and production practices, Outbound practices and the Reverse logistics of the company was studied using a five point Likert scale. Rigorous statistical methods were used to validate and access the constructs. The method used was Path analysis using Smart PLS software. The results showed a significant positive relationship between the constructs. It implies that the Green SCM pressures that influence Green supply chain practices can improve environmental performance and hence enable organizations to be responsible citizens. The research empirically attempts to bring out the need for Green practices and environmental sustainability of organizations. Though logically there is great relationship between the constructs the weakness shown is due to the change in the level of implementation across the supply chain. Many industries have their environmental management active within the organization and have improved their environmental performance. Practices like inbound, outbound and reverse logistics have scored relatively low which indicates that the level of implementation across the supply chain is low. Coordination with their partner companies with regard to environmental objectives is hence weak.
- A research study entitled ‘Green supply chain practices and its impact on organisational performance: an insight from Indian rubber industry’ Rameshwar Dubey*Surajit Bag, Sadia Samar Ali(2014)¹⁴. The paper investigated the impact of green supply chain practices on organizational performance in Indian rubber industry. The study has adopted two prolong strategies that includes critical literature review published in reputed journals to identify research gaps and identify variables and survey methodology using structured questionnaire. In order to validate, variables they performed exploratory analysis and identified parsimonious factors which are orthogonal. The orthogonal factors are named as technology and best practices, supplier relationship management, waste reduction through collaborations and regulatory norms and two measures for organizational performance, i.e., business performance

and environmental performance. The multiple regression analysis suggests that 'supplier relationship management' and 'waste reduction through collaboration' are found to have positive effect on 'business performance'. The multiple regression analysis using parsimonious factors were regressed on environmental performance. The output suggests that 'technology and best practices' and 'waste reduction through collaboration' are found to have positive effect on 'environmental performance'. The analysis suggests that 'regulatory support' is not found to be statistically significant. The unique contribution of present study is GSCM-business performance and GSCM-environmental performance framework for Indian rubber industry.

RESEARCH DIRECTION

Green supply chain management continues to be an important research agenda among the researchers. However, there are still limited number of studies investigating GSCM adoption and implementation in developing countries like India . Therefore, our research direction will be to focus on ISO 14001 certified manufacturing firms in Indian context in order to extend the study about GSCM in more depth. ISO 14001 certified firms will be focused because they are expected to be involved in the adoption of GSCM practices to some extent. This is supported by the studies of Darnall et al.(2006)¹⁵and Zhu et al(2008)¹⁶.

CONCLUSION

The purpose of this paper is to discuss an overview of the development of GSCM literature in developing countries like India. Although some studies in the literature discussed the level of GSCM implementation and performance over the world, but there has been still little research about the GSCM implementation and adoption in developing countries especially India. Further research is still required for more understanding towards the adoption and implementation of GSCM practice implementation and its adoption benefits. Although results from review of literature reveal the positive relationship between GSCM practice implementation and Performance of the organization in terms of economic, environmental , and in terms of building company image and competitive advantage but require further empirical testing to empathize results and motivate organizations to adopt them voluntarily. More organizational awareness level on environmental problems that is caused by their business operations is also required and the remedies available to overcome them require further thought.

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