

Implementation of Green Supply Chain Management Practices in Automobile Industry in India

Kamal Mongia, Earnest Vinay Prakash

Abstract— Green supply chain management has evolved as a proactive approach for improving environmental performance of processes and products in accordance with the requirements of environmental regulations. Various approaches for implementing green supply chain management practices has been proposed and recognized in previous literatures, yet no investigation has identified the reliability and validity of such approaches particularly in automobile industry. This study examines the consistency approaches by factor analysis that determines the implementation of green supply chain management in Indian Automobile Industry. The findings indicate that these enterprises would emphasize on supplier management performance in the crucial role of implementing green supply chain management. Establishing an environmental database of products, asking for product testing report and top management support are among the most important approaches. The results for the implications of green supply chain management implementation in automobile industry investigated in this work generate a generic hierarchy model for decision-makers who can prioritize these approaches for implementing green supply chain management in India.

Index Terms— Supply Chain Management, Green Supply Chain Management, Lean Supply Chain Management, Waste Management, Go Green, Reuse, Recycle.

1 INTRODUCTION

Environmental pollution is the main problem today which human beings face almost every day. The major emissions of toxic and harmful gases are from the manufacturing industries and the heavy locomotives. The Automobile Industries should include concepts of Green in to their Supply Chain, to overcome this problem and to reduce environmental pollution. Environmental concern has become an important factor in manufacturing industries, so they are in need of practicing supply chain concern towards environment or also known as Green Supply Chain Management. According to Srivastva (2007) Green supply chain management is defined as—integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product its useful life. The industry subjected to study is the Automobile Industry in India.

2 AUTOMOBILE INDUSTRY IN INDIA

The Automobile Industry in India plays a vital role in the Indian economy. The growth of Automobile Industry in India is huge in recent years. The Automobile Industry in India creates a largest employment opportunities for the Indian populace. Automobile industry plays an important role to India's economic growth in top ranking. In 2009, India emerged as Asia's fourth largest exporter of passenger's car, behind Japan, South Korea, and Thailand, overtaking Thailand to become third in 2010. In recent years Automobile manufacturers face some barriers such as instability in manufacturing costs, skill labour need, technology change, exchange rate, and impacts of high competitiveness, environmental legislation and directives as well.

3.1 Green Procurement

Green procurement is defined as an environmental Purchasing consisting of involvement in activities that include the reduction, reuse and recycling of materials in the process of purchasing. Besides green procurement is a solution for environmentally concerned and economically conservative business, and a concept of acquiring a selection of products and services that minimizes environmental impact. The findings in green procurement activities of Indian manufacturers are presented:

- *Supplier selection:*

(1) Purchase materials or parts only from "Green Partners" who satisfy green partner environmental quality standards and pass an audit process in following regulations for the environment-related substances.

(2) Select suppliers who control hazardous substances in company's standard lists and obtain green certificate achievements

- *Procurement process:*

(1) Reuse or recycle - paper, parts container (plastic box/bag)

(2) order via email (paperless).

3.2 Green Manufacturing

Green manufacturing is defined as production processes which use inputs with relatively low environmental impacts, which are highly efficient, and which generate little

or no waste or pollution. Green manufacturing can lead to lower raw material costs, production efficiency gains, reduced environmental and occupational safety expenses, and improved corporate image. The findings in green manufacturing activities of Indian manufacturers are presented:

- *Hazardous substance control:*
 - (1) Lead free – replace other substances such as bismuth, silver, tin, gold, copper
 - (2) Rinse parts with clean water instead of using chemicals and reuse water
 - (3) Quality control in inputs at vendor site and recheck before processing
- *Energy-efficient technology:*
 - (1) Reduce power consumption in products such as ramp load/unload technology in HDD
 - (2) Increase product life-span resulting in higher efficiency and productivity
 - (3) Improve machine uptime
 - (4) Improve machine performance
 - (5) Design product, for example compact design with improved features yet using fewer resources to produce, Strive for higher %recyclability and % recoverability for products as stipulated by WEEE directive, product exterior using a bio-based plastics achieve high level of fire retardancy.
- *Waste minimization:*
 - (1) Promotes reuse/recycle of parts
 - (2) Enhance environmental consciousness via minimisation activities

Reduce indirect materials.

3.3 Green Distribution

Green distribution are consists of green packaging and green logistics. Packaging characteristics such as size, shape, and materials have an impact on distribution because of their affect on the transport characteristics of the product. Better packaging, along with rearranged loading patterns, can reduce materials usage, increase space utilization in the warehouse and in the trailer, and reduce the amount of handling required. The findings in green distribution and activities of Indian manufacturers are presented:

- Green packaging:
 - (1) Downsize packaging
 - (2) Use “green” packaging materials
 - (3) Cooperate with vendor to standardize packaging
 - (4) Minimize material uses and time to fasten delivery.

3.4 Reverse Logistics

Reverse logistics is the process of retrieving the product from the end consumer for the purposes of capturing value or proper disposal. Activities include collection, combined inspection/selection/sorting, re-processing/direct recovery, redistribution, and disposal. The findings in reverse logistics are presented:

- (1)Used Automobiles stores
- (2)Disassembly/ recycle plants

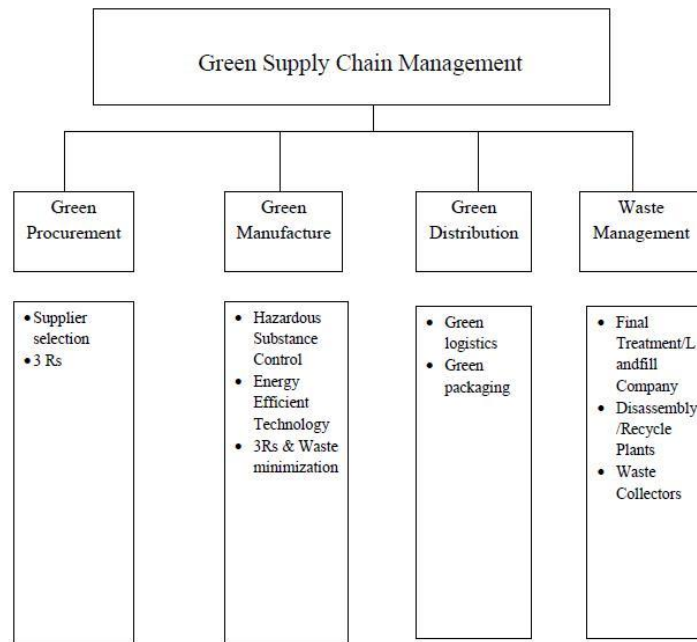


Figure 1. Activities in Green Supply Chain

4. SUGGESTION

To obtain efficient and effective in GSCM, collaborative among important stakeholders in Automobile industry must be strongly concerned. After making discussion about research results with experts and manufacturers, some important suggestions are noted here:

- Promote Eco design: Eco design as an activity that integrates environmental aspects into product design and development, the integrated activities lead to continual improvement of the environmental performance of the entire product through technological innovation. Developing environmentally friendly products is cause to change in product design using 2 principles:

(1) Designed to extend lifetime of product, it can be improved, repair, and re-use of products such as modular design.

(2) Designed for recycling / design for disassembly, after end of life products that can be more recovered

- Set rules for disposing automobile waste and consider more investment in recycle plants
- Propagate GSCM knowledge and encourage using environmentally friendly goods and services
- Set a direct responsible unit to take in charge of automobile waste only which will increase reverse logistics efficiently
- Promote refurbishing and recycling through campaigns/ activities to raise reuse/recycle awareness in electronics consumption
- Set a database unit to collect and record information about production, import/export data, and waste management (do traceability)
- Encourage team building and train skilled labours for reverse logistics management
- Raise the applications in Extended Producer Responsibility (EPR); EPR is an environmental protection strategy based on the "polluter pays" principle, by making the manufacturer of the product responsible for the entire life-cycle of the product and packaging they produce
- Promote Product Service System (PSS); services and product-service combinations are recognized as a potentially powerful concept for sustainable development. A product-service system (PSS) is a new trend that has the potential to minimize environmental impacts of both production and consumption. Thus, more traditional material intensive ways of product utilization are replaced by the possibility to fulfil consumers' needs through the provision of more dematerialised services.

5. Acknowledgment

I would like to thank my advisor Er. Earnest Vinay Prakash for his support and encouragement. I would also like to thank my team members Er. Rahul Charles Francis and Er. Rahul Davis for providing valuable advices. The product of this re-

search paper would not be possible without all of them. I would like to thank all the AMW Motors Ltd. Employees participated in the interview and survey. Especially I am very grateful to my friend Mr. Chandan Chaturvedi Assistant Manager of New Product Development at AMW Motors Ltd., Bhuj Plant Facility now working at Steel Authority of India Ltd., Bhilai Plant Facility as Junior Manager for his immense support on making this thesis successful. I extend my warm gratitude to all the dedicated staff members of School of Innovation, Design & engineering and my beloved friends, who directly or indirectly helped me in the project.

6. References

- [1] Q. Zhu, J. Sarkis, and K. Lai, "Green supply chain management: pressures, practices and performance within the Chinese automobile industry," *Journal of Cleaner Production*, vol.15, 2007, pp.1041-1052.
- [2] A. A. Hervani, M. M. Helms, and J. Sarkis, "Performance measurement for green supply chain management," *Benchmarking: An International Journal*, vol. 12, no. 4, 2005, pp. 330-353.
- [3] R.I. Van Hock, "From reversed logistics to green supply chains," *Logistics Solutions*, vol.2, 2000, pp.28-33.
- [4] J. Sarkis, "A strategic decision framework for green supply chain management," *Journal of Cleaner Production*, vol.11, 2003, pp.397-409.
- [5] B.M. Beamon, "Designing the green supply chain," *Logistics Information Management*, vol.14, no.4, 1999, pp.332-342.
- [6] "India's November Car Sales Slump, Outlook Grim Too". Cnbc.com.
- [7] "Automobile Industry in India, Indian Automobile Industry, Sector, Trends, Statistics", ibef.org. [9]Nair, Vipin V, "Suzuki, Hyundai's Indian Car Exports Beat China's", Bloomberg.com.
- [10] M.A. Salam, "Green procurement adoption in manufacturing supply chain," *Proceedings of the 9th Asia Pacific Industrial Engineering & Management Systems Conference (APIEMS2008)*, 3-5 December 2008, Indonesia, pp.1253-1260.
- [11] K. Kamigaki, "Generation of green brand," *Asian Electrical and Electronic Green Society International Conference*, 7-9 October 2009, Thailand.
- [12] J.C. Ho, M.K. Shalishali, T. Tseng, and D.S. Ang, "Opportunities in green supply chain management," *The Coastal Business Journal*, vol.8, no.1, 2009, pp.18-31.