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Emerging Needs and Importance of Green Supply Chain Management - A Case Study

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Abstract: ***Green Supply Chain management (GSCM) focus onenvironment friendly supply chaini.e. green concept from design part to material procurement, green operation and green logistics. This need has emerged due toincreasing environment disturbances with the increase in growth of production and consumption rate in organizations. Apart from warehousing and logistics operations whether in-house or outsourced one, green initiatives on supplier's end, has already been started from more than a decade.The present study is carried out from related research papers and journals with basic objective to gain theoretical understanding on the significance of green supply chain management, its need and impact on environment in general.A case study of a leading automobile company based in Delhi-NCR has been done to understand the green practices adopted by this firm through an empirical evidence.***

Keywords: Green Supply Chain Management (GSCM), Logistics, Environment, Pollution, Sustainability, Automobile, Green Procurement, Warehousing

1. Introduction

There is a big threat to Environment with the increase of production and consumption of products which causes the diminishing of raw material sources, increasing the pollution level which is impacting air and water pollution. Waste generation is also uncontrollable which a Burden on environment. Similarly the global warming has also disturbed the ecological balance, thinning the ozone layer, glaciers are melting.

In order to manage environment two major aspects are important, designing and implementations of process with strict rules. As a design part the product designing is done in such a way that it doesn't harm the environment much and as per implantation parts lean & flexible production system, green procurement system, reverse Logistics, life cycle management and disposal plans are important. To regulate implementation part it is important to adopt environment policy (ISO14001). This also emphasis on IT enable system to focus more on online system for effective Supply chain and reduction of paper which saves trees consumption.

Government of India has already come up with a plan to improve design of vehicles to reduce pollution. In automobiles BS-III standard is upgraded by BS-IV Norms from 1st April-17 onwards and the next upgradation of BS-VI replacing BS-IV is planned by 2020 (BSES, Bharat Stage Emission Standard, Government of India). Similarly the presence of hi-bred vehicles is availableon big cars, studies are on for low cost solution so that it is implemented in all cars which will further will reduce pollution level.Similarly there is a waste generation due to packaging like polythene and other plastic materials which create imbalancing. Restrictions are being imposed by government for use of such materials which cannot be reused or reprocessed.
To support environment for next generations it is responsibility for all of us. To speed upit became responsibility of OEM's and big industries to ensure Environment balancing at their end as well as their supplier's endthrough green supply chain management program (GSCM). Since Automobile is one of the fastest growing sector in India (India brand equity foundation, IBEF) and vehicular emissions are also the one of the major concerns resulting pollution in environment, therefore automobile industry has been taken up for the present study.

2. Problem Statement

While recognizing the pollution as the big threat to environment with the increase of production and consumption of products, it is imperative to find answers of various questions for environment imbalancing, current practices& technology used to deal with environment in automobile sector, practice of green suppliermanagement in automobile sector and the interrelation of various factors of supply chain which impacts environment.

3. Objective of the Study

Following's are the objectives

- To study the green supply chain management and its impact on environment.
- To study current practices to deal with environment in automobile sector.
- To study current practice to ensure green practices at suppliers end in automobile sector.

4. Research Methodology

The present study is descriptive in nature supported by empirical evidence using case study approach. For the purpose of present study, various research articleson green supply chain management have been taken from research journalsand case study of an automobile organization. A leading automobile company based in Delhi-NCR was selected for conducting case study in which current practices on green supply chain front have been explored, by interviewing middle management who are directly involved

in day to day working. The interviews held with operations and safety team who are taking care of in-plant activities related to GSCM & supply chain team who are responsible for green initiatives at supplier end for their in-plant improvements as well as logistics which plays key role for environment equilibrium.

5. Literature Review

In this section, reviews of literatures from research papers published in the leading journals on Green Supply Chain management have been undertaken. The reviews have been arranged in the chronological order.

Sarkis, J. (2003) focused his study on the evaluation of alternatives in terms of technology, projects etc. to implement GSCM. He identified multiple elements and factors which contributes to GSCM and helps in making a strategic decision framework for the same.The technique used for this framework is ANP (Analytical Network Process) which provides an opportunity to the managers and experts to dynamically incorporate all interdependent factors.

Cagliano, R., Caniato, F., &Spina, G. (2005) observed that the e-sourcing and e-procurement tools have proved to benefit the purchasing efficiency but simultaneously did not seem to integrate the inter-firm business processes significantly. The statistics and the prognosis they have reflected from their studies highlights the role of exchanges over the applications ofcontemporary stage of B2B internet.

Hervani, A., Helms, M., &Sarkis, J. (2005) identifies the environment problem, factors affecting environment, green initiatives in supply chain management and its performance measures and suggested the integration of supply chain activities with its performances and environment. The study developed the system to evaluate supply chain and its green imitative which could be applied within or between organizations.

Srivastava, S. K. (2007) reflected the importance of GSCM by emphasizing its advantages such as reduction in the environmental hazards caused by the industries without compromising the quality, efficiency, cost and reliability; and how this paradigm shift has led to an ecological as well as environmental benefits. Say for an instance, products can be designed as technical systems with a well-planned modular strategy by workers or robots and reverse logistics.

Green Jr, K. W., Whitten, D., & Inman, R. A. (2008) have made study to assess a logistics performance model. The data is collected from 142 plants managers at national level organizations by using structural equation modeling methodology. The logistics and supply chain performance impacts to the overall company performance which includes sales and marketing, financial, quality,flexibility, and delivery.

Craig, R. , Carter, D., & S. Rogers, (2008) provided a comprehensive review of the sustainability literature, introduced sustainability to the field of supply chain management, and expanded the conceptualization of sustainability beyond the triple bottom line to consider key supporting facets which are posited to be requisites to implementing SSCM practices.

Seuring, S., & Müller, M. (2008) provides conceptual frame work in sustainability based of reviews on earlier research works on supply chain management. Two main areas where they suggested are supplier management for risk performance and supply chain management for sustainable product. This concept will be useful for academics and industries.

Vachon, S., & Mao, Z. (2008) studied the link between supply chain management and sustainable development. In SCM strength depends upon quality & quantity of suppliers and customers. Similarly sustainable developments depends on environmental performance, corporate practices towards environment and social sustainably.

Nikbakhsh, E. (2009) conceptualized GSCM by discussing its origins, benefits, boundaries etc. and examined the green scheme including green operations and procurement as well as GSCM frameworks and role of government and organizations in encouraging the green practices. He also emphasized the gap in holistic approach between environmental and the supply chain managers. He highlighted the benefits of GSCM and its role in sustainability and in the country's GDP.

Ho, J. C., Shalishali, M. K., Tseng, T., &Ang, D. S. (2009) identified the difference of traditional and green SCM. The traditional supply chain comprises five parts: raw material, industry, distribution, consumer, and waste whereas green supply chains extend the scope to all value chain which includes ecologically negative effects on environment as well as on human body. In this paper, they discussed mainly manufacturing, bio-waste, construction, and packaging.

Sarkis, J., Qinghua Z., &Kee-hung, L. (2011) introduced nine theories that have been utilized to investigate various issues related to GSCM. The nine theories, in an alphabetical order, included: Complexity; Ecological Modernization; Information; Institutional; Resource Based View; Resource Dependence; Social Network; Stakeholder; and Transaction Cost Economics theories.

Diabat, A., &Govindan, K. (2011) studies emphasizes on green supply chain for environment balancing solution with help of studying the factors effecting green supply chain management using interpretive structure modeling.

Luthra, S., Kumar, V., Kumar, S., &Haleem, A. (2011) There is a growing need of GSCM in automobile industries with the increase in demand and awareness, but to implement such practices lot of barriers comes which make hurdles for smooth transactions. They developed a structural model with the help of MICMAC analysis and interpretive structural modeling(ISM). They identified eleven type of barriers out of which three are drivers, five are dependents and three linked variables. They have also suggested the remedies of these barriers.

Jain, V., Sharma, S. (2011) studied the 10 automobile companies in Madhya Pradesh State to understand the effectiveness of environment practices, the management involvement, short coming if any and suggestion to proceed further. They observed 26 type of GSCM practices, presently, in practice which are huge but these are on is just at primary stage only. The study suggested to go for structured approach to implement the ISO 14001 certification, an environment standard with proper training for skill development.

Luhtara, S., Dixit, G., &Abid, H. (2012) studied the environment issues, identified 11 type of practices being followed for GSCM. The study used majorly survey based approach by using ISM (Interpretive Structural Modeling) &MICMAC analysis. They focused on use of lean and flexible production system, waste management and use of recyclable packing material. They advocated to follow TQEM and ISO 14001 practices for optimization and Green procurement strategies

Wu, J., Dunn, S., & Forman, H. (2012) studied on various sustainability reports shared by large global organizations about the GSCM. The study indicated that although company's major goals while implementing GSCM is to create a cost effective and environment friendly approach, they are also trying to inculcate sustainable measures in their organizations.

Bose, I., & Pal, R. (2012) have commented on the impact of the initiatives of GSCM on stock prices of the firm. They formed an event study for the causes of statistical increment in the stock prices which may include the manufacturing expenditure, high R & D costing and so on. Their research proved to be profitable for the operations managers. But further investigation is required to forecast the long-term behavior.

Dekker, R., Bloemhof, J., &Mallidis, I. (2012)has taken the current problem of global warming and reasons which they identified mainly due to industrials growth resulted consumption of natural resources and increase in pollution.Authors has mapped current and futuristic feasible approach on design, planning and control, logistics &operations. The operation research emphasis for technology change to take care of the threat e.g. from petroleum to electric run vehicles.

Amemba, C. S., Nyaboke, P. G., Osoro, A., &Mburu, N. (2013)emphasized that organizations need to make essential amendments in operating their supply chain in order to reduce the pollution &greenhouse emissions and highlighted the need of conservation of the resources. Their study inferred that sustainable development can be brought with the use of green practices in supply chain management.

Jaggernath, R., & Khan, Z. (2015)came up with the criticism on non-adherence to the government's policy related to the implementation of green supply chain management for improving the environment despite the availability of guidelines.

6. Case Study

This section contains the case study of an automobile company existing in Delhi-NCR region. The survey was done based on interview from middle management people engaged in SCM, operations and logistics and safety.The interview was based on what best practices they are using for equilibrium of environment inside the plant and at supplier's end. The attempt was also made to explore their various challenges being faced&their motivation in implementing the same and also the impact of implementing GSCM by them. Following are the key points which were discussed.

7. Key Observations

1) **Green Designing**- The designs are made in soft and doesn't have any hard drawing concept. The drawings are having limited excess but need based internal team and suppliers are linked with this excess. The product designs are also complementing to environment and generates low carbon footprint.
2) **Green Manufacturing -** Painting process contaminate water pollution & generate lot of pollution in system while dispose-off. The water based paining process is installed which is not harmful as well as its self-life is also more than traditional method. Similarly robots are used for perfection and in area where it can impact to human body.
3) **Green Supply Chain & Procurement System**- While emphasizing upon green supply chain, all communications to suppliers including release of purchase orders, schedule agreement, and material procurement follow up, Gate Entry and Goods receipt note of material receipt is done through soft copies and no hard copies are generated. The suppliers are linked to the portal where they can excess their performance and payment system.
4) **Green Logistics**- Logistics mainly are distributed into 3 major heads -Transportation, Warehousing & Packaging. For implementing green transportation, proper maintenance of trucks are undertaken within time bound schedule. Usage of milk run by 3PL service providers is done. It brings the material from various suppliers in one go as per production requirement. This concept has reduced the requirement of trucks drastically. i.e. the reduction in pollution level. Similarly in warehouse internal transportation is done by battery operated equipment which reduces the pollution. Similarly from Supplier material is receipt is done in reusable packaging i.e. bins and trolleys. Supplier take back their empties by reverse logistics route. Similarly the organization themselves don't use the consumable packing for their domestic supplies.
5) **Water Conservation** – For water conservation, push type taps are installed which gets off after certain discharge of water. Waste water is circulated for farming and toilets use. Water harvesting system is implemented for collection of water in rainy season,the cooling tower is upgraded for effective use. The water balancing is maintained i.e. whatever water is consumed equivalent or more than that is given back to nature.

6) **Energy Conservation** – For energyconservation, LED lights are replaced with CFL for reducing electricity consumption. These lights are gets off automatically incase of nobody is there to use that area. Traditional ACs a replaced by Invertor A/Cs in offices. Even A/Cs temperature is set to certain temperature so that it doesn't consumes more Electricity. There is a culture to switch off all A/C. Fan, Lights when not in use. Cooling system in shop floor is designed to bring more cooling with less consumption of electricity. The machine motors are replaced with low power consumption motors to save energy. Solar system is installed for cost saving.
7) **Plantation** – Lot of trees are planted on road sides to ensure the adequate supply of oxygen in surroundings and absorptions of more carbon dioxide. Even in shop floor Green walls has been made so that operators breathe better air while working on machines. The roof top is also having Greeneryso that the heat flow in building is reduced which enables building roof to remain cool and hence consuming less electricity for overall cooling in shop floor.
8) **Prevention of Pollution**- The system of prevention of pollution is in place i.e. Effluent treatment plant (ETP) & Sewage treatment plant (STP)for recirculation of clean air and water are functioning properly, which are being audited on regular intervals. This ensures the discharge of clean water without contamination. Further, the use of polythene is reduced to bare minimum which is in the line of the agenda of year 2018 on world Environment Day. The alternatives chemicals against hazardous chemicals are used which is harmful in nature.
9) **Green Initiatives at supplier's end**– The program is run with all key suppliers who supplies the material to them. The team is formed who visits to suppliers, giving training to their team .They jointly identify the improvement areas which saves water consumption, power consumption, reduce waste and pollution. Implementation of reusable packing's&reverse logistics is insisted.
10) **Green Marketing** – Similar to green procurement, there is a system to connect all dealers, their requirements are clubbed together in soft and dispatches are made based on priority decided. There is no paper generated in such process. They ensured green practices at dealers end by guiding them of green concept, ensuring effluent treatment plant, use of soundproof generators.
11) **Corporate Social Responsibility (CSR) –** Under this program, lot of plantation of trees,has been taken in societies to make future green. The solar panels are installed for people to get natural lights. The LED lights are also installed to save energy.
12) **Challenges being faced** – The major challenge is there to implement green initiatives at supplier's end. They have limit of resources as well as there is lack of enthusiasm and seriousness towards spending money. The dedicated team of OEM is putting efforts at their end by giving them the training, guiding them the benefits and well as ensuring they should meet legal compliance as well.
13) **Motivation level**- The team is fully motivated by working in a healthy atmosphere, no pollution & noise at work. Nearby society people are also very happy for their improved life. This is giving motivation to team by getting wishes and respect from them. Similarly there is improvement in working style at suppliers and at dealers end. Ultimately team feels pride and motivated by achieving implantation targets and they receive awards also for this.

8. Conclusion

The present study has made an attempt tounderstand the gravity of environment imbalancing and factors which are impacting environment imbalancing. The literature review is done to identify the areas of green supply chain in which major studies have been conducted.The study also encompass the best practices for GSCM being followed by automobile companiesfor ecological balance of environment and to neutralize the impact of pollution on environment. Because of the resource constraints by majority of small and medium industries, major expectations on GSCM initiatives are much more from the big OEM's to support them in implementation of green concept in supply chain.Since, logistics is one of the major areas of operations apart from the manufacturing activities in automobile industry, further studies are needed to understand thehow logistics elements can be leveraged in improving supply chain as well as overall performance of the organization. The present study can be made more extensive by taken large sample from automobile companies to understand the various factors responsible for green initiatives and challenges being faced by those organizations to implement green practices in order to meet sustainable development goal.

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