GSCM in Forward Supply Chain Management- A Review

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Abstract: ***The Green Supply Chain Management (GSCM) is the new era of conventional supply chain management. It has seems to introduce a new ideas in creating innovative environment regarding green supply chain management. The main aim of this review paper is to enhance the GSM with the aid of supply chain management. The intension of this review is to give brief knowledge about GSCM and its application fields.***

Keywords: Forward Supply Chain Management (FSCM), Environmental Management and Green Supply Chain Management (GSCM).

1. Introduction

The GSCM is to introduce the new innovative ideas in the field of SCM for the availability of green environment to the chain management which includes product design, material resource, selection of manufacturing process and materials. It helps to improve the management of customer services and its satisfaction. As per the consumption point of view it also integrates the finished goods and productivity. The quantity of energy as well as material consumptions is rising due the present economic growth, which plays a vital role in an environmental issues and resource depletion problems. The GSCM has become energy significant for the firms, like competitive, regulator and community pressure firms. There is a questioned that which should be best for balanced economic and environmental aspects. So some changes related to environmental issues which affects the supply and customers are being adopted by different firms and also the manufactures and their suppliers of raw materials needs to work together in order to produce ecological friendly products.

2. Literature Review

The review works deals the price and sophistication are perceived as greater barrier to implement GSCM which highlight the need of cost effective and easy to implement solutions[1]. Brand building is one of the top incentives for green supply chain management, highlighting the importance of public perception of how companies operate the GSCM. The present FSCM system in industries is deteriorating the environment and soon a day will come when damage done to earth which become irrecoverable [2]. As per the research on GSCM is inevitable, if the earth is to be kept green and appropriate methodology maybe adopted by the industries to minimize the detrimental effect on environment. Anoop and Regi Kumar has reviewed on a numbers of issues on green supply chain and their management which focused on four major functions that could be considered as driers within the green supply chain management[3]. These functions are purchasing, in bound logistics, production and distribution of out bounded logistics. One of the researches gives the summary of GSCM literature in a developed countries and developing countries. Although some studies in the literature discussed the GSCM implantations includes drivers, practices and performance over the world, but there has still little research includes drivers practices and performance over the world [4, 5, 6]. The GSCM incorporates a shift in which the concept of sustainability is source of competitive advantage for companies [7, 8]. Today the manufacturing companies are under pressure of competitive environmental issues to adopt these implementations to improve an environmental stance, reduce costs, risks and increased revenues.

2.1 Conventional/Forward Supply Chain Management

In the process of environmental supply chain management the production is processed to transform the raw materials to the finished product as per the customer's needs. A suitable resource and the process starts with the raw materials source and create to deliver the finished product to the end users. So the basic need of the environmental supply chain management is defined as above lines. The extended overview of ESCM and improvisation over the extra activities in the environmental related issues are explained.

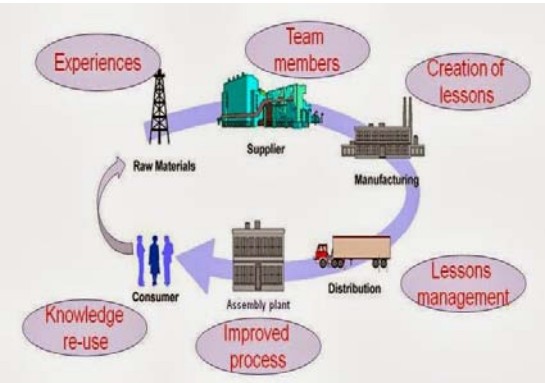

Figure 1: Closed loop supply chain management system

Figure 1 illustrates flow of raw materials to finished goods with closed loop supply chain management system [10].

In 1999 the definition of supply chain were explained as the combination and co-ordination of flow of goods from the original phase to their final destination. From the review its come to know that, the environmental chain management is the array of distributors, transporters manufacturers, suppliers and retailers. Information and goods logistics management service providers that are engaged in providing goods. The points to be undertaken in environmental supply administration are lesser in the total amount of sources as per need to provide the preliminary level of customer service to explicit segment [10, 11, 12].

3. GSCM

The environmental chain management emphasizes the supply chain management though green supply chain management, including product manufacturing process, delivery of final product to the consumer, material resourcing and selection as well as end of life guidance of the product after its fruitful life time. In terms of achieving the GSCM, product manufacturing companies must follow the basic rules established by ISO 14000 and particularly by state-of-the-art ISO 14001. By following ISO standards, it is entreaty that organization developing process that emphasize on continuous improvement and as well as the operations analysis [13, 14, 15]. For the effectiveness of the system and to come up with guidelines for productive GSCM implementation, the following four items to be noted:

I. Design of green material.
II. Management of Green materials.
III. Green Manufacturing Process.
IV. Green Distribution and Demand.

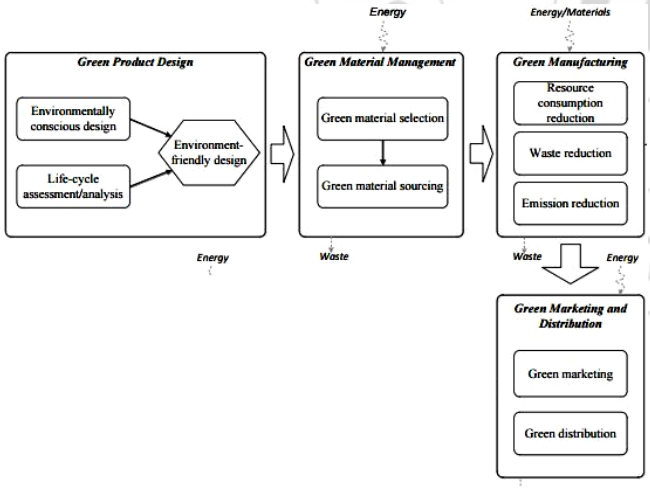

Figure 2: Block diagram of GSCM process

3.1 Design of Green materials

The main aim of the designing of the green product is to take off the catastrophic effect completely from the environment in a systematic way as well as in sensitive design. The implementation program of GSCM in designing does not need the renewable sources to impact on the environment at very minimum range, and get connect people with natural environment. Green design includes essential material selection, product procurement, package design and energy use.

3.2 Management of Green materials

This management is defined as environmental purchasing consist of involvement in activities that includes the reduction, reuse and recycling of materials. The following sequences for the selection of materials, recovery of material should receive more support:

I. Using different materials for easy separation.
II. To maintain harmonic situation with the existing manufacturing conditions, fewer numbers of different materials in a single product should be used.
III. More adaptable materials for multiple product applications should be used.

3.3 Green manufacturing process

The Green material management's generally manufacturing process needs an excess amount of energy which is fulfilled from burning various natural combustible sources such as coke, natural gas and coal, combustion causes air pollution. Manufacturing system consist of lots of intrinsic as well extrinsic factors [16, 17]. Our main aim of green manufacturing is to save more energy by supplying environmental source of energy. The key factors of green manufacturing are,

1. Quantitative energy
2. Proper utilization of resources.
3. Grade of green energy
4. Amount of hazardous waste
5. Control over hazardous waste

3.4 Green distribution and demand

The merchandise of Green marketing is the event of promotion of products that are taken for grant to be environmentally trustworthy [18]. Thus green manufacturing integrate a wide range of conditions, including product modification as well as modifying advertising. Green marketing highlights changes to the production process, packaging changes, and green characteristics during sale and promotion of products and services.

4. Innovations and results of GSCM

Innovation	Results
Purchasing Now a day's companies are like Intel, Nortel and other electronic companies moved away from purchasing material toward receiving chemical services via chemical management programs. These services can include procurement, inventory management, data tracking, and waste management.	Chemical management providers are no longer compensated based on the volume of chemicals they sell to their customers, but on value-added services Instead. With appropriate incentives, providers are rewarded for reducing chemical usage (and costs), increasing productivity, or decreasing waste.
Material handling Now a day's most of the	By using reusable packing and container system solid

organisations are used to reusable packing system and also initiate the Eco-efficient packing business. GM introduces the reusable containers program.	wastes are reduces rapidly. And this also helps to decrease damage during Shipping, and eliminate ergonomic and safety problems. GM successfully switched to reusable packaging systems and reduced its disposal costs by $12 million between 1987 and 1992.
Storage Some of the companies have changed their inventory storage procedures for maintenance, repair, and operating (MRO) materials by consolidating storage areas and requiring suppliers to adhere to stringent material return Policies.	The changes significantly decreased the disposal of obsolete paint and other materials, reduced storage space requirements, And lowered carrying costs. Public Service Electric and Gas Company streamlined its purchasing And storage processes and saved more than $2 million in 1997.
Material recovery By applying green supply management several companies deducting wastes, focusing on their high volume material flows and striving to eliminate wastes. Several companies are justified the material recovery projects by applying environmental accounting methods.	This innovation is expected to yield a 50% return on investment and has already enabled Andersen to decrease solid lumber purchases by 750,000 board-feet. Andersen Corporation (manufacturer of Andersen Windows and Patio Doors) developed a composite material from wood wastes generated during its manufacturing processes.
Disposition Many companies take responsibility to deposit their own company product which is so definite in process and attributed to save money. Companies use this cost information to identify more financially attractive alternatives to disposal.	Once these costs were made explicit, the company began developing a cost-effective method for grinding tree limbs. A life cycle accounting approach highlighted the indirect costs created by a variety of activities, including disposal.

5. Cost category

Types of Cost category	Definition
Contingent	Potential liability or benefit that depends on the occurrence of a future event, e.g. potential occupational health and clean- up costs related to a spill of a hazardous substance.
Potentially Hidden	Expenditure liable and advantage to the company that are difficult to be traced to the responsible products or processes, e.g., supervisor salaries and safety training courses
Traditional	Material, labour, other expenses and revenues that are commonly allocated to a product or process
Image/Relationship	Costs/benefits related to the subjective perceptions of a firm's stakeholders, e.g., a community group's resistance to a plant expansion or an insurer's concern about the lack of a formal environmental management
External (most difficult to quantify	Costs/benefits of a company's impacts upon environment and society that do not directly accrue to the business, e.g., the benefits of reduced traffic congestion from a company's Telecommunication program.

6. Conclusions

From the above restudy we conclude that GSCM is an emerging in field of making environment safe which directly or indirectly impacts the of forward supply chain management. Also studied the distinct approaches of the various authors towards the GSCM. In the above studies shows that GSCM is a new era of conventional supply chain management which also consist discipline of environmental chain management. The outcome of this review states that implementation of GSCM is necessary tool to overbear through the suppression of supply chain management and related financial impacts.

GSCM helps to obtain many things in which motivates alignment in management because its consist of many negotiating policies for the people who are involved, which results in good adjustment for the principles and process in business and also its emphasis nimbleness which results in minimizing risk. There is further research is required for the awareness level in an organisations on environmental issues and for implementation of GSCM.

References

[1]. Srivastava S.K., "Logistics and Supply Chain Management Practices in India", 6th Global Conference on Business and Economics,(2006),India

[2]. Gupta, M."Environmental management and its impact on the operations function", International Journal of Operations and Production Management, 15 (8): 34- 51. 1995,

[3]. Anoop A.T and Dr. Regi Kumar V. , A review of GSCM issues in Indian bottle water industry,Kerala,India,2013

[4]. B.L. Lakshmimeera and Dr. Chitramani Palanisamy, "Conceptual Framework on GSCM Practices", Coimbatore, India.

[5]. Robert Hanfield, Nicole Darnell," Environmental management system; Green supply chain management; compliment for sustainability", 2008.

[6]. NASSCOM, (2007),"It adaptation in the Indian Auto Component Industry", Dec. 23,2013.
[7]. Nimawat Dheeraj and Namdev Vishal, "An overview of Green supplies chain management in India" Research journal of recent sciences. Rajasthan, India, 2012,vol1.
[8]. Maruf Husan, "Sustainable Supply Chain Management Practices and Operational Performance", Sydney, Austalia,2012.
[9]. Coopert, Lambert, Pagh," supply chain management; more that a new name to logistics", The international journal of logistic management, December 1996,Ohio, USA.
[10]. Assey Mbang Janvier-James, "A New Introduction to Supply Chains and Supply Chain Management: Definitions and Theories Perspective", International Business Research. Shanghai 200051, China,2012, vol 5.
[11]. Chung, C-J.and Wee, H-M. (2011), "Short life-cycle deteriorating product remanufacturing in a green supply chain inventory control system", International Journal of Production Economics, Vol. 129, No.1, pp. 195-203.
[12]. Kaiser, H. F. (1974), "An index of factorial simplicity", Psychometnka, Vol. 39, pp. 31-36.
[13]. Wu, Z. and Pagell, M. (2011), "Balancing priorities: Decision-making in sustainable supply chain management", Journal of Operations Management, Vol. 29, No. 6, pp. 577-590.
[14]. Holt, D. & Ghobadian, A., (2009) "An Empirical Study of GSCM Practices amongst UK Manufacturers", Journal of Manufacturing Technology, Vol. 20, No. 7, pp 933-956.
[15]. Diabat, A. & Govindan , K., (2011) "An Analysis of the Drivers Affecting the Implementation of Green Supply Chain Management", Resources, Conservation and Recycling. 55, pp 659-667.
[16]. Beamon, B. M., (1999) "Designing the green supply chain", Logistics Information Management, Vol. 12, No. 4, pp 332-342.
[17]. Joseph Sarkis, (2003) A strategic decision framework for green supply chain management. Journal of Cleaner Production. No.11. P.397-409.
[18]. Wang, Yingluo, Wang, Nengmin & Sun, Linyan. (2003). The Basic Principles of Green Supply Chain Management. Engineering Science. No.5 P.82-87.

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