GREEN LOGISTICS: A TOOL FOR SUSTAINABLE DEVELOPMENT OF A FIRM

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ABTRACT

Greenness has become a codeword for a range of environmental concern and is beneficial for sustainability of a firm. Green Logistic comprise of the two words: Green means for environment which narrates the practices which are environmentally friendly. Logistic is t the heart of modern transport systems which signifies a degree organization and control over freight movements. The ecological concern in logistics determines how far the logistics or the supply chain of a firm is faced with the issue of environment protection. Also, Government rules and laws are playing an important role in regulation of Green logistics. Our paper aimed on the environmental impacts of logistics and its implication on ecological aspects. Also, our paper is providing an information regarding application of green logistics to the various firm's supply chain management. The outcomes of Green logistics toward the firms are sustainable development likes social and environmental and profitability of firms.

KEY WORD: Green Logistics, Supply chain management, Sustainable development.

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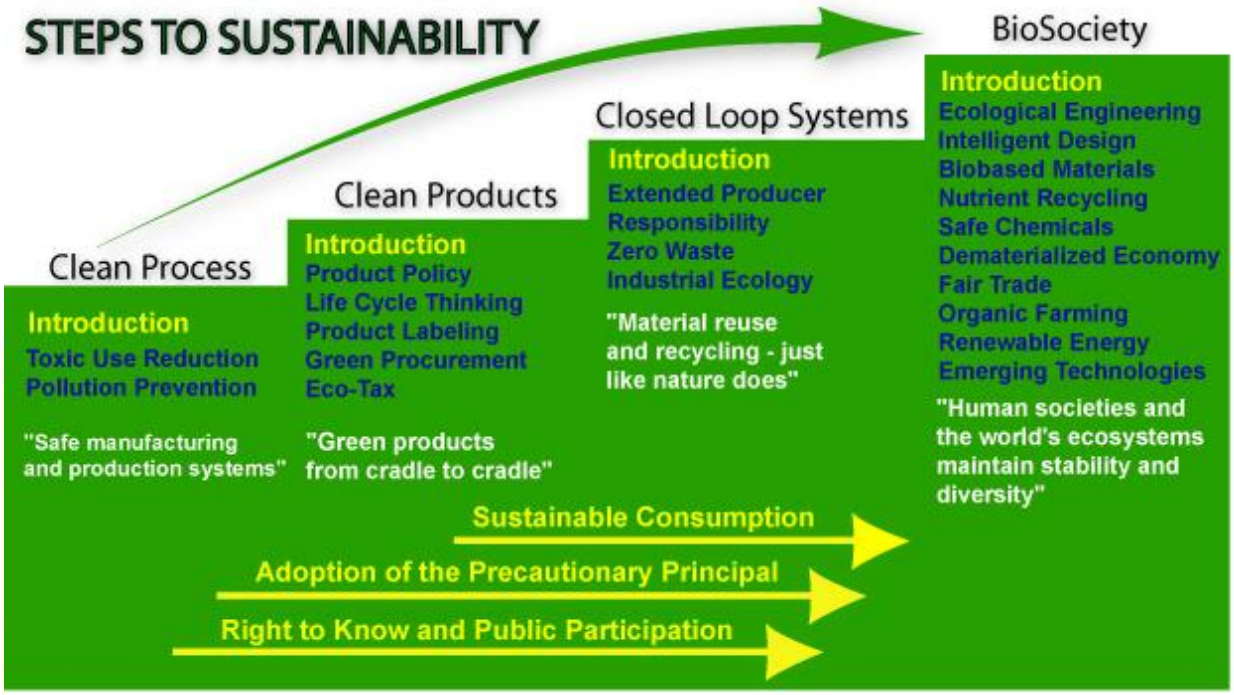
1.0 INTRODUCTION:

Supply Chain Management (SCM) is an essential part of every business. The supply chain of a company is its network consisting of all the companies' suppliers, itself, and its customers, a firm cannot successfully operate without a successful SCM system. Bozarth Handfield defines SCM as the "active management of supply chain activities and relationships in order to maximize customer value and achieve a sustainable competitive advantage" (Soni, 2008, p. 19). Logistics is the integrated management of all the activities required to move products through the supply chain. For a typical product this supply chain extends from a raw material source through the production and distribution system to the point of consumption and the associated reverse logistics. The logistical activities comprise freight transport, storage, inventory management, materials handling and all the related information processing. Green logistics have its origin in the mid 1980s and was a concept to characterize logistics systems and approaches that use advanced technology and equipment to minimize environmental damage during operations. Green logistics describes all attempts to measure and minimize the ecological impact of logistics activities. This includes all activities of the forward and reverse flows of products, information and services between the point of origin and the point of consumption. It is the aim to create a sustainable company value using a balance of economic and environmental efficiency.

Firms, as a part of their social and environmental responsibility policies should work towards sharing best practices after achieving operational excellence & help other organizations become more efficient to reduce their footprints on the environment. This may be a great way for organizations to get visibility to consumers as being a leader in environmental innovation thereby improving their brand name & therefore increasing sales. Over the past few years, one has seen that investing in sustainable & green supply chains can have enormous long term cost benefits while reducing the damage on the environment.

Sustainability - Meeting current needs without hindering future needs in terms of economic, environmental & social challenges. The Institute for Supply Management defines green sourcing as – "Making environmentally conscious decisions throughout the purchasing process, beginning with product and process design, and through product disposal" (also termed "sustainable procurement").



2.0 LITERATURE REVIEW:

Logistics are an important function of modern transport systems. While traditional logistics seeks to organize forward distribution, that is the transport, warehousing, packaging and inventory management from the producer to the consumer, environmental considerations opened up markets for recycling and disposal, and led to an entire new sub-sector: green logistics (Byrne and Deeb, 1993). Inserting logistics into recycling and the disposal of waste materials of all kinds, including toxic and hazardous goods, has become a major new market. Reverse distribution is a continuous embedded process in which the organization (manufacturer or distributor) takes responsibility for the delivery of new products as well as their take-back. This would mean environmental considerations through the whole life-cycle of a product (production, distribution, consumption and disposal). For example, BMW is designing a vehicle whose parts will be entirely recyclable (Giuntini and Andel, 1995).

A business gain can gain the following benefits from getting into 'green logistics' –

- Reduction in CO2 emissions

- Unlocking significant cost savings
- Heightened supply chain optimization
- Boosted business performance
- Paradoxes of Green Logistics

When adapting green logistics there could be some inconsistencies that might arise.

The issue is that green logistics is supposed to be environmental friendly, but logistics Green Logistics & its Significance in Modern Day Systems 91in itself is not very green because of pollution and waste that it creates. So when adapting green logistics there are some paradoxes that arise as given below:

Cost: Companies wants to get the cheapest way to do things but at the same time they should choose options that are green, which sometimes are more costly to the company. The purpose of logistics is to minimize costs, notably transport costs. The cost-saving strategies that are pursued by logistics operators are often at variance with environmental considerations. Time/Flexibility: The modern integrated supply chains and JIT provide adjustable and competent physical distribution systems but on the other hand extended production, distribution and retailing models are consuming more space, energy and generate more emissions (CO2, particulates, NOx, etc.).

Reliability: At the heart of logistics is the overriding importance of service reliability. Its success is based upon the ability to deliver freight on time with the least threat of breakage or damage while the least polluting modes are generally regarded as being the least reliable in terms of on-time delivery, lack of breakage and safety. Ships and railways have inherited a reputation for poor customer satisfaction, and the logistics industry is built around air and truck shipments... the two least environmentally -friendly modes.

Warehousing: A reduction in warehousing demands is one of the advantages of logistics. This means however, that inventories have been transferred to a certain degree to the transport system, especially the roads. Inventories are actually in transit, contributing still further to congestion and pollution. The environment and society, not the logistical operators, are assuming the external costs.

E-commerce: The explosion of the information technology has led to new dimensions in retailing - e-commerce. However, changes in physical distribution systems by e-commerce have led to higher levels of energy consumption.

2.1 TRIPLE BOTTOM LINE ACCOUNTING – SUSTAINABILITY PERFORMANCE MEASURE – INTEGRATING GREEN LOGISTICS:

Triple Bottom Line (TBL) originally coined by John Elkington to describe corporations moving beyond reporting only on their financial "bottom line" to assessing and reporting on the three spheres of sustainability: economic, social and environmental. Triple Bottom Line can be seen as a mere reporting device (e.g. information presented in annual reports) and/or an approach to improving decision-making and the fundamental functions of organizations (e.g. the provision of tools and frameworks for considering the economic, environmental and social implications of decisions, products, operations or future plans). TBL provides a framework for measuring and reporting corporate performance against economic, social and environmental benchmarks. Reporting on TBL makes transparent the organization's decisions that explicitly take into consideration impacts on the environment and people, as well as on financial capital. It can reduce risk, assist in delivering better outcomes for employees, shareholders, customers and clients, and enhance reputation.

2.3 BENEFITS OF GREENING SUPPLY CHAINS:

Aberdeen Group (2008)	**Insight (2008)**
'Best-in-class goals for sustainability initiatives'	***'Benefits of the green supply chain'***
Reduce overall business costs (56%)	Improve brand image (70%)
Enhance CSR (54%)	Satisfy customer requirements (62%)
Improve profits (48%)	Differentiate from competitors (57%)
Reduce waste/improve disposal (43%)	Reduce logistics costs (52%)
Improve visibility of green supply drivers (41%)	Establish a competitive advantage (47%)
Increase use of recyclables/reusable (37%)	Optimize logistics flow (40%)
Improve fuel efficiency (35%)	Expand to new markets (38%)
Reduce emissions (33%)	Optimize manufacturing (35%)
Win new customers/develop new products (26%)	Reduce manufacturing costs (32%)
Reduce use of toxic materials (19%)	Other (2%)
Improve employee satisfaction (9%)	

2.4 KEY DRIVERS FOR THE GREENING OF LOGISTICS AND SUPPLY CHAINS:

Eye for transport (2007)	Aberdeen Group (2008)	Insight (2008)
'Key drivers for instigating green transport/logistics'	***'Top five pressures driving the green supply chain'***	***'Main drivers for green logistics'***
Improving public relations (70%)	Desire to be thought leader in sustainability (51%)	Optimize logistics flow (18%)
Improving customer relations (70%)	Rising cost of energy/fuel (49%)	Improve corporate image (16%)
Part of their corporate responsibility agenda (60%)	Gaining competitive advantage/differentiation (48%)	Reduce logistics costs (15%)
Financial return on investment (60%)	Compliance with current/expected regulation (31%)	Achieve regulatory compliance (15%)
Government compliance (60%)	Rising cost of transportation (24%)	Satisfy customer requirements (14%)
Decreasing fuel bills (60%)		Differentiation from competitors (11%)
Increasing supply chain efficiency (55%)		Develop alternative networks (10%)
Decreasing risk (50%)		
Improving investor relations (38%)		

3.0 STUDY OBJECTIVES

1. To study the green logistics as a tool for sustainability for a firm.

2. To study the areas of application of green logistics in various industry.

3. To study implications of green logistics on a firm's operation.

3.1 STUDY METHOD

Method used for study is exploratory in nature using secondary data only.

3.2 APPLICATION OF STUDY FOR SUSTAINLABLE GROWTH:

4.0 FIRMS CAN FOCUS ON FOLLOWING AREAS TO PRACTICE GREEN LOGISTICS FOR SUSTAINABLE GROWTH:

4.1 Product Design:

- Use more environmentally friendly materials.
- Design more efficient product.
- Plan in recycling of product at end of life.
- Consider environmental impact of product.

4.2 Choice of Suppliers:

- Review supplier environmental data.
- Consider supplier source of raw materials/components.
- Partner with suppliers to improve environmental performance.
- Consider energy-efficient practices ("green" manufacturing facilites, hybrid delivery vehicles etc.)**.**

4.3 Manufacturing:

- Use more efficient processes.
- Institute pollution/emission controls.
- Plan waste management.
- Implement quality control.

4.4 Packaging/Shipping:

- Use environmentally friendly/recyclable packaging.
- Plan for reuse of packaging materials.
- Ship in hybrid/efficient vehicles.
- Ship directly to customers.
- Minimizing transportation.
- Using alternative fuel for transportation.
- Using bio-fuels for shipping products.

4.5 End Product:

- Deliver efficiently to end user.
- Use recyclable/reusable packaging.
- Deliver in hybrid/efficient delivery vehicles.
- Consolidate shipments.
- Plan for recycling/reuse of product/components at end of life

- Educate customer on recycle/reuse policy.

4.6 Cost savings:

- Efficient design saves waste.
- Environmentally friendly sourcing saves disposal costs.
- Pollution/emissions control saves cleanup costs.
- Compliance with environmental regulations.

Many different outcomes may arise from implementing a Green Supply Chain Management system. A company may find difficulty spelling out exactly every little minute detail that occurs. As long as a careful watch is kept on the costs versus the perceived benefits, Green logistics will produce positive outcomes such as:

- More efficient resource use
- Increased sustainability
- Customer satisfaction
- Competitive advantage
- Cost advantage

Companies and governments can substantially reduce the environmental impact of logistics. Businesses devising green logistics strategies and government ministries developing sustainable logistics policies need to exploit this full range of parameters rather than rely on a few narrowly defined initiatives. It requires different levels of logistical decision making. McKinnon and Woodburn (1996) differentiated four levels:

- Strategic decisions relating to numbers, locations and capacity of factories, warehouses, shops and terminals.
- Commercial decisions on product sourcing, the subcontracting of production processes and distribution of finished products. These establish the pattern of trading links between a company and its suppliers, distributors and customers.
- Operational decisions on the scheduling of production and distribution that translate the trading links into discrete freight flows and determine the rate of inventory rotation in warehouses.

- Functional decisions relating to the management of logistical resources. Within the context defined by decisions at the previous three levels, logistics managers still have discretion over the choice, routing and loading of vehicles and operating practices within warehouses.

5.0 INDUSTRY EXAMPLES SHOWCASING BENEFITS OF GREEN PRACTICES:

- **Texas Instruments:** Saved $8 million each year by reducing its transit packaging budget for its semiconductor business through source reduction, recycling, and use of reusable packaging systems (20% annual savings).
- **Commonwealth Edison:** Produced $50 million in financial benefits from managing materials and equipment with a life-cycle management approach
- **Pepsi-Cola:** Saved $44 million by switching from corrugated to reusable plastic shipping containers for one liter and 20-ounce bottles, conserving 196 million pounds of corrugated material.
- **Dow Corning:** Saved $2.3 million by using reconditioned steel drums in 1995. Also conserved 7.8 million pounds of steel.

6.0ELABORATIVE CASE STUDY ON GREEN LOGISTICS PRACTICES:

6.1 WAL MART:

October 2005, Wal-Mart CEO Lee Scott committed the company to three ambitious goals:

- To be supplied 100 percent by renewable energy
- To create zero waste and to sell products those sustain Wal-Mart's resources and the environment.
- To meet those goals, Wal-Mart would seek to transform its supply chain, in cooperation with suppliers and environmental non profit organizations.

Wal-Mart's Significant Initiatives on green logistics:

Hired Blu Skye Sustainability Consulting is help a firm for identify the categories of Wal-Mart's products and processes that had the greatest environmental impact.

Wal-Mart/Blu Skye team multiplied sales data with environmental impact factors from the Union of Concerned Scientists, and identified 14 focal areas, bundled into three broad categories:

- Renewable energy Eg. Global greenhouse gas strategy, Alternative fuels, Energy & design construction and maintenance of global logistics.
- Zero waste, Examples like Operational and internal procurement packaging.
- Sustainable products, Examples like textile, foods and beverages, electronics, paper, jewellery and seafood.

For each focal area, an executive sponsor and a network captain took charge of building a sustainable value network of Wal-Mart employees and representatives from government, academia, environmental nonprofits, suppliers, and other stakeholders. The goal was to reduce environmental impacts and derive profit from that positive change. Network captains were typically senior managers from Sam's Club or Wal-Mart who were considered to be among the company's top performers.

6.2 DELL COMPANY INITIATIVE ON GREEN LOGISTICS:

Dell's delivering products with minimal environmental impact.

Dell ships products to 180 countries worldwide, at a rate of one system per second. Dell, but behind the scenes firm also work hard to minimize the environmental impact of each shipment. From choosing the right transportation mode for each order type to minimizing packaging, firm continuously refining our global transportation and logistics network so your transactions with us are more eco-friendly without added cost or complexity.

Optimizing transportation networks for more efficient trip.

One of the biggest ways, Dell cut waste is by continually refining our global processes and tools to find the most efficient use of air, land and ocean transportation for every occasion — receiving supplies, shipping products, delivering services and accepting returns.

Truck to Rail, Air to Sea.

Dell is exploring new transportation modes and routes, including shipments from Asia to Europe, and from China to South Asia. Our Air to Sea initiative has reduced carbon emissions by shifting many international shipments from aircraft to ocean freight.

Retail Partner Expansion.

Dell also found ways to complete our retail orders closer to end customers and consolidate them into fewer shipments. This reduces travel distance, fuel consumption and carbon emissions.

Developing internal processes to cut waste.

Dell proud that our hard work has been recognized with many environmental awards, including high rankings on Newsweek's Greenest Company in America list (in the top five, 2009–11). We understand the responsibility that comes with such recognition and continue to drive improvement for our customers through internal processes ranging from container optimization to packaging innovations.

Container Optimization.

Company refined its processes for pallet building and trailer loading because shipping trailers and containers with higher densities reduce fuel consumption and carbon emissions.

Packaging Innovations.

Dell driven many innovations in the packaging arena through our 3Cs strategy, pioneering the use of bamboo packaging for lightweight consumer products and mushroom-based packaging for heavier products. Firm always looking for ways to reduce the volumes of paper used in shipping our products. Each region's logistics fulfillment centers also have developed initiatives to recycle packaging dunnage (the paper and plastic used to protect cargo shipments).

Reverse Logistics (Product Returns).

Dell new efforts to decrease product returns resulted in making 94 percent of returned assets available for resale through our Dell Outlet, up from 90 percent in FY11. These items can be quickly returned to usefulness and resold as Certified Refurbished, Dell Outlet New or Scratch and Dent, and all Dell Outlet machines carry a Same-As-New warranty. The remaining six percent of returned assets are recycled responsibly.

Collaborating with partners on green initiative.

Dell relies on the industry's best logistics and transportation partners to ship products safely to our customers. These partners, such as DHL, FedEx®, UPS® and DB Schenker share our commitment to both efficiency and environmental stewardship.

Smart Way.

Dell is participating in the EPA's SmartWay® program and expects our carrier partners to as well. Smart Way participants identify technologies and strategies to reduce the carbon emissions of their freight operations. Dell is also working with the industry to extend green shipping programs elsewhere, leveraging our experience to support a similar program in Asia.
ISO 14001.

Many of our partners voluntarily comply with the standards of ISO 14001, which helps companies improve their environmental performance. Their improvements include transmitting shipping documents electronically and using recycled cardboard dunnage to protect freight.

7.0 CONCLUSION:

The main objective of logistics is to co-ordinate these activities in a way that meets customer requirements at minimum cost. In the past this cost has been defined in purely monetary terms. As concern for the environment rises, companies must take more account of the external costs of logistics associated mainly with climate change, air pollution, noise, vibration and accidents. Sustainable green logistic is examining ways of reducing these externalities and achieving a more sustainable balance between economic, environmental and social objectives. Firms have to face changing circumstances for several years. In addition to increasing diversity and dynamics, environmental issues become more important. Social, political and economic demands for

sustainable development force organizations to reduce the impact on the environment of their supply chains and to develop sustainable transport and supply chain strategies. There are strong interactions between logistics, environment and natural resources. In addition, the approach of logistics is interdisciplinary, holistic and cross-company. Realizing environmental objectives can be done in synergy with other strategic and financial goals. This is the basis of the great potential of this new logistics problem and challenge.

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