

Green Supply Chain: Improving Supply Chain Governance with Sustainable Supply Chain Model in rural areas

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Abstract

Green Supply Chain Management (GSCM) has appeared as an environmental innovation which integrates environmental concerns into supply chain management. GSCM has gained popularity with both academic and practitioners. The purpose of the paper is to briefly review the recent literatures of the GSCM 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 a developed and developing countries including all those researchers which is relevant to environmental and social sustainability towards operation management and the supply chain. It shows that lack researches to examine the adoption and implementation of GSCM practices especially in developing countries such as Malaysia. Thus, the authors bring forward a proposed research direction on GSCM adoption and implementation in Malaysia's manufacturing industries.

KEY-WORDS: -

Supply Chain Management, Green Supply Chain Management, Environmental Management, ISO 14001, Certified Manufacturing Firms

Introduction

Environmental change is upon us. We are seeing turbulent weather patterns - everything from record heat waves, rains, snowfall and hurricanes - that are becoming extreme in every sense throughout the world. "People should be concerned about what we are doing to the climate," said Jay Lawrimore, Chief of the Climate Monitoring Branch of the National Oceanic and Atmospheric Administration. "The burning of oil and other fossil fuels releases carbon dioxide, which rises, blankets the earth and traps heat." Brenda Ekwurzel, a Climate Scientist with the Union of Concerned Scientists, a public interest group, states, "When you look at temperatures across the globe, every single year since 1993 has been in the top 20 warmest years on record. Not only do we have climate problems but we are also

dealing with a resource depletion issue. India and China are growing economically at double digit rates, and the population of the world continues to grow creating shortages of many resources that we use to take for granted. "The World Bank reports that 80 countries now have water shortages that threaten health and economies while 40 percent of the worlds - more than 2 billion people - have no access to clean water or sanitation. "We will ultimately run out of natural resources if we keep up this torrid pace of use. "Humankind has inherited a 3.8 billion per year store of natural capital. At present rates of use and degradation, there will be little left by the end of the next century." Many of us may not be around by the turn of the next century but our children and our children's children will be suffering from our over-indulgence.

In the United States we will soon start to see more legislation enforcing stricter environmental regulations. Europe has already passed several laws with the most notable being the Restriction of Hazardous Substances directive (RoHS).

This legislation restricts the amount of certain substances in electrical and electronic equipment. There are also other initiatives being pushed in Europe to control and curtail resources that may damage or deplete the environment. China has also passed its own RoHS law which is more stringent than the European version. The Chinese law restricts all of the same substances that the European law does but it allows no exemptions and requires "laboratory testing and labeling requirements." In the next several years you will be hearing more about Supply Chain Sustainability or the Green Sustainable Supply Chain. A Green Sustainable Supply Chain can be defined as "the process of using environmentally friendly inputs and transforming these inputs through change agents - whose byproducts can improve or be recycled within the existing environment. This process develops outputs that can be reclaimed and re-used at the end of their life-cycle thus, creating a sustainable supply chain." The whole idea of a sustainable supply chain is to reduce costs while

helping the environment. Many people would argue that being environmentally friendly increases your costs. In the past, most companies were focused on reducing unit costs. Many companies later evolved into looking at total landed costs with the on-set of global trade. Companies also started looking at the usage costs with a piece of equipment (i.e. what are my cost per copy when using a copier). In today's "sustainable" world the thinking should be what is the life cycle costs of this part, piece of equipment or supply chain process.

Research Methodology

The methodology of the research underpinning this paper consisted of two parts a systematic literature review (SLR) and an empirical case study. The purpose was to interrogate the research literature with practitioner experience to understand how business processes are adapted and modified to manage supply chains sustainably in rural areas.

Objectives of the study

The rapid and continuous growth of Indian Industries be it manufacturing, IT, chemical etc. have brought great challenges towards energy resource security. Industry's concern towards environment is comparatively very low and the knowledge on GSCM practices limited. There are a handful of Indian companies which follow an environment-friendly GSCM initiative. The diversity in the adoption rates has seen some manufacturing supply chain companies proactively implementing environmental strategies such as green purchasing and eco-design. Indian manufacturing companies have experienced increasing environmental pressure while simultaneously recognizing various benefits and incentives to green their supply chains. Thus, GSCM practices have emerged as a systematic approach in India to balance the economic and environmental sustainability of firms.

Green Sustainable Supply Chain:

The chart to the right shows what a Green Sustainable Supply Chain looks like within a company. Sustainability could be a tremendous weapon for companies to reduce costs. There are many facets of the supply chain that could be improved by looking at it from a sustainability standpoint. The first issue that sustainable companies are focusing on is the design and production of the product. "Interface Corporation is a leading maker of materials for commercial interiors. In its new Shanghai carpet factory a liquid had to be circulated through a standard pumping loop similar to those used in nearly all industries.

A top European company designed the system to use pumps requiring a total of 95 horsepower. The Interface engineer working on the project re-designed the system by using "fatter pipes" and straightening/shortening the length of the pipes used in the system. The overall horsepower requirement was now 7 horsepower or a 92% reduction. His re-designed system cost less to build, involved no new technology and worked better in all respects. This engineer used whole system thinking which can help managers find small changes that lead to big savings that are cheap and free.¹

Many forward thinking companies are using the environmental issues to their advantage. They are innovating and coming up with cutting edge solutions that help them become more profitable while helping the environment. In the book Green to Gold the authors talk about 3M and their program Pollution Prevention Pays (3P). "Anything not in a product is considered a cost; it's a sign of poor quality. As 3M execs see it, everything coming out of a plant is either product, byproduct (which can be reused or sold), or waste. Why then should there be any waste? If every company thought along those lines would we have the landfills and environmental problems that we have today? Many companies are also focusing on their indirect purchases (packaging and transportation) to reduce environmental issues. Reducing the amount of cardboard or filler by designing "smart packages" can save companies money. "Filling your trucks as full as possible. Dell has upped its average truck load from 18,000 to 22,000 pounds and worked with UPS to optimize delivery strategies. 3M developed an innovative system to install adjustable decks in trucks. Placing pallets on two levels allowed one 3M facility to reduce the number of daily truckloads by 40 percent and allowed them to save \$110,000 per year.

One of the bigger issues facing companies these days is the actions of suppliers. Companies today are being held accountable for environmental problems created by suppliers. Unfortunately, the press is quick to link companies who deal with environmentally unfriendly companies especially if a catastrophe occurs. Can your company afford that type of exposure? Many companies are performing environmental audits or implementing "rules of conduct" to check the actions of their suppliers.

Sustainability can also be profitable. GE now has an "Ecomagination program where they are focused on growing their revenue stream from

environmentally friendly products to the tune of 20 billion dollars by 2010.” They recognize the opportunity associated with saving the environment. Many utility companies are offering customers environmentally produced power and charging a premium for that offering. Grocery stores are able to charge a higher price on organic food because people are willing to pay a premium for food grown organically. Sustainability can be a competitive advantage for many companies. If you can develop a sustainable supply chain think of the money that can be saved by not having to dispose of harmful by-products, reducing obsolescence, decreasing the amount of money spent on scrap and the resources spent on adhering to regulatory issues. Several companies have developed new revenue sources on the by-products they used to throw out! Many companies are using sustainability as a competitive advantage to grow market share within their industry.

So how would your company develop a sustainable supply chain? The United States Environmental Protection Agency (EPA) has written a guide called the "The Lean and Green Supply Chain: A Practical Guide for Materials Managers and Supply Chain Managers to Reduce Costs and Improve Environmental Performance." This is an outstanding guide that provides a systematic approach to implementing a Green Supply Chain. It's a four step decision making process.

- ❖ The first step is to identify environmental costs within your process or facility.
- ❖ The next step is to determine opportunities which would yield significant cost savings and reduce environmental impact.
- ❖ The third step is to calculate the benefits of your proposed alternatives.
- ❖ The last step is to decide, implement and monitor your improvement solutions. The manual also gives several great examples of what companies have done to "green" their Supply chain.

In the future companies will be moving to a sustainable supply chain. The harsh reality is that we need to change what we are doing from a supply chain standpoint in order to ensure that future generations will have resources to use in their lifetime. The benefit of implementing a green sustainable supply chain is that we can improve the profitability of our company and help the environment. Green can not only be profitable, but the right thing to do.

Key components of Supply Chain purchasing and Inbound Logistics:

The purchasing function involves the acquisition of materials from suppliers to meet the needs of producing the organizational product or service. The purchasing decisions like vendor selection, material selection, outsourcing, etc. can have a deep impact on the environment. For example, purchasing recycled material from a distant location or selection of the material or vendor that uses toxic materials.

Other practices, such as the Just-In-Time technique (JIT), is used by a lot of companies to save money on storage, raises fuel consumption and traffic congestion. Carrier selection, a part of supplier selection, is an important in-bound logistics decision. Transportation is important to all industries. As an example, the Chemical Manufacturers Association (CMA) cited Roadway Express, a major carrier, as a responsive care partner in hauling chemicals.

Production: Within this area come issues like designing the product, empowering employees, controlling the quality etc. Most often companies encounter questions like what happens to liability and corporate risk when sensitive and sometimes technically complex issues are part of the environmental decisions? Similar to quality control, which has evolved to include everyone in an organization, can environmental decisions be allowed to permeate? These questions are critical since employee involvement is a practice that companies' believe are central to pollution control in the production function⁴. Issues like disassembly, remanufacturing, and material recovery principles also play a major role.

Distribution and Outbound logistics: Whereas, purchasing and in-bound logistics focuses on managing the vendor-organization relationships of the supply chain, the distribution and out-bound logistics function is meant to address the organization-customer relationship issues. Customers' interest in environment friendly product plays a very important role in company going green. No matter what the incentive is, companies first look for economic impact and then at the environmental impact.

Reverse Logistics: Reverse logistics incorporates the return of materials, components and products back into the "forward logistics" chain. Reverse logistics operations include the following major steps: collection, separation, densification or disassembly, transitional processing, delivery and integration. The operational emphasis is dependent on the type of material or component that flows in

the reverse logistics channel. For example, disassembly will be required for copy machines, whereas plastic bottles would require densification. This is an area that makes tremendous impact on the environment. For instance, shifting to a supplier that uses plastic packaging will have a negative impact on the environment.

In one form or the other, every corporation as a whole has an impact on the environment; and this impact has a price that every corporation pays in the form of 'environmental costs'. But the traditional structure of the cost accounting system does not count these costs. Raw material and labor costs are directly allocated to the appropriate product or process, the other costs are accumulated into overhead accounts, which are allocated at a set proportion (e.g., based on the number of units manufactured) to all products, processes, or facilities but costs such as waste disposal, training expenses, environmental permitting fees, and other environmental costs-go unaccounted.

For instance, if a new production process requires the use of hazardous materials, the expenses that a company might incur to clean up hazardous material spills would be classified as 'contingent' costs. However, any future spills might also trigger 'image/relationship' costs, such as concern among the company's employees or neighbors, and 'external' costs, such as damage to a nearby aquatic ecosystem⁵.

Environmental Costs:

- **Conventional costs** - Material, labor, other expenses, and revenues that are commonly allocated to a product or process
- **Potentially Hidden** - Expenses incurred by and benefits to the firm that are not typically traced to the responsible products or processes, e.g., supervisor salaries and safety training courses.
- **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
- **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 system
- **External** - Costs/benefits of a company's impacts upon the environment and society that do not directly accrue to the business,

e.g., the benefits of reduced traffic congestion from a company's telecommuting program. By taking into account the above costs, a company can not only save potentially hidden expenses but also save the image of their product. For instance:

- **Purchasing and Inbound:** GM reduced its disposal costs by \$12 million by establishing a reusable container program with its suppliers.
- **Production:** Commonwealth Edison, a major electric utility company, realized \$25 million in financial benefits through more effective resource utilization.
- **Outbound and Distribution:** Andersen Corporation implemented several programs that reduced waste at its source and had internal rates of return (IRR) exceeding 50%.
- **Reverse Logistics:** Public Service Electric and Gas Company saved more than \$2 million in 1997 by streamlining its inventory process to avoid product obsolescence and disposal.

Decision-Making Framework:

While the potential benefits are significant, relatively few companies are pursuing the opportunity to improve their financial and environmental performance by explicitly addressing environmental costs. A clear, simple framework can help companies adopt Green Supply Management System.

The four-step framework companies can pinpoint and understand the costs and environmental impacts that result from materials management decisions.

- **Identify Costs:** A systematic review of the facility or process is conducted to determine if and where significant environmental costs occur.
- **Determine Opportunities:** The identified functional areas and processes are evaluated to determine which changes will likely yield significant cost savings and reduce environmental impacts. Potential changes are evaluated with criteria that can include the magnitude of potential cost improvement, the types of environmental burdens, and the barriers to change. This step yields a possible set of alternatives with significant potential for improving costs savings and reducing environmental impacts.
- **Calculate Benefits:** Quantitative and qualitative analyses of the costs and benefits of a selected group of projects are

conducted. Some of the analytical tools and methods used during this step are activity-based costing approaches, net present value (NPV) calculations and risk evaluations. The result is a summary of the merits of the current process and any proposed alternatives.

- **Decide Implement and Monitor:** First, a decision is made to continue with the status quo or to pursue a new approach. Financial benefits and/or environmental improvements then occur as changes are put into action. The new practices are institutionalized as information collection processes are integrated into the company's materials resource planning (MRP II), enterprise resource planning (ERP) systems and other information systems. After implementation, a periodic review and continuous improvement effort allows decision makers to evaluate their progress and pursue additional opportunities.

Environment Management System:

After adopting the Green Supply Chain Management (GSCM), next in line are EMSs or Environment Management Systems. Although the role coincides with the GSCM, EMSs are strategic management approaches that define how an organization will address its impact on the natural environment. More than 88,800 facilities worldwide had certified their environmental management systems (EMS) to ISO 14001, the global EMS standard, and thousands more had adopted uncertified EMS.

An EMS consists of a collection of internal policies, assessments, plans and implementation actions affecting the entire organization and its relationships with the natural environment. Although the specific institutional features of EMSs vary across organizations, all EMSs involve establishing an environmental policy or plan; undergoing internal assessments of the organization's environmental impacts (including quantification of those impacts and how they have changed over time); creating quantifiable goals to reduce environmental impacts, providing resources and training workers; checking implementation progress through systematic auditing to ensure that goals are being reached; correcting deviations from goal attainment; and undergoing management review.

EMSs are intended to help organizations embed environmental practices deep within their operational frameworks so that protecting the

natural environment becomes an integral element of their overall business strategy. EMSs implementation requires companies to get ISO 14001 certified. ISO 14001 adoptions requires certification by an independent third party auditor who helps to ensure that the EMS conforms to the ISO 14001 standard. Once certified, the ISO 14001 label indicates that the organization has implemented a management system that documents the organization's pollution aspects and impacts, and identifies a pollution prevention process that is continually improved over time⁷. For example, Federal Foam Technologies, Inc., a Minnesota-based company, adopted an EMS and certified it to ISO 14001. By relying on its EMS structure, the firm reduced its annual landfill use by 40 percent, and decreased its associated disposal costs and liability risks.

Although organizations have been using EMSs to be more environmentally sustainable, issue is that EMSs do not require organizations to improve their environmental performance, instead focus on creating and documenting environmental policies and procedures. EMSs therefore may represent only symbolic efforts to improve an organization's image.

The relationship between EMSs and GSCM practices has potentially complementary and significant implications for an organization's environmental sustainability because together they offer a more comprehensive means of defining and establishing sustainability among networks of business organizations⁷. However, when EMSs are adopted in the absence of GSCM, environmental benefits are likely to diminish. This is because the organization's supply chain network does not share its environmental goals and environmental sustainability of any organization is impossible without incorporating GSCM practices.

Conclusion

With companies waking up to an environmentally aware world, whether it's about the competitive advantage or for regulatory reasons, greening the supply chain has become a necessity. Greening the supply chain is not a onetime exercise, nor can it be done overnight. It's a journey that not only requires the four major functions - purchasing and in-bound logistics, production, distribution and out-bound logistics, and reverses logistics- to be the drivers, but also requires organizations to adopt an EMS system. EMS and GSCM adoption may not just provide a vehicle for organizations to "signal" to market participants that their environmental strategies adhere to or exceed generally accepted environmental standards but

also lead to greater acceptance of the organization's strategic approach and insulate organizations from competitors' criticisms. In the future companies will be moving to a sustainable supply chain. The harsh reality is that we need to change what we are doing from a supply chain standpoint in order to ensure that future generations will have resources to use in their lifetime. The benefit of implementing a green sustainable supply chain is that we can improve the profitability of our company and help the environment. Green can not only be profitable, but the right thing to do.

Reference

1. Shultz, C.J.II & Holbrook, M.B., (1999) "Marketing and Tragedy of the Commons: A Synthesis Commentary and Analysis for Action", *Journal of Public Policy and Marketing*, Vol. 18, No. 2, pp 218-29.
2. Ninlawan, C., Seksan, P., Tossapol, K., & Pilada, W., (2011) "The Implementation of Green Supply Chain Management Practices in Electronics Industry", *Proceedings of the International Multiconference of Engineers and Computer Scientists*, 3.
3. Zhu, Q. & Sarkis, J., (2004) "Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises", *Journal of Operations Management*, 22, pp 265-289.
4. Beamon, B. M., (1999) "Designing the green supply chain", *Logistics Information Management*, Vol. 12, No. 4, pp 332-342.
5. Zhu, Q., Geng, Y., Fujita, T., & Hashimoto, S., (2010) "Green Supply Chain Management in Leading Manufacturers: Case Studies in Japanese Large Companies", *Management Research Review*, Vol. 33, No. 4, pp 380-392.
6. Fortes, J., (2009) "Green Supply Chain Management: A Literature Review", *Otago Management Graduate Review*, 7, pp 51-62.
7. Srivastava, S.K., (2007) "Green supply-chain management: a state-of-the-art literature review", *International Journal of Management Reviews*, Vol. 9, No. 1, pp 53-80