Strategies to Reduce Cost & Improve Environmental Performance in Lean & Green Apparel Supply Chains

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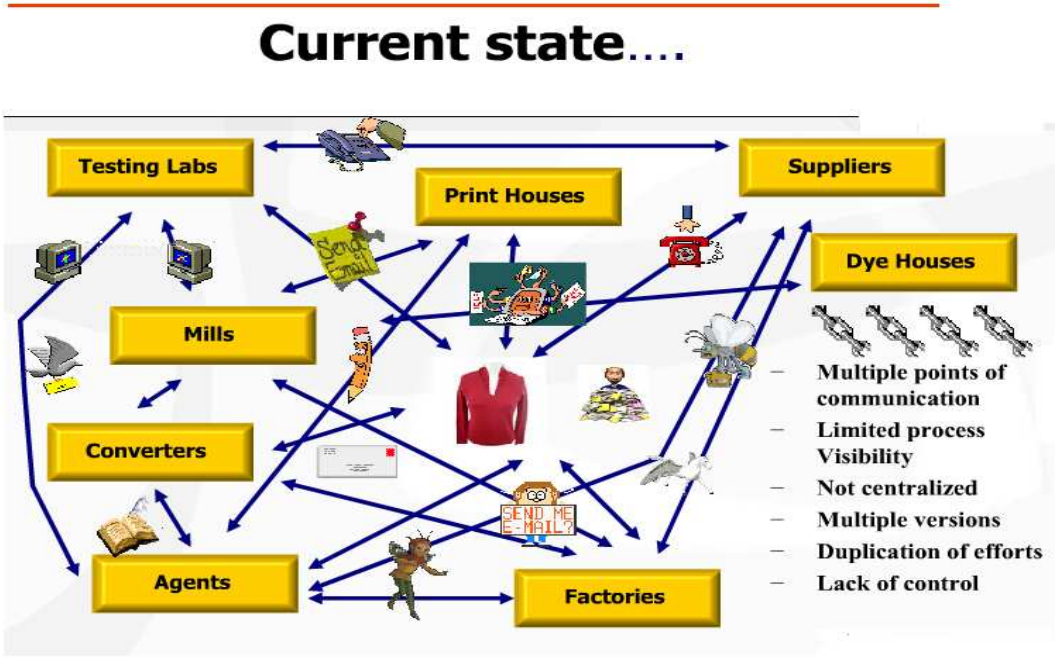
Introduction

Business Organizations are completely changing their strategies of how they manage their supply chains. Strict norms, Dominance in the supply chains have been turned out to be the alliance with the relationships with the upstream as well as the downstream partners. As part of the lean supply chains, it is very imperative to check the non-value added activities in the entire process as well as to increase the profitability. The other element which has been talked for few years in the industry is "Greening" of supply chains or Green Supply Chain Practices which are ruling across the various industries. Supply Chain managers of the industries are finding it very difficult to balance both the economic & environmental performance in the Fashion Industry. In recent years, the focus has gone into the environmental management principles for all the members in the Supply Chain to orient towards sustainability by combining principles across other elements such as product recovery, reverse logistics and re-manufacturing. Business performers have adopted different strategies that focus on internal operations including the environmental management system as well as accounting systems. Research has been initiated on the various phases on the supply chains including, Purchasing, Manufacturing and Distribution with material handling at Stores to identify the possible ways of improvement on the Environmental performances. This paper will discuss the various strategies adopted by the industries to increase their lean & green performances with respect to apparel supply chains and the to propose some fundamental changes in the Supply chain especially material handling with the less environmental impact.

The paper will discuss best practices in material & product handling to have Green & Lean in the apparel supply chains, which finally reduce the Carbon foot print of the materials.



The present status of apparel supply chain is not aiming for Lean & Green. It is having the multiple contacts. Continuous improvements are aimed at the different angle to reduce the wastes and more sustainable in giving less impact on the environmental front.

Need of the Green & Lean Apparel Supply Chain practices:

Green & lean Supply chains are modelled and designed to reduce both the costs and wastes. Each industry is working on the increase its productivity at the same time to use the resources effectively through Green & lean Supply Chain practices. By adopting the Green & lean practices, the companies can exhibit their competitiveness by creating good practices with sustainable approaches. Many Companies just concentrate on the reduction of wastages at the same time, they fail to identify the increase in the cost concurrently due to the practices taken into the supply chains. In the other sense, they fail to identify the environmental burdens in the supply chains. It results into the extended supply chains incorporating immediate and eventual environmental effects. GSCM – Green Supply Chain Management practices together with eco-design and Green Purchasing, is the need of the hour for all the Business organizations to show their environmental performance. Apparel Supply chain is one of the Supply chains where the complexity rises with respect to lean & Green. Due to the shift in the business, for apparel players it is challenging for them to keep their supply chain both as "lean & Green". Mainly it focuses on following strategies:

- To analyse & reduce the Carbon Foot Print in all phases of Apparel Supply
- To have a sustainable material handling in the supply chain to minimize the wastages

The use of environmental management practices has a huge impact on Operations policy. The practices adopted can be on the following areas:

- Production Planning & Purchasing : The introduction of careful environmental targets often requires high attention of product structure. (materials such a fabric manufacturing and trims etc., Components etc.,)
- In the production, introduction of "cleaner" technologies ie the equipment and plant with a reduced impact on the state of natural resources
- In Logistics, the effective attention needs to be given on the green product innovations with the re-cycling options.

Very minimal effort and studies have gone into the analysis of environmental performance measurement with respect to Green Manufacturing Strategies.

Factors for the Green Supply Chain strategy :

The internal factors for Company's strategic attitude heavily depend upon managerial environmental awareness. Every professionals should have

- Ethical objective.
- May consider the environment as a means of achieving competitive advantage. The introduction of green product development program or incorporation of green competencies in the day to day managerial performances.
- Compliance with the current environmental regulations.
- May take effort to improve the environmental performance.

External Variables :

- Green movements and regulators
- Company's relationships with other supply chain value partners.

<u>Some of the Green Supply Chain Strategies:</u>

Pro-Active Green Strategy : It starts with the integration of relationships between a company and its vendors or suppliers. This has been integrated at the design phase itself and also to handle the returns management. This will be clearly established strategic relationship. MAS Holdings, a renowned apparel manufacturing organization in Sri Lanka has established the strategic partnership with its partners. It is considered to be the highly professional and advanced in that industry.

Responsive Strategy: The Company is adjusting its internal set up according to the environmental consequences it is facing. It is highly predominant in the Indian conditions as companies, go for the re-adjustments according to internal working climate available.

Reactive Strategy: Market –oriented only, it is determined according to the companies, external

conditions.

Unresponsive behaviour ; Where environmental conditions are not adopted into the operating strategies. Small firms with the financial limitations are having the problem in pursuing the green supply chain initiatives. The environmental performance of Apparel supply Chain can be increased or analysed by the following areas :

- Sourcing & Procurement Policies
- Product Planning
- Production/Manufacturing Technologies
- Logistics
- Human Resources Management

Some of the Cost saving possibilities & avenues discussed for Apparel Chains are :

Procurement - It is highly advantageous to develop the Co-operative relationships with suppliers to design new environmentally friendly product. The companies change the purchasing parameters to make the recycling programs easier. This way it would easy for us to correct the mistakes and be able to concentrate on the benefit on the both. The CPFR (Collaborative planning) model adopted by Wal-Mart can be extended on the

Product Planning : Some pro-active firms, they plan the samples with new green strategies that can be fully recycled. This is having the huge relationship between the product developers and other organizational units such as production to arrange for the production.

Production/manufacturing : companies in apparel supply chains are highly on the developmental path. They are adopting the strategy to minimize their manufacturing cost. Some of the videos will be discussed in the presentation. They have taken so much of effort to reduce their manufacturing cost and it would be a recycling based initiatives. For this they focussed on to minimize the toxic materials of environmental concern to be used in the production and all the professionals who are involved in the production are highly aware of the environmental issues on that. Companies also took initiatives to reduce energy consumption by using the other sources of energy and reducing the operational wastes. This is were lean manufacturing strategies have been applied in the industry.

Logistics : A change in the Operating procedures will help to boost the Corporate image by adopting the environmental friendly transport systems. This would enrich the green image of the organization and also the Lean manufacturing and JIT principles are highly applied resulting from the transportation systems. Logistics are highly aimed now a days with the Green approach.

Some of the strategies in Green (Apparel) Manufacturing :

- Waste Management, Clean Technology, Energy Use and Green Belts
  Good waste management has heightened the environmental consciousness of all associates. operations. This naturally extends to working with like-minded business partners to ensure continuity of our constantly monitored and improved clean technology agenda. All Manufacturers follow a strict policy of wastewater treatment that returns clean water to the environment.
- Less Material Wastage:
  For the Green Manufacturing raw material that are preferred are generally eco-friendly. For E.g. organic cotton is eco friendly product, but lot of textile manufacturers do not produce fabric with the organic cotton. Hence manufacturers make garment with these kind of fabric and they make the best utilization of it.
- Less Chemical Usage & Managing Water Usage
  Suppose that the fabric printing process requires high use of water and results in high volumes of water discharge. wastewater treatment plants, should be complied with environmental regulatory authorities. Chemical pre-treatment of raw waste water controls the performance parameters of (Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and pH levels with samples analysed monthly by the regulatory authorities.
  These eco-efficient plants ensure that all their chemicals and dyes meet global standards and so, compatible with company environmental policy. In garment manufacturing unit chemicals are mostly used in washing and dyeing unit. Hence chemicals used here should be more organic and eco friendly.

For E.g. eco-friendly dyes, azo dyes, etc… Among the series of measures to reduce water consumption are recycling, a rain water harvesting system that the factory can use each day, and the introduction of a tertiary filtration system and disinfection which allows water to be reused for toilet flushing and gardening

- Less Energy Usage & Energy Efficiency Initiative

In garment manufacturing unit a lot of energy is spent on stem iron, boilers, thread sucking machine, etc… a lot of energy is consumed in converting the water into stem rather than electric boilers solar boilers could be used to save electricity.

Some of the Energy saving strategies from the Apparel Factories are :

The energy initiative was worked through the Central Energy Management and cascaded to different factories inside one organization. Measures implemented across the factories consisted of using more efficient lighting and air conditioning, better management of air compressors and pneumatic systems and monthly flue gas analysis. Sophisticated new air-conditioning systems should be introduced and the ducting redesigned for greater efficiency. Special prismatic material can be used for skylights in the roof allows only the passage of solar light without the accompanying heat Sophisticated new light emitting diodes (LEDs) should be used as task lights provide light to the sewing machines at needle point, supplementing the natural light provided by the skylights. High bay lights are to be used only on cloudy or rainy days. The factory's steam boilers and steam distribution systems have should be been redesigned for greater efficiency. Transportation within the premises is by electric vehicles to eliminate use of fossil fuel inside the plant. An advanced intelligent building management system controls relative humidity and carbon dioxide levels to improve comfort levels for all Associates in the factory.

- Hazardous Waste Disposal

Environmental Protection License from the respective authorities, encourage the 3R strategy (Reuse, Recycle, Rework), while attempting to reduce the waste generated by its processes, monitors noise levels, ambient air quality, temperatures and treated waste water to ensure standards compliance and eliminate discharge of toxic gases. The factory should achieve zero solid waste disposal by recycling or reusing 100 per cent of the solid waste it produces. Even canteen wastes can be composted and it contributes to biogas generation. The green areas in the gardens will increase substantially to provide all occupants with a better view of green area, and two indoor should be introduced to the plant with the largest floor area.

- Companies move from traditional end-of-pipe control to new technologies.
- End-Of-Life Management
- Waste source reduction on the spot.
- Recycling
- Virgin Materials are recycled

Integrated Clean Technology, Waste Management, Energy Management and Environmental Conservation are the operations on the basis of a strong belief that sustainable industrial development can drive its ultimate goal of being a completely green business concern.

All this adds up to lower operating costs and a better planet for all. Lean is Clean. Clean is green, and green is "the new black" that will show up on your P&L.

Importance of costs in the Supply Chains:

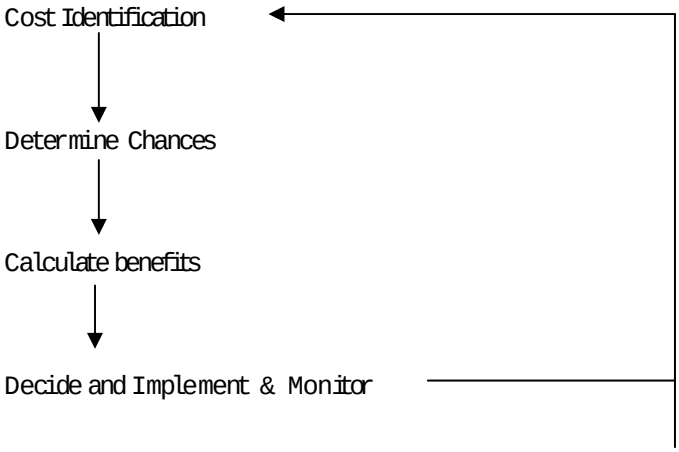
Material handling decisions will have impact on the company performance including operating costs, Investment options, Product quality and have the huge impact on the meeting the delivery schedules also. It is normal tendency the material handling costs with respect to the environmental benefits are overlooked. This overlooked costs have a greater version of impact on the environmental burdens and also but it's a obstacle to improve the financial performance. Apparel supply chain professionals do not attack the concerns of environments with an allaround analysis due to the structure of traditional cost-accounting systems. The Product Cost traditionally includes the raw material and labour costs, and the over heads include the Plant operations cost, wages and other Maintenance costs. The Position of environmental costs is always a paradox in the apparel supply chain. Traditional environmental cost accounting system allocates the cost along all the products even the particular product has less problem on the ecological point of view. But in the Improved allocation, we would like to apportion the costs to the particular product which has the environmental impact. This would help us to design the apparel supply chain better as they help us to analyse the both upstream & downstream processes

which can be fine tuned drastically. For eg : Considering the possibility of re-cycling of materials, the product design stage itself, it would be better to start the material handling. The cost hierarchy identified in the Supply chains are :

1. Conventional costs – which include material and other expenses that can be allocated to the product or process
2. Potentially Hidden – These are intangible costs that are identified as the benefits obtained by the firms and wont be able to trace it the responsible products or processes. eg in the Apparel industries are : Product training course benefits
3. Contingent costs : Future event costs. The potential costs on the future benefits on the apparel supply chains. Such as making it as green factory by reducing the electricity consumption and also Compliance costs, which can attract the buyer after the implementation.
4. Relationship Category : Costs related to subjective prepositions of the firm's stake holders.

The Managerial aspects of cost savings in the Apparel Supply Chain are :

The Decision making frame work also is based on the best practices of the companies that have initiated and implemented environmental accounting systems.



Cost Identification:

Review needs to happen at the systematic level to determine the occurrence of environmental costs. This step will help the professionals who are participating in the supply chain can analyse each and every process and its relevant cost with the environmental impact.
Some of the areas ;

- Material losses during production
- Raw material
- Shift in the change of the Suppliers
- Internal recycling costs

Determine the Chances/Opportunities:

Identification of the several new areas and the potential changes are evaluated to determine which changes will likely yield significant cost savings and reduce environmental impacts. It is much helpful to identify the potential changes which can be evaluated during this phase.

- Appropriate technology
- Involvement of the workforce
- Conduct an Activity based costing analysis
- Information gathering – Production records for material usage rates, Operator training, Maintenance logs, Utility bills, Facility blue prints etc.,
- Interviews
- Supplier analysis
- Successes of exemplar Companies

- Best practices in the industry

Calculate Benefits:

Both qualitative and quantitative analysis of costs needs to be done with more depth. This would be supplemented with the present method analysis and with the proposed alternatives with their benefits.

- How much is the material used and for landfilled ?
- Hazardous materials used in the Processing?
- Total costs Due to overtime, lowered efficiency and quality defects etc.,
- How much will employee satisfaction be improved by switching from a hazardous materials

During the Review of EOQ model also, two environmental considerations being done. Material loses and waste disposal has been included.

$$Q = \sqrt{2DS/HC}$$

In this, H- is the holding cost which will be revised to include the disposal costs also.
Item cost (C) – cost of inventory ($/unit)

	Conventional	Revised
Annual Demand (D)	80,000 Pcs	80,000 Pcs
Set up costs (S)	$ 100	$ 100
Holding costs (H)	10 %	15 % (+5 % for Disposal)
Item cost (C)	$ 6/pc	$6+ $ 2 (Disposal cost)
EOQ	5164 pcs	4216 pcs

With this approach the company also reduce the environmental burdens and decrease the overall costs associated with waste disposals.

Decide, Implement and Monitor:

- Team approach and Consultancy
- Trade off analysis needs to be implemented
- Establish the group for the implementation
- Provide appropriate training
- Computerized environment

Once the decisions are made, the final challenge is implementing the change. Cross functional analysis is the right step in the apparel supply chain. Many companies have practiced the same.

Conclusion

Apparel Supply chain professionals can improve both financial and environmental performance of their systems through the above strategic applications. This paper gives the broader paradigm on the different approaches given by the professionals that can be applied to the apparel field successfully. The trend of maintaining the good eco efficiency, Conservation of scarce resource, avoidance of toxic products in the Green and Lean manufacturing is highly appreciated. The no of factories have started implementing the strategies with an strong aim to reduce the pollution at the source and this process would have started at the earliest stage of product planning itself. The cost controlling strategies are the main elements in Environmental accounting methods which can be highly useful to increase the benefits of the stakeholder.

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