

“SUSTAINABLE SUPPLY CHAIN MANAGEMENT IN FASHION & TEXTILE COMPANIES - A STUDY ON EXISTING SUSTAINABLE TOOLS AND MODELS”

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ABSTRACT

Fashion and textile companies in the current scenario are still awakening to the process of developing a sustainable model for the business processes and supply chain systems. There is no doubt that the textile and fashion industry is significant to global economies as it occupies a substantial 30% share of the total industrial sectors. However, within the context of sustainability, this industry commonly operates to the detriment of environmental and social factors. The companies which are manufacturing fashion products need to realize that producing a sustainable commodity will also help in reducing marketing costs related to the product. Moreover the theory of “Triple P” (People, Planet & Profit) needs to be realized in order to make fashion business successfully sustainable. The fashion consumer is still in quite a dilemma that if the sustainable product actually exists or not and why pay a premium price for such product. The projection of sustainability concepts will be authenticated as the company works on a very transparent sustainable model which is understood and accepted by the consumer. This paper looks into the supply chain problems faced by the garment and textile sector and explores existing models of sustainable supply chain management(SSCM) which can bring in a considerable change in the industry’s current model of SCM. Moreover, there are no models which are found perfectly adequate for fashion and textile sector which further on justifies this research.

KEYWORDS: Apparel Value Chain, Green SCM Models, Social Compliance, Eco-Efficiency, Sustainable Future

INTRODUCTION

Apparel Industry and Supply Chain

Fashion has played an important role in shaping our society and has been an inspiration to many corresponding businesses. It is not only to satisfy human needs, but has allowed us to express our identity, culture and creativity (Cataldi, Dickson, & Grover, 2010). The global apparel market was valued at US\$1.7 trillion in 2012 and According to statistics from the UNIDO (United Nations Industrial Development Organization) Industrial Statistics Database (INDSTAT), around 26.5 million people work within the clothing and textiles sector worldwide (ILO, 2006).As a result of increasing demands for fashion items accelerated by population growth and economic development, a significant volume of apparel products are being supplied and produced. The current trend gave rise to “fast fashion” taking over the industry and production pattern (Bhardwaj & Fairhurst, 2010). Fashion trends rapidly change nowadays and the industry has been required to respond to the speed of turn-over, making profits by selling in quantity with low prices. With need to quickly respond to market demand and severe competition, apparel companies need to try to keep production cost low. In this context the companies compromise on areas which are causing serious environmental and social damage to the societies.SCM issues are brought into the game every time fashion companies embark in sustainability strategies and practices. Indeed,

company's most significant impacts are often found not in its own operations, but in its value chain, upstream in the social and environmental impacts of its suppliers, and downstream in the impacts of its products and services, through use and disposal. (KPMG, 2013). Improving the sustainability performance along the supply chain as one entity is a key aspect of sustainability management (Seuring and Gold, 2013).

Companies have become aware that customers appreciate the value of products and services provided by supply chains without differentiating between the various factors involved (Seuring and Gold, 2013). Moreover, activists and other stakeholders use "name and shame" campaigns to force companies to make supply chain sustainability commitments (Bartley, 2007).

Brand reputation is a major incentive for fashion brands, from luxury to mass market, to embark in sustainability. The incentive goes in either way: ethical and sustainability claims can: i) increase brand value by differentiating the brand offer from competitors' or conversely ii) shield brand value against reputation risks related to "name and shame" campaigns.

Thus, the higher the brand value and reputation, the stronger the impact of supply chain sustainability attributes on companies' marketing strategies. "Some companies have built reputations for ethical practices in one arena—for example, certain apparel retailers celebrate the working conditions at their first-tier suppliers. But all firms will find that consumers' interest can stretch farther back up the chain. As Tesco and Wal-Mart have discovered, there is little point in trumpeting the excellent conditions for the stitching of jeans if the cotton is being harvested unethically." (New, 2010)

Fashion was actually among the first industries to prioritize supply chain sustainability back in the '90s, stimulated by the iconic Nike scandal about children labor in 1996¹. A few years after the scandal explosion, under pressure by NGOs and accused to exploit its workforce and damage the environment, Nike had to admit, in a 2001 report, that the company was not able to properly and quickly address the issue because of the lack in the company's SSCM standards: "Our goal is to continue to do everything we can to eradicate child labor in our contract factories, but we can be certain that cases will occur. We are just beginning to truly understand what being a sustainable business means" (quoted in Day, 2001).

Sadly, almost 20 years later, a similar declaration of inadequate or improper SSCM was put forward as defense by some fashion brands involved in the 2013 Rana Plaza tragedy².

Nonetheless fashion brands practices and organization, international standards and ONG campaigns have evolved since the Nike scandal days. The observation of two decades developments in the fashion industry SSCM practices provides us with some stylized facts.

As a result of mass production in developing countries where there are poor environmental and social regulations, lower cost, severe market competition, increasing demand, and production chain complexity in time and scale, the apparel industry continues creating challenges to sustainability both at the regional and global level (Claudio, 2007).

¹[reference to the Nike scandal]

²[reference to the Rana Plaza tragedy]

Problem Areas in the Apparel Supply chain

The major area where the fashion and garment supply chain is encountering on a constant basis is the social and environmental impact on the developing countries where the suppliers and manufacturers are located. Following are the problems which have been a matter of discussion in the textile and garment sector.

Environmental Impact

Although environment is an important component for achieving sustainability, literature suggests that environmental issues are not generally addressed as much as human rights issues in apparel supply chain management schemes (Jørgensen & Pruzan-Jørgensen, 2003). After the launch of the Greenpeace DETOX/the fashion Duel campaign in 2011 and the establishment of the Sustainable Apparel Coalition that is working on the Higg index things have changed and today the environmental aspect is at least as important as the human rights issue. The impact on the environment depends on the kind of product being manufactured and supplied to the respective locations; the impacts of environment could be in for of polluting air, water and land to start with. As an example, the apparel production is highly water intensive. About 60kg of water is consumed and 45kg of waste water is discharged per kg of output (Allwood, et al., 2006). In addition to the chemicals, various heavy metal ions could go into the textile itself (Guner & Yucel, 2005). These chemicals may remain in the textile and cause allergic reactions to end consumers when wearing the products and pollute soil and ground water when disposed (Guner & Yucel, 2005). The whole process is also energy intensive. Because the current energy generation is mostly from non-renewable sources, its contribution to climate change is also unavoidable. Thus environmental degradation caused by apparel production goes beyond borders if seen from a life cycle perspective, though the impacts are not visible when items are purchased. As Sherburne, 2009 points states that the biggest impacts of textiles and garments occur when they are being used by the consumer (estimated at 75–95% of the total environmental impact) and is mainly explained by the use of electricity, hot water and washing and drying processes. This contributes to the generation of greenhouse gases and global warming. One of the very fine examples from a company to reduce environmental impact is IKEA where they extensively use flat packaging to ship their goods from their warehouse to retail locations which immensely reduces the CO₂ emission to the atmosphere.

Social Impact

Research Studies have highlighted that the garment industries not only produce environmental impact but they also affect the social well being of the people involved in the process. Some of the issues highlighted for social impact would be social compliance where in the rights of the workers are saved and the working conditions are not too extreme. Because much of the clothing production does not require high skill, workers tend to be young, not highly educated people of whom 70% are female (Allwood, et al., 2006). In Bangladesh, 40% increase in export was mainly fuelled by ladies garment manufacturing in the past seven months as of February 2011 (Chowdhury, 2011). They may lack knowledge in regards to labor rights and benefits. As a result, they could be vulnerable to unreasonable termination of contracts, discrimination and harassment. Child labor is also often detected by media and Non-Governmental Organizations (NGO). In this context big garment companies producing fast fashion have to keep a strict check on their suppliers in order to produce what is ethical and doesn't cause harm to the workers. In addition, though minimum wages are usually set by national or regional law, it is sometimes well below the living wage (Miller & Williams, 2009). The suppliers need to abide by the social compliance manuals which are need to be compiled by the companies producing big order quantities.

Energy Consumption

Energy consumption in the retail sector is also a growing area of concern to both the company and the environment. A 20% cut in energy costs represents the same bottom line benefit as a 5% increase in sales. (Energy management, Carbon trust, 2012). An example of more efficient use of electricity as a source of energy is the use of Light-Emitting Diode (LED) technology in retail outlets. The efficiency of conversion from electric power to light is higher with LED lights than with incandescent or compact fluorescent alternatives. Big retail giants use this technology as a cost cutting measure and is by far is more effective is conservation of energy in the retail industry. According to Carbon trust around 40 % of energy is used in lighting, 30 % is used in heating the retail spaces, 5 % in hot water and ventilation, another 10 % each for computing and catering approximately. Marks and Spenser noted as one of the most sustainable companies in the U.K launched Plan A program on 2007 aimed at becoming world's most sustainable major retailer by 2015. As a part of the program they devised sourcing or generating 100% 'green' (renewable) electricity for M&S stores, offices and distribution centers in the UK and Republic of Ireland and reducing the amount of energy we use in our stores by 25% per square foot of floor space.

Waste Reduction

Garment companies also accumulate a substantial amount of waste with materials such as paper and fabric material. 10-20% of all textiles in the fashion industry is estimated to be wasted. About 15% of fabric intended for clothing ends up on the cutting room floor. This waste rate has been tolerated Industry-wide for decades. The U.S. EPA estimates that textile waste occupies nearly 5% of all landfill space, moreover Up to 95% of the textiles that are land filled each year could be recycled. (Textile exchange, 2012). There is a lot of fabric left over's from the cutting, pattern making, sewing and finishing departments of the industry, whereas a lot of documentation of the industry takes places using paper which is just dumped without any realization. The garment companies could set up in house recycling sections to re-use the paper and fabric materials used in the whole process, hereby cutting costs and contributing to a more sustainable process. An average recycling machine each for paper and fabric recycling costs around 3000-6000 \$ depending on the speed and capacity.

Need/Importance of the Study

On researching over the web, research papers and various SCM models it is found that available to date research on sustainable supply chain management (SSCM) is still at the development stages and there is no precise conclusion to which model would be more practical in application in the garment sector. There are multiple different competing conceptualizations of SSCM, and it would to his paper would discover which is most appropriate/applicable in the context of clothes manufacturing or, more precisely, clothes manufacturing in developing economies (CMDE). The models described are still being applied to the major global supply chain giants such as Wall mart, IKEA, Tim Horton's, Xerox etc and are finding new and innovative ideas to make the supply chain greener and subsequently profitable to the companies. The garment sector needs to integrate and function according to the green solution provided by different models and finally develop a robust model of SSCM for a better future. As it is seen that the current research in SSCM lacks consistency in defining sustainability and uptake of the theoretical background in the apparel value chain. There are observed research gaps in developing a suitable model for sustainability in fashion and textile industries. Therefore, the aim of this paper is twofold:

- To provide a comprehensive understanding of SSCM and evaluate the work done in fashion industries till date.
- To explore on relevant concepts, models and theories in the field of supply chain management and buyer-seller relationships.

The Research Question

- How can businesses collaborate effectively and legitimately (also among competitors) to drive collective action for sustainability?
- How can garment industries incorporate a model through comparative evaluation of the models of sustainability?

RESEARCH DESIGN AND METHODOLOGY

Reviewing the Journals: Following types of articles has been reviewed: comprehensive literature reviews, case studies and surveys, theoretical and conceptual works Around 50 research journals and reports were studied on the themes such as green marketing, problems of sustainability in garment and textile sector, energy consumption in industrial sector, waste reduction and packaging, models of SSCM, social compliance and supplier-company relationships. Different models of SSCM were explored and the models discussed in the paper are the ones which were found to be the closest in functionality and most likely to be achieved in the coming future.

- **Exploration of the models in the garment industry scenario:** All the models discussed in the paper have been put in accordance with the current problems in the garment industry and the models describe individually how they could provide us with most desirable solutions. The progress made in the garment sector has been kept in accordance with the models and required areas of concern have been solved by the models.
- **Analysis of the models:** Towards the end each model is analyzed individually with limitations and advantages and compared with one another to provide the best solution for SSCM in the industry.

ANALYSIS OF MODELS

The 2016 Future Supply Chain Model by Global Commerce Initiative, Capgemini (May 2008)

This futuristic model aims at an industry featuring extensive collaboration in SCM to increase sustainability across industries. Collaboration will not only help the industries to work together but will also save a lot of environmental impact securing a stronger framework of sustainability. Moreover by collaborating the companies could come together in solution finding process and achieving results faster instead of dealing with problems individually. The garment industries haven't found correct measures to work together in a collaborative manner with the same industries and other parallel industries. To explain the model we quote an example of horizontally integrated garment company producing for the local and international markets such as ZARA, H&M, and GAP and have a substantially big supply chain management systems operating in the current scenario.

From the figure below we would explain how collaborative warehousing could be an effective way of sustainability in SCM. The following four collaboration concepts are at the heart of the overall future supply chain architecture:

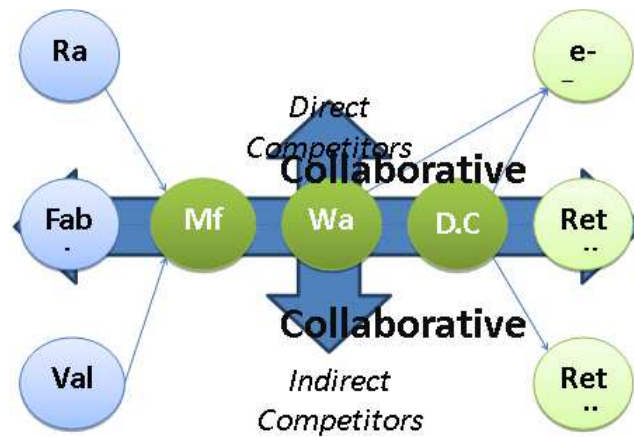


Figure 2: Collaborative Apparel Supply Chain

- Information Sharing** – Information is the driver that serves as the “glue” to create a coordinated supply chain. In the existing models of supply chain there is a visibility of smooth information flow but still a lot of scope still exists in improving the information flow. One of the good examples to exhibit success in supply chain is ZARA, as an example if a black trouser is getting out of stock from a store in Dubai, all the participating members of the supply chain from the raw material to the final distributor are informed simultaneously via ERP and MRP systems about the requirements and value fulfillments of the particular product. But the problem is while product assembly operations are being conducted online, more complex operations such as specifications of the fabric are still off-line which is a very critical factor in garment manufacturing, a sustainable solution to such a problem could be developing an online collaborative fabric library by the garment industries of that particular country or region. Furthermore, the future model is based on multi-partner information sharing among key stakeholders: consumers (the originators of the demand signal, either from home or from a store), suppliers, manufacturers, logistics service providers and retailers.
- Collaborative Warehousing**- As the emphasis of the model lies in collaboration the first stage after the manufacturing processes in warehousing. As realized clothing and food are the most essential needs of human being and need to be available at all corners of the globe where life exists. In this context the concept of collaboration works very efficiently. Warehousing is one of the most cost extensive operations in SCM and often it's debated to as how to optimize the warehousing operations by the company. Moreover due to ever fast changing fashions and uncertain demands it becomes quite difficult to manage warehouse for mid-size companies to hold up a certain cost for warehousing. In accordance to this model there could be two ways of incorporating collaborative warehousing in apparel supply chain. One could be that small and middle size apparel companies combine together with keeping mutual trust and confidentiality as prime values and build joint warehouses for particular locations in countries and regions, this way smaller companies could share cost of warehousing and could optimize the resources to a better extent. Second way could be collaborating with the indirect competitors such as FMCG goods companies more precisely non-perishable/non-liquid goods as there is always a probability of the garments being spoiled or staining. This idea has a certainty as FMCG products are daily products and such companies strive hard to reach consumers in the most difficult areas and there would be no possibility of capturing the competitor's consumers. Moreover as concluded by the model warehouse locations on the edge of

cities would be reshaped to function as hubs where cross-docking will take place for final distribution.

- **Collaborative City Distribution-** In today’s market speed of delivery is the heart of the company’s survival. With implementation of newer methods of selling and most companies indulging in them such as e-retailing timely distribution becomes more crucial in occupying market segments. In fashion especially where the consumer mind is extremely fickle the companies need to provide the right product and the right time and the right price. Moreover big apparel giants concentrating on mass producing for middle and below market segments would prefer to be present in most locations inside a country or region which can be easily supported by collaborative city distribution by collaborating with indirect competitors such as FMCG goods as stated above. This would also support small order distribution which often is a case in case of fashion and lifestyle products. Other than cost efficiency and wide distribution one of the other problem areas which this model addressed are environmental and social impacts in distribution. Optimization of logistics through collaboration will not only control the CO₂ emissions in the atmosphere but will also decrease traffic congestions which is also an increasing concern for governments in various developed parts of the world. Lastly, the mode of distribution which would be by mini-vans, trucks, trains and air will also be optimized and would be used more efficiently.
- **Collaborative Non-Urban Distribution-** The challenges magnify as the apparel products have to reach non-urban the companies are striving hard to supply merchandize to non-urban places. Factually it is realized that there is a growing consumer demand in non-urban areas as in many non-urban areas there could be many flourishing business which make a strong consumer market gradually but if the consumer demand is not satisfied at the right time the consumer tends to shift to more urban buying and thus decreasing the size of the future markets. Subsequently, apparel companies should collaborate with the FMCG companies to achieve wide spread distribution and cost effectiveness. Non-urban areas will have regional consolidation centers in which products will be cross-docked for final distribution. Last but not the least this would be a very grand opportunity for E-retailing to flourish as a new business in many developing regions of the world biggest example of such an opportunity could be African countries such as Nigeria, South Africa, Ethiopia, Kenya & Botswana. It would also strengthen and solidify the existing e-retailing companies from developed countries.

Findings of the 2016 Model: The total impact of this supply chain redesign (even taking into account the usage of current transport and storage technology) could potentially:

- Reduce transport costs per pallet to the order of more than 30%;
- Cut handling costs per pallet to the order of 20%
- Reduce lead time by 40%; and Cost Reduction
- Lower CO₂ emissions per pallet to the order of 25% whilst also improving on-shelf availability.

The Sustainability Oriented Innovation (SOI) Model for SCM

The SOI model aims at innovating activities that a firm engages in order to become sustainable. This model is developed by Dr. Richard Adams, University of Exeter in association with NBS (Network of business and sustainability, 2013).

The aims of the model are listed below:-

- To develop innovative strategies for supply chain models inside companies.
- Deliberate changes to products and processes.
- Social and Environmental change and adding on eco-value to the company's operations.

The framework of the model divides the model into three stages:-

Operational Optimization

In the stage of Operational Optimization, the organization actively reduces its current environmental and social impacts without fundamentally changing its business model. Referring back to Figure 1 the garment industry is responsible for causing lot of harm to the society and environment as stated above in the problems of this industry. Starting from textile production to the final disposal of the garment each stage causes a substantial impact on the surroundings. In the recent time there has been a lot of debate on the companies being very specific on choosing their suppliers, as the garments are being majorly sourced from the developing nations the suppliers of the finished garment often land up in miserable social compliance regulations which is an extremely anti-sustainable concept. In confrontation with one of the Bangladeshi officials on anews channel related to the incident recently occurred in Bangladesh, he stated that the reason of menial wages of the workers is the buyer itself. He further added that the buyer till date wants to pay the same price what they used to pay five years ago which further on depletes social compliance. Around 70% of clothing workers are women (Hernández, 2006). In the garmentindustry, women typically sew, finish and pack clothes. Supervisors, machine operators and technicians tend to be men—who earn more. Such cases are examples where the buyer needs to set proper specifications manuals to source vendors and needs to keep a strict control on vendors in developing nations in order to reduce the impact on the society. Further on as described above textile processing also releases a lot of chemical in to the land and soil polluting the sub-urban surroundings of the cities. This model innovates to “do less harm.” Innovations are typically incremental, addressing a single issue at a time. Using new technologies is a way suggested by the model to reduce impacts while maintain the business. The garment sector should innovate within the companies to reduce cost and control the environmental and social impact at the same time at this stage. IKEA employs a ‘Staircase Model’ which encourages continuous improvement from its suppliers by establishing four levels of progressive achievement. Also, IKEA audits are not just ‘box-ticking’ exercises. Each auditor must “check that procedures work in reality.” Auditors are required to “explain the IKEA philosophy and check that the supplier understands the key environmental impacts and has started to measure and follow up.”(Unchaining Value, 2008. UN Environment Program).

Further on this model divided a company into three levels of operation on how to achieve a sustainable outcome.

Organization Level- Starting from organizational level the changes could be implemented, as stated below are the areas where the industries need to concentrate.

- **Pollution Controls** –Water and land pollution are the important areas of development and change in this sector. Textile processing not only consumes a lot of water but also pollutes it after processing and as the water mixes in rivers or soil, it causes further damage as this discharges water contains toxic chemical materials such as dyes. China has some of the worst water pollution in the world, with as much as 70% of its rivers, lakes and reservoirs

being affected by all types of pollutants. About 20% of the organic pollutants from all sources in China are accounted for by discharges from textile industry. (Brigden K, Labunska I, Pearson M, Santillo D & Johnston P, 2011).

- **Waste Diversion-** Garment industry produces waste during pattern making (paper), cutting and sewing (left over fabric pieces and sample garments). Such waste paper and fabric could be recycled and used again in the chain reducing costs and contributing towards eco-packaging. Using recycled cotton saves 20,000 liters of water per kilogram of cotton, a water-intensive crop. The U.S. EPA estimate that only 15% of all textiles are recycled therefore there lies a large scope in recycling the waste from the textile sector.
- **Energy Efficient Lighting-** As discussed earlier use of energy efficient modes of lighting such as CFL and LED optimizes and reduces cost of energy in a company at all stages.
- Use of Renewable Energy such as wind and solar would also add to making a company more sustainable, moreover collaborating and supporting renewable energy projects in developing countries would enable a collective industrial growth.

Product Level- At the product level also companies could also optimize resources by the following ways:-

- **Reduced Packaging-** Referring to the point above on waste diversion we could utilize the recycled paper and fabric for packaging as a direct implementation in our companies, moreover efforts should be made in areas of reducing plastic as a packaging material which would further help in optimization.
- **Decreased Use of Raw Materials-** Fabric consumption has been an area of concern to the garment companies as it's one of the most crucial areas to support better product development as it's an effective costing measure.
- **Optimization of Product Size/Weight for Shipping-** Muji, a Japanese retailer has devised ways to pack a t-shirt in a vacuum packed cube form; such methods save a lot on shipping costs and reduce pollution content as due to reduction in packaging we can ship more at a point of time.

Service Level- At the service level we would concentrate on the components of logistics as in how to minimize the environmental impact.

- **Hybrid Electric Fleet Vehicles-** hybrid vehicles have found a niche segment in the consumer market and soon they would also need to occupy the commercial sector as its most effective use of energy with reducing the environmental impact.
- **Delivery Boxes Redesigned -** this point is from Single to Multi-Use of boxes used for packaging and shipping. The delivery boxes would be designed in a manner to be reused in order to reduce consumption of materials for packaging and thus reducing cost and damage to the environment.

Organizational Transformation- “New Market Opportunities”

Sustainability is often talked about as a tool to provide new angle to marketing and promotions. But a sustainable society is not possible without sustainable individuals (Cavagnaro and Curiel 2012). That is, individual capacities seem to be at the heart of the issue. The consumer today is interested to know more and discover the true market supplying green

products. The consumer today really cares about where the product is coming from and novelty at the ends of sustainable products is at high demand at the moment in the fashion market. An example of such a product in this case would be Earth keeper's collection by Timberland, introduced in 2009; it now makes up 75% of all Timberland footwear. The company set an SPG goal: Style, Performance and Green. It worked with vendors and manufacturers to reduce water usage, pushed for the use of recycled plastic bottles (PET) bottles in linings, laces, uppers and even faux shearing. Rubber soles are made out of recycled rubber. When cotton is used, it's organic. Introduction of new recyclable/green materials and technology to process these materials would help to reshape the market offering in case of eco-goods and develop a new market space which would offer doing well to the society. Green apparel and accessories still make up barely more than 2% of the \$200 billion fashion business in the U.S., says Marshal Cohen, chief analyst at the NPD Group, a market research firm. Still, that's about \$5 billion.

Now a factor which holds importance in organizational transformation is consumption. Total UK household consumption on clothing and footwear is € 59 billion. Thus, British consumers spent about €900 on fashion; this is slightly above the EU-27 average of € 700 per year. (www.fashionunited.com). the consumption of human in case of clothing would possibly increase in the coming future which would be an alarming situation in the coming future, the concept of conscious consumption along with change in consumer habits would be a vital part in encouraging a more sustainable consumer behavior. Over the past decade, sustainability and ethical conduct have begun to matter in fashion (Emberley 1998; Moisander and Personen 2002); companies have realized that affordable and trend-sensitive fashion, while typically highly profitable, also raises ethical issues (Aspers and Skov 2006).

Lastly the use of information technology of processing the information though the internet as in making the information available online would decrease the use of resources such as paper in case of billing, documentation etc.

Systems Building- “Societal Change”

Towards the summary of the model it intend towards developing a societal change through collaboration with counterparts in the market atmosphere. Collaboration is a competitive weapon that you can use to improve business performance. It allows you to establish strategic partnerships with your suppliers and trading partners in order to set mutually beneficial goals and share business processes and information. Collaboration helps drive market share, sales, and product adoption while maximizing your return on assets (ROA) and return on investment (ROI) (SAP, 2007). According to Kate Fletcher (2008), the process of transforming the industry into something more sustainable—and more sensitive to our needs—takes time. It is a long-term commitment to a new way of producing and consuming that requires widespread personal, social and institutional change. It also suggests that companies offering different services and products can come together to achieve sustainability and individually it would be difficult to find a way to achieve it.

Tools for Sustainability: The HIGG Index 2.0

The Higg Index 2.0 was launched December 2013 by Sustainable Apparel Coalition. Consumers choose products based on trusted sustainability information. The focus of the Sustainable Apparel Coalition is the development and support of the Higg Index. The Index asks practice-based, qualitative questions to gauge environmental sustainability performance and drive behavior for improvement. It is based largely on the Eco Index, Nike's Apparel Environmental Design Tool, Global Social Compliance Program (GSCP) reference tools, and Social/Labor Best Practice Tools (e.g., SAI Social

Fingerprint, FLA Sustainable Compliance Initiative, etc.), however it has been significantly enhanced through a pilot testing period and over 14 months of organizations using the Higg Index 1.0. Developed by the Sustainable Apparel Coalition, the Index is the first public rollout from the motley crew of manufacturers, retailers, non-governmental organizations, and academic experts, which include such bold-face names as Adidas, Esprit, Gap, H&M, Levi Strauss, Nike, Marks & Spencer, Patagonia, Timberland, Target, Wal-Mart, the National Resource Defense Council, and the U.S. Environmental Protection Agency. The HIGG index is composed of a set of tools:-

Facility Tools

There are two tools that are ready to be used by facilities, vendors, or manufacturers to assess specific facility sites:

- **Facility Module–Environment:** used to assess environmental performance of material, packaging, and manufacturing facilities.
- **Facility Module–Social/Labor:** used to assess the social and labor performance of material, packaging, and manufacturing facilities.

Brand Tools

There are three tools that are useful to Brands:

- **Brand Module – Environment: Apparel:** assess apparel and footwear product-specific environmental practices at the brand level.
- **Brand Module – Social/Labor: Apparel/Footwear-:** assesses social and labor apparel and footwear product-specific social and labor practices at the Brand level.

Product Tools

There are two tools that can help to understand the impacts of products:

- **Rapid Design Module (RDM) –:** Prototype to test how we can guide designers on sustainable product design with directionally correct information and streamline decision support framework.
- **Materials Sustainability Index (MSI) Data Explorer:** online platform to allow users to understand the data and methodology behind MSI Base Material Scores, which can be seen in the RDM.

Impacts of the HIGG Index

Because the Higg Index is a tool primarily created by industry, for industry, early adoption of its metrics in decision-making processes seems high. There stated to use the HIGG index for their products such as Adidas who have commented that they intend for the Higg Index to form an increasingly important part of our overall product creation and production strategy in the years to come. The MSI is also a very precise statistical tool to measure the impacts material wise, the higher the score the more sustainable is the material.

Material (including base processing)	Chemistry score*	Energy/greenhouse gas emissions intensity score	Water/land intensity score	Physical waste score**	Total score
Rubber, natural latex	5.4	10.5	12.1	14.0	42.1
Down	5.1	10.3	7.8	15.0	38.2
Polypropylene	6.0	9.3	8.2	12.6	36.1
Polyvinyl Alcohol (PVA)	5.5	9.1	8.1	11.8	34.5
Corrugated box	2.3	9.4	12.5	10.1	34.4
Polyethylene foam	5.6	8.9	8.1	11.8	34.4
Zinc	5.5	8.7	5.3	14.1	33.4

Figure 3: Materials Sustainability Index (MSI), Source: Sustainable Apparel Coalition

Further Scope of Research

Further on in this research the models could be implemented in some garment industries to see what problems could be encountered and a statistical analysis could be provided in order to prove the efficiency of these models and tools. Impact of various materials and process could be mathematically calculated and proceed towards reducing the impacts in the future.

CONCLUSIONS

The first model 2016 Future Supply Chain Model by Cap Gemini is a model which focuses majorly on collaboration in distribution and is quite compact in nature but this model doesn't focus on how to reduce social impacts which is a very critical problem of the garment sector. However the idea for collaboration for distribution could be taken directly from this model as it would help garment companies to widely distribute the product in urban and non-urban areas. Coming to the second model describing about sustainability oriented innovation, this model is by far a very extensive model which covers quite a lot of problems which garment sector suffers today. This model satisfies the need of examining the value chain from the supplier to the convincing of the final consumer which is quite a requirement for garment sector. Our sector needs changes to be implemented from each stage but finally the consumer can't be left out as the buyer of the final green product should be thoroughly convinced in the buying process to last it longer. The model examines each stage very precisely in a result achieving approach. In our opinion this model holds more proximity to the garment sector and is a complete solution.

Last but not the least the HIGG index is a tool to measure the impact on the environment and society which is a very important tool to achieve success in greening to supply chains. This tool should be implemented in garment firms to at least realize the impact caused and gradually come to a better sustainable solution in the future. As a result of the review we believe that HIGG index would be a benchmark for the whole supply chain to realize the impact on environment and the final consumer would find it much easier to realize the actual values of the product and would assist further on in better buying behavior for eco products. The garment sector at this moment needs to arrive to a more green policy for the products. There is no doubt that fast fashion encompasses a major section of our industry but still there is an ever growing market for green products. Also it is true that garment industries might face challenges to implement such models in the coming future as the value chain in garment sector is highly disintegrated, its seen that the suppliers are generally located in the developing countries when in the value chain is in very miserable condition as explain above in the paper. Big fast fashion players should ensure that they follow certain standards before choosing their suppliers and thus it will enforce a change on a global platform and thus enforcing such models for a better sustainable green future of green products.

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Annexure

1. Table 1 :-Country of Origin Labeling Rules
2. Figure 1 - The transparency ladder
3. Figure 2: Apparel Supply Chain
4. Figure 3: Materials Sustainability Index (MSI), *Source: Sustainable Apparel Coalition.*