

MAPPING THE ENVIRONMENTAL SUSTAINABILITY PRACTICES IN A GARMENT MANUFACTURING UNIT: A CASE STUDY ANALYSIS TO IDENTIFY INHIBITORS

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ABSTRACT

The research was aimed at mapping the environmental sustainability practices of a leading shirt manufacturing unit in India against a developed framework for environmental sustainability and finding out factors preventing the company from realizing their sustainability goals

A suggested framework was developed after analyzing the capabilities and assessment objectives of the established or proposed frameworks for gauging the environmental sustainability of a garment manufacturing unit through a thorough literature review

The sustainable manufacturing practices of the selected company were mapped against the developed framework through a case study format. Content analysis of primary data from field studies, on-site observations and information gathered through interviews with stakeholders was used to identify significant practices adopted and factors hindering in achieving the sustainability targets

The key findings of the study indicated the commitment of top management, reduction in costs and a competitive edge over other companies as drivers for the implementation of sustainable practices. Some of the key areas were identified where the focus of the company was needed. Knowledge gap and human negligence/ reluctance were identified as the key inhibitors in achieving the desired results for the company

KEYWORDS: *Environmental Sustainability, Environmental Sustainability Framework, Content Analysis & Case Study*

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INTRODUCTION

The Fashion Industry is synonymous with mass manufacturing through a complex supply chain network involving high levels of resources consumption and emissions leading to negative environmental impact. Apparel and Garment Industry is an intrinsic part of the Indian Textile Sector giving employment to 12.3 million people and produces 3.6 million tons of apparel and garments. This readymade garmenting segment contributes to 42% of the Indian textile exports which include cotton garments and accessories, man-made fiber garments and other textile clothing. (MOT Annual Report, 2017).

The apparel and fashion Industry remains world's second largest industrial polluter, accounting for a major chunk of global carbon emissions. With each step of the clothing life cycle leaving a carbon footprint, sustainable production has become globally relevant, driving companies to incorporate sustainability concepts into their business practices. Achieving a sustainable framework across the entire business requires a strategic approach that captures

the multiple dimensions of sustainability (i.e., economic, social and environmental) and relates these to the specific targets and timelines for achieving them (Subic et al., 2012).

Voluntary environmental management (EM) initiative by industries was intensified worldwide with the publication of ISO 14001 environmental management system (EMS) in 1996. (Gbedemah, 2004) Many organizations have undertaken environmental reviews or audits to assess their environmental performance. The emerging consensus is that when environmental management system becomes a part of management of any organization, only then an organization can survive in the long terms. (Roy, 2011)

Sustainable fashion is taking center stage with environmentally conscious stakeholders. Renowned brands like Levis and H&M are incorporating the concept of sustainability in every stage of their products' life cycle. Sustainable production is a core area of interest for brands to reduce their carbon footprint. The hunt for lower production costs is leading to a relocation of the production sites and it is becoming increasingly important for the garment manufacturing units in India to become environmentally conscious in order to offer a competitive advantage.

LITERATURE REVIEW

Sustainability initiatives are crucial to companies' strategies, especially those in sensitive business areas (e.g., intensive use of natural resources, poor labor conditions), as is the case of the fashion industry (Caniato et al., 2011). Environmental sustainability is becoming increasingly important within the industry, both for its growing relevance in the value proposition of well-established international brands and for its role in enhancing new market opportunities that smaller companies are exploiting to find a competitive niche. Although sustainable development has been advocated as a guiding principle in the industry, it still must be assessed and transformed into business practices, particularly within the supply chain. The relationship between the adoption of green practices and environmental performance is not clearly understood, and the possibility of leveraging environmental sustainability to obtain a competitive advantage on the marketplace has not been analyzed. (Caniato et al., 2011)

An article by Aleksandar Subic presents the developed sustainable manufacturing framework for Sustainable Manufacturing of Sports Apparel and Footwear. The research presented in this article is aimed at developing a sustainable manufacturing framework (SMF) by identifying the capabilities that suppliers require in order being able to achieve the desired environmental targets. The finalized SMF included eight level one capabilities, termed "clusters" and eighteen level two capabilities, termed "applied outcomes. These groups and clusters were aligned with the main sustainability objectives of the manufacturer. These clusters were broadly grouped into three areas of sustainable manufacturing: Resource Efficiency (cluster 1 to 3): energy efficiency, water efficiency and material efficiency; Emissions Reduction: (clusters 4 and 5): controlling and reducing environmental flow, carbon emissions; Improved Management Practices (clusters 6 to 8): effective environmental management system, environmental decision making and continual environmental improvement. (Subic et al., 2012)

A study by Hakan Karaosman presents a classification framework in which sustainability practices are categorized according to a three-dimensional concurrent engineering framework by focusing on product, process and supply chain levels. It provides a classification framework divided into sustainability aspects and categories at operational levels. The framework also some illustrates the strategic practices to be taken to advance sustainability in fashion operations. Key aspects of Product Design, Production Process and Supply Chain looks at the practices implemented under

the identified key areas of Materials, Water, Biodiversity, Effluents & Waste, Products & Services, Labor Practices & Decent Work and Society Product Responsibility have been established in the framework. (Karaosman et.al., 2016)

Shanthi Radhakrishnan, in her study revolving around The Sustainable Apparel Coalition and The Higg Index, recognized that environment management systems and sustainability frameworks encourage environmental awareness and focus on strategy and decision making. A sustainable manufacturing framework, in consultation with the manufacturer and participating suppliers along with a review of the sustainability targets and documents of the manufacturer and similar global manufacturers has been presented in her paper.

The framework proposed in the paper – ‘Practices for Environmental Sustainability in the Textile, Clothing and Leather Sectors: The Italian Case’ (Resta et.al, 2014) comprises of the following categories: Products and Services, Supply Chain Management, Production Process, Culture, Governance. Practices related to the energy saving (plant efficiency optimization, energy utilization reduction, renewable energy production and consumption, etc.), waste reduction (Carbon Capture and Storage, waste management, waste utilization as energy source, etc.), water (water utilization reduction, water recycling, etc.), process materials (environment pollution by process materials reduction, etc.) are also included under this category. The final framework presented was used to map the environmental practices implemented by the Italian companies operating in the TCL sectors. (Resta et.al, 2014)

The paper titled ‘Environmental sustainability in fashion supply chains: An exploratory case based research’ identifies that internal drivers like corporate values as the commitment of the owner or of the top management to sustainable objectives, area propelling factor in companies. These companies assert that their to the reduction of material, energy, and Market pressure is also a relevant driver for SAFs, but it is a consequence of a complete redesign in the business model. The paper demonstrates yet another significant insight law compliance is not a relevant driver for these companies because they want to go beyond the lower boundaries defined by regulations in terms of green performance (Caniato et.al., 2011)

RESEARCH METHODOLOGY

A comprehensive review of relevant literature established that given the vastness and complexity of the fashion supply chain network, integrating sustainability throughout fashion supply chain for well-established garment manufacturers would prove to be an expansive, step-by-step process. Thus, the specific segment of the Environmental Sustainability in Garment Manufacturing was elected as the topic of further exploration for this paper.

The initial phase of our research consisted of reviewing the existing literature available on frameworks for sustainable manufacturing. With the aim of understanding where the garment industry stood in context of the established or proposed frameworks for gauging the environmental sustainability of a company, a thorough research was done identifying and analyzing literature available on the sustainability practices throughout all segments of fashion supply chain. After identifying papers which talked about sustainability in the apparel manufacturing processes of the Fashion Supply Chain, 4 papers were selected as substantively relevant literature for thorough analysis.

The selected frameworks were then reviewed and analyzed by considering their capabilities and assessment objectives. A proposed framework was developed after comparative analysis of the selected frameworks and detailed study of the sustainable manufacturing practices being followed in the garment industry. This framework was then used to gain an insight of the sustainable manufacturing practices of one of the leading shirt manufacturers of India through a case study

format. Content analysis of primary data from field studies, on-site observations and information gathered through interviews with stakeholders was used to map the significant practices adopted by the company.

FRAMEWORK FOR ENVIRONMENTAL SUSTAINABILITY PRACTICES IN GARMENT MANUFACTURING

A detailed review and analysis of the sustainability practices in fashion supply chain resulted in the identification of some core elements responsible for mapping sustainability efforts vis à vis garment manufacturing. These key elements were extracted and compiled into a process specific framework for Environmental Sustainability Practices in Garment Manufacturing. The suggested framework consists of the following eight categories: Energy Management, Water Management, Material Management, Waste and Effluents Management, Chemicals Management, EMS, Carbon Emissions and Compliance. Performance indicators for each category of the framework were established as the relevant factors for the purpose of internal measurement and external reporting.

Table 1: Theoretical Framework for Environmental Sustainability Practices in Garment Manufacturing

Topic	Category	Performance Indicators
Environmental Sustainability	Energy Management	<ul style="list-style-type: none"> • Reduce energy and fuel usage • Efficient use of energy, fuel, processes and buildings • Use of energy from renewable resources
	Water Management	<ul style="list-style-type: none"> • Reduce water Consumption • Maximize alternative water supply • Water recycling and reuse • Water waste treatment
	Material Management	<ul style="list-style-type: none"> • Efficient resource utilization • Material flow usage Optimization
	Waste and Effluents Management	<ul style="list-style-type: none"> • Waste Management • Appropriate Handling, storage, treatment and disposal of waste • Prevent ground water and land contamination
	Chemicals Management	<ul style="list-style-type: none"> • Adopt policies for Restricted Substance List (RSL) that considers health impacts to workers and consumers suppliers/factories to support compliance
	Environment Management System	<ul style="list-style-type: none"> • Follow Environmental established auditing processes • Comply with environmental systems' standards
	Carbon Emissions	<ul style="list-style-type: none"> • GHG and air emissions • Account for carbon emissions • Reduce carbon emissions
	Compliance	<ul style="list-style-type: none"> • Verification of sustainable manufacturing processes • Process certifications (i.e., ISO 14000, 14001, Higg Index etc.)

This framework was then used to classify and analyze the sustainability practices followed by a leading shirt manufacturer in India.

CASE STUDY

Company Profile

The Company X Pvt. Ltd is a part of a world class global player in textile and garment operations, spanned across four countries. The company produces 5,000,000 Shirts per year for some of the leading brands of the world and is characterized by its strong quality. Having a workforce of 2100, the commitment of Company X towards sustainability is from the top level management.

The environmental responsibility has emerged as a core focus area of this group and all stakeholders within factory are being encouraged to adopt environmentally conscious practices for resource conservation and pollution prevention. Sustainability Key Performance Indicators (KPIs) have been identified by the management. Monitoring systems have been introduced to better monitor energy and water consumption as well as waste and effluents. Aggressive yearly targets are set and the reduction trends in energy, water consumption and waste generation have been significant. The theoretical framework described in figure 1 was used to map the sustainability efforts made by Company X. The mapped findings were mentioned in the following tables 2 to 8.

Table 2: Energy Management Initiatives of Company X

Reduce Energy and Fuel Usage	<ul style="list-style-type: none"> • Electricity, Diesel and Briquettes consumption as KPI. • Awareness among grassroots levels to save energy through posters and training modules.
Efficient Use of Energy, Fuel, Processes and Buildings	<ul style="list-style-type: none"> • The installation of 12 Energy meters for critical zones to monitor and achieve maximum efficiency in electricity consumption • Elimination of 1 T5 tube light per fitting with needle point LED light • Use of fluorescent lights instead of incandescent bulbs • Replacement of sodium vapor street lights to CFL Lights
Use of Energy from Renewable Resources	<ul style="list-style-type: none"> • Replacement of wood with briquettes for boiler for better calorific value and higher fuel efficiency • Installation of solar streetlights • Daylight Harvesting through enlarged windows and roof portals

Table 3: Water Management Initiatives of Company X

Reduce water Consumption	<ul style="list-style-type: none"> • Water consumption (L/person/day) as KPI • Awareness created through posters, training modules and announcements. • Water meters for continuous monitoring • Auto close push taps for wash basins • Per head consumption of water in our plant is 35 liters which is in accordance with the international standards • Reduction trend from 108562 l/day in June 2016 to l/day in July 2017.
Maximize alternative water supply	<ul style="list-style-type: none"> • Water supply entirely from Bore well in factory
Water recycling and reuse	<ul style="list-style-type: none"> • Rainwater Harvesting System - 40,000 liters capacity • Sewage Treatment Plant
Water waste treatment	<ul style="list-style-type: none"> • Sewage treatment plant in campus for sewage water treatment - reusing water washing and cleaning purpose.

Table 4: Waste and Effluents Management Initiatives of Company X

Waste Management	<ul style="list-style-type: none"> • The food waste reduction trend has been observed from 125 kg per day in 2014 to 18 kg per day in 2017. • Reduction trend of total waste from 19251 kg/month to 12982 kg/month.
Appropriate Handling, Storage, Treatment and Disposal of Waste	<ul style="list-style-type: none"> • This recyclable are also used as fuel for boiler. • Clearly labeled containers used solely for the collection of scrap fabric
Prevent Ground Water and Land Contamination	<ul style="list-style-type: none"> • All departments like cutting, sewing, finishing and canteen have dedicated bin for recyclable and non-recyclable wastes.

Table 5: Chemicals Management Initiatives of Company X

Adopt policies for Restricted Substance List (RSL) that considers health impacts to workers and consumers suppliers/factories to support compliance	<ul style="list-style-type: none"> Updating MSDS boards in diesel storage area Use a limited amount of chemicals and restrict as per Bestseller's manual.
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Table 6: Environment Management System of Company X

Follow Environmental Established Auditing Processes	<ul style="list-style-type: none"> EMS in factory as per guidelines. Driven by top management HIGG Index 2.0 audit, ISO 14000, MNS Plan A
Comply with Environmental Systems' Standards	<ul style="list-style-type: none"> ISO 14000 compliant

Table 7: Mapping of Carbon Emissions by Company X

GHG And Air Emissions	<ul style="list-style-type: none"> GHG emissions as KPI measured in kgCO₂/pc
Account for Carbon Emissions	<ul style="list-style-type: none"> Carbon footprint calculation and monitoring
Reduce Carbon Emissions	<ul style="list-style-type: none"> Reduction in carbon emissions through planned measures e.g. Decrease in factory bus routes 3rd party consultant to drive carbon reduction

Table 8: Compliance Initiatives of Company X

Verification of Sustainable Manufacturing Processes	<ul style="list-style-type: none"> In 2014, an energy audit was completed using TERI, a leading energy consultant.
Process Certifications (I.E., ISO 14000, 14001, Higgindex Etc.)	<ul style="list-style-type: none"> Company X has been certified Plan A compliant factory by M&S in 2014 which is an endorsement of its green initiatives. HIGG Index Audit ISO 14000 certified ISO 26000 certified

The sustainability initiatives taken by company X translated into reduction trends in energy, water and waste continuously from 2015 to 2017 as shown in Table 9. This led to cost saving and also became a talking point for the company when pitching for market differentiation.

Table 9: Summary of the Reduction Trends in EMS Areas

EMS Areas	2015-16 Actual	2016-17 Actual	2017-18 Target	Reduction Trends from 2015-15 till June 2017
Electricity (units/month)	105345	98077	80000	Reduced consumption by 7%
Water (consumption/day)	110945	77917	40000	Reduced consumption by 64%
Diesel (Consumption/hr)	70	60	55	Reduced consumption by 6%
Briquettes (Kg/Day)	1348	1076	800	Reduced consumption by 20%
Paper waste (Kg/Month)	800	736	650	Reduced consumption by 8%
Food Waste (Kg/Day)	62	31	23	Reduced consumption by 50%
Plastic waste (Kg/Month)	150	116	90	Reduced consumption by 23%

CONCLUSIONS

Sustainability was not as strong as an issue ten years back as it is today and thus, it is challenging for well-established garment manufacturing facilities to conform to the performance indicators measured in the framework from the scratch. This framework aims to act as an academic reference for the garment manufacturers aiming to adopt sustainability

The extent of adoption of the performance indicators of by Company X was not quantifiable. Mapping of the sustainability efforts was done in a qualitative format and the case study ascertained the relevance of the framework categories in real-life context.

One of the relevant drivers for sustainable initiatives at Company X was commitment of the top management to sustainable objectives. Market drivers which translated into reduction in costs and a gaining a competitive edge over other companies were also identified as being crucial in the adoption of sustainable policies. The investment in sustainability is paid back in the form reduction of costs incurred in running the factory in terms of the resources comprising of water, energy and wastes management.

Some of the key areas were identified where focus of Company X was needed. A lack of investment in building a specialized team focused on sustainability practices with the necessary knowledge and skill-set was noted. A knowledge gap was observed when it came to driving sustainability in the right direction and the help of third parties for the same is suggested. For water management, it was noted that improvement for waste water quality has to be considered and proper targets need to be set and reviewed periodically. In terms of Chemical Management, It was observed that Company X does not collaborate with brands and chemical suppliers to prioritize and select chemicals for alternatives assessment from substances of concern and/or restricted substances lists. The facility has not reduced the use of any chemicals by recovering and reusing them.

The factory needs to communicate Environment management to its appropriate internal and external stakeholders so that it can be a major market driver in terms of attracting buyers and brands. This study contributes to the literature available on the industry specific sustainable manufacturing practices and presents a recent relevant case to understand the current scenario of the efforts made by the garment manufacturing companies in India to incorporate sustainability as a business practice.

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