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Recouping eco-impacts and intendancing concerns - A case of Textile Upcycling in Geetanjali Woollens

It was an exceptionally hot afternoon on June 28, 2017, as Amrit Trivedi- General Manager, Recycling (Unit in Halol, Gujarat),Geetanjali Woollens- was busy planning for a review meeting with Raj Bhargav, CEO, Geetanjali Woollens (Geetanjali). They were to review the non-conformance of three orders of upcycled[1] sweaters for the company's European buyers. Bhargav had been very busy exploring the possibilities of expanding his mechanical recyclingbusiness in Africa, but it seemed difficult given the company'suncertaintyregarding the defined norms for acceptance of mechanically recycled textiles. The recycling business had been an ethically and economically gainful proposition for Geetanjali. However, operating in the realm of stricter regulatory frameworksplus oscillating buyer norms and acceptance requirementshad become exceedingly difficult. Given his 32-year long experience at Geetanjali, Trivedi knew quality of products made with virgin ingredients could be better controlled in terms of process variations, but it was implausible to conceive of Geetanjali without its recycling unit.

Geetanjali had always upheld the principles of environmental and social responsibility and cultivated upcycling (reprocessing and remanufacturing) at its core. Sustainable manufacturing was not a discretionary option- it was the need of the day and a mandate for the future. But, the international trade of mechanically recycled products had become complicated with rigid regulations and technical barriers. There were certain limitations that upcycled products had which surfaced as minor product inconsistencies, resulting in customer concern. Business growth with sustainability goals had proved to be a yielding proposition for the company since its inception; however, holding on to it was now becoming a challenge. Trivedi knew it was not the business focus, but the buyer acceptance norms, that needed change. Bhargav had asked Trivedi to address the non-conformances and propose long-term strategic options to deal with buyer concerns and acceptability.

APPAREL AND TEXTILE INDUSTRY

Sustainability had become a buzzword in the Apparel and Textile industry since the revelations regarding its environmental impact took the shape of fierce discussions at various platforms, followed by the search

[1] Upcycling is the process of converting reclaimed fiber from old, post-consumer textiles into products of considerable value and practical worth.

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for remedial actions. Textile and apparel industry, a US$3 trillion global industry, was the second most polluting industry after the oil industry and accounted for 10% of global carbon emissions.Twenty-five percent of the world's chemicals were used in textile production. Increasing consumerism, fast fashion, throwaway culture, irresponsible disposal and globally distributed operations added to the environmental concerns.Driven by the regulatory framework and the need to create a 'clean' and 'responsible' image in consumer markets, apparel brands, retailers and textile manufacturers had geared up for pro-environment practices and products. Europe was in the forefront of this movement and had formulated strict regulations for chemical composition in textile products. The most relevant pieces of legislation were chemical related- the most important being Registration, Evaluation, Authorization and Restriction of Chemical substances (REACH) (Regulation (EC) No 1907/20069). Biocides Regulation (Regulation (EU) No 528/2012) established a regulatory framework for the use of biocidal products. The Waste Framework Directive (Directive 2008/98/EC) specifically referred to textiles.

Major apparel retailers such as GAP, H&M, M&S, Patagonia, Nike, and Levi's realized that the global fashion trends and the increasing consumer awareness towards skin-and-environment-friendly products had created a market for sustainable and eco-friendly clothing.They were aware that to portray their businesses as environmentally- progressive and proactive, they had to add 'sustainable' and 'green' product lines to their portfolio. The definition of 'sustainable textiles' was still open to debate, considering the relatively high impact that textiles had on the environment during their life-cycle.

Various initiatives of textile manufacturers, retailers and independent organizations spurred up as environmental responsiveness. Concepts like Reduce-Reuse-Recycle, upcycling, remanufacturing, clothing exchange, cradle-to-cradle, closed-loop, repositioning, textile-to-textile recycling models, end-of-life management of products had become the buzz words within the fashion and apparel world, not only to participate in the green revolution but also to portray a 'clean and green' image in front of stakeholders.

Manufacturing, being one of the most dominant functions in business, owned a bigger share of responsibility in the movement towards green fashion supply chains. Producing clothing from virgin raw material was an energy-intensive process and involved consumption of non-renewable natural resources, thus having large carbon footprint. Environmental remedies in manufacturing sectors were generally adopted in the forms of recycling, using reclaimed fibres and clean production techniques. Recycling was the reuse, remanufacturing, or reprocessing of a material or product with the aim of reducing waste. In terms of textiles, recycling could cover many different areas including used-clothing markets, conversion to new products, and serving as wiping and polishing clothes, landfill and incineration.

GEETANJALI WOOLLENS

Geetanjali Woollens Pvt. Ltd. was an ISO 9001: 2008 certified manufacturer of woollenand cotton yarns and fabrics. Known for its pro-environment practices, Geetanjali had a wide product portfolio consisting of woollenyarns, open-end cotton blended yarns, woollen, cotton and acrylic blankets and wool fabrics. With integrated manufacturing spanning across the value chain from fibre to fabric, the company adorned an innovative business approach with constant innovations in products and processes. Large scale manufacturing capabilities, efficient supply chain and logistics system and world class manufacturing practices for best quality standards provided the company a distinct position in global markets.

Geetanjali endorsed environmental responsibility by adopting a closed-loop manufacturing process.[2] Treating waste as a resource, the company provided upcycling solutions by utilizing old and discarded used-clothing to make fibres, yarns, woollen fabrics, blankets and throws. Global Recycle Standard (GRS) certification of the entire plant and production process assured brands and retailers of the genuineness of the recycled content. The process reclaimed fibre from old, post-consumer textiles and converted it into products of considerable value and practical worth- an activity that the management considered its unique proposition and proudly referred to it as "upcycling". The closed loop manufacturing process lowered theenvironmental impacts due to the absence of dyes and chemicals and involved lesser consumption of water and energy vis-a-vis processing of virgin material. Such reclamation and remanufacturing reduced the amount of textile waste that was generally sent to landfills.[3] The process also saved agricultural land occupation and limited emission of green-house gases. The upcycling activities at Geetanjali also enabled social empowerment and economic upliftment of women from underprivileged sectors of rural areas.

The company had three manufacturing units in India and three overseas, in Ethiopia, Mozambique and Zambia in Africa.The main unit in India was ina village called Ghansar Muwadi, district Halol in Gujarat. The second was a recycling unit of was set up in avillage called Ramesara, Halol Gujarat. The open-end spinning plant was in this unit.The third unit of the company, in Vitoj village, Gujarat, was the wet processing unit for woollenfibre. The company witnessed a prolific increase of more than 30 times in its woollen yarn capacity with its modernized plant. The rain water harvesting pond with a total capacity of 80 million litresset up by the company sufficed approximately 60% of their manufacturing needs. Waste water was treated in the Effluent Treatment Plant before discharge.

Geetanjali'sthree-pronged philosophy, woven around the elements of trust and commitment included the principles of 'Quality', 'Productivity' and 'Sustainability'. Placing 'green thinking' at its core, the company aimed at providing innovative,high quality, cost effective andeco-friendly solutions and customized services to its customers. The company's philosophy embodied the concept of upcycling as a potential remedy for increasing landfills, from where approximately 95% of textile waste could be recycled. It had a strong belief that leveraging the untapped potential of post-consumer textile waste by upcycling would cut down the need of virgin textile resources drastically, thus reducing the carbon footprint associated with virgin fibreproduction.

Emphasis was on productivity through highly efficient and empowered technical teams, helpful sales teams capable of providing prompt support to the global customers, excellent infrastructure and state-of-the art technology. The company aimed to provide quality blankets, yarns and fibres at affordable prices while ensuring prompt delivery using its strong supply chain logistics.

The Geetanjali timeline

Forward thinking and a unique value proposition propelled Geetanjali's journey from a trading and sourcing company to becoming a world-famous manufacturer and exporter of superior quality textile fibre, yarns, blankets and throws. Business growth went hand in hand with continuous focus towards social and environmental causes, which was in sync with Geetanjali's core philosophy(See Exhibit 1).

[2]Closed loop manufacturing can be defined as any proactive EOL (End-of-Life) strategy that keeps a manufacturer's products out of a landfill or from being incinerated. (The Centre for Remanufacturing and Reuse (2008))

[3]A post-consumer cotton t-shirt emitted 7 lbs of $CO_2$when sent to landfills (Geetanjali Woollens, White Paper, 2017).

The upcycling process at Geetanjali

Geetanjali purchased unserviceable used clothing (used clothing which cannot be sold in the second-hand clothing market) in large heavy press packed bales to save on transport costs and space. This was imported from all over the world from countries such as USA, Canada, UK, France, Germany, Belgium, Holland, Spain, Italy, Poland, Australia, Japan and Korea. The used clothing was imported in containers which otherwise would have to be shipped back empty to India under the shipping companies' repositioning programs to maintain their balance of container inventory at major ports worldwide.

Unloading and warehousing was done in the recycling unit in Gujarat. Primary sorting of the bales was done manually, according to fibre composition on the conveyor belt where cotton, acrylic, and woollenfabrics were separated from other synthetic blended garments. Sorting was done by women from neighbouring villages, who could not read the labels but were trained to differentiate between fabrics by touch and feel. The separated garments were sent to separate rooms by a conveyor system. Secondary sorting was done according to colour. The company made more than 50 colours for each grade of fibre, collected as heaps of nearly 1000 kgs of each colour, and then sent it for cleaning. The cleaning process included removal of buttons, zippers, labels and other trims from garments. The cleaned pieces of garments were called'clips'. A final quality check of the clips was done before shredding them in different shredders for making fibres. Automatic bin 'emptiers'were used for homogeneous blending of fibres and the double baling press facilitated easy movement and storage of fibres. Fibres were also shipped world-wide to spinning millsthat could not afford their own recycling of fibres due to high labour costs in their respective countries. During the spinning process, these fibres were blended with the post-consumer regenerated polyester for adding strength as per need. The blend was then spun either on the advanced woollen spinning system or open-end system to produce yarn suitable for knitting or weaving.

The entire plant and production process was certified as per the GRS V3.0. Apart from certifying the recycled content, GRS also audited the manufacturers for their social, chemicaland environmental compliances, thereby offering the brands and retailers further security that their production had been done in an ethical manner.

End uses of this yarn were in the fashion industry as well as the home textiles industry for making sweaters, pullovers, socks, gloves, scarves, beenies, woollen fabrics, canvases, drills, bags, blankets, throws, curtains, bed covers etc.

Recycling limitations and concerns

Trivedi, a textile engineering graduate, joined Geetanjali in 1985 as a technical trainee in the production department.He had worked in different profiles in different departments before heading the Ramesara based woollen and cotton recycling unit as the General Manager. The 18 years of involvement in Geetanjali's upcycling unit had imparted Trivedi deep insights regarding the opportunities and challenges in this sector. The company had acquired a position of high repute in the US and European markets due to its dedicated business of post-consumer textile upcycling. This upcycling initiative had always been a motivation for the company.Bhargav joined Geetanjali in July 2015. His penchant for efficiency and quality suitably matched Geetanjali's commitment of conforming to buyer specificationsandoffering superior quality products. Trivedi's passion for sustainability and Bhargav's efficiency-orientation proved to be a good alliance for the company.

Despite its diligence and focus on meeting buyer requirements, Geetanjali received three non-conformance test reports- dated October 24, 2016, February 14, 2017 and March 11, 2017- for European buyers, which

was a matter of concern.[4] The reports mentioned the presence of toxic Alkylphenol Ethoxylates (APEO) /NPEO, which was banned in the UK.[5]

Trivedi considered this task of retrospection and analysis as an opportunity to highlight some of the inherent and inevitable limitations of upcycled textiles to which such rejections could be attributed.While preparing for the meeting with Bhargav, Trivedispent some time in identifying the past cases of non-conformance in post-consumer textile upcycling at the company. He also researched industry reports and working papers on such occurrences in other textile upcycling businesses. There were cases of presence of residual chemicals in the feed stock. Textile upcycling of post-consumer textiles was a chemical- and dye-free process, but the input material could contain prohibited chemicals. Cost, time and technology constraints made the testing of chemical composition of input materials (post-consumer textile) impractical, and there were always possibilities of presence of 'residual chemicals' in the feedstock. Even a single item could significantly spoil the blend and again bring back chemicals in the textile; but in case of discarding the textiles into landfills these harmful chemicals would find their way back into the landfills and harm the environment by percolating into the ground, emitting CO_2 and occupying precious land. However, Trivedi discovered that according to the 2016 European Commission Regulation (EU), there was an amendment in Annexure XVII of REACH regarding Nonylphenol Ethoxylates (NPE), in which second-hand or new textile articles produced exclusively from recycled textiles were exempted from the presence of NPE in concentration equal to or greater than 0.01% by weight.[6]This exemption was, however, not completely accepted by brands. There was either lack of awareness or there were certain barriers in the system.Trivedi collected and analysed yarn and product testing reports (at sampling stages) since 2013 and found inconsistencies in test methods and acceptance requirements.Reports also revealed that as an immediate solution, APEO remover could substantially reduce the APEO/NPEO contents (Analysis of Test reports, Serial No. 26, 27). [7]

In other situations of non-conformances, the fibre composition was a problem. The composition of the yarn could vary from lot to lot and colour to colour.Thus, labelling the fibre composition of the upcycled products became difficult, especially in countries with strict labelling regulations such as USA and those in EU. This, according to Trivedi, was not a big problem as upcycled products could always be given a distinct "eco-label".US Federal Trade Commission labelling requirements had already laid specifications for appropriate labelling of products made from recycled fibres.

Another major area of concern was batch to batch colour variation. No dyes were used in processing of upcycled articles. The entire colour matching process to achieve the desired blend was done manually and could never qualify stringent testing of colour consistency. This was an area where both retailer and customer acceptance of upcycled products with colour inconsistency could be increased by promoting the upcycled products as emblematic of the consumers' contribution torestitution of the environment. Designers had an important role in embracing the limited colour palettes in the upcycled lot and creatively increase its

[4] Annexure 1 is provided as sample test report

[5] Alkylphenol ethoxylates (APEOs – often called alkyphenols or alkylphenyls) are surfactants which have an emulsifying and dispersing action, so they have good wetting, penetration, emulsification, dispersion, solubilizing and washing characteristics. NPEs/ OPEs are included in the group of non-ionic surfactants called alkylphenolethoxylates (APEOs). NPEs and OPEs can degrade to NP and OP respectively.

[6]REACH is a European Union regulation concerning the Registration, Evaluation, Authorization and restriction of Chemicals. It came into force on 1st June 2007 and replaced a number of European Directives and Regulations with a single system.

[7] Analysis of test reports is provided as Annexure 2.

versatility resulting in higher buyer acceptability. Upcycled products had unique value proposition such as in case of hand-crafted products where the flaws and variations due to hand techniques imparted the products a distinct and valued essence.

Despite the limitations of upcycling, Trivedi referred to life cycle assessment of recycled fibre vs production using virgin material to strengthen his support for textile upcycling at the upcoming product non-conformance review meeting with Bhargav. Research on the environmental benefits of recycling post-consumer textiles strongly confirmed it as a favourable processing technique as compared to the processing of virgin material. The process of textile manufacturing from post-consumer material differed in various stages from manufacturing with virgin material, thus a direct comparison was not feasible. The environmental impacts of the two processes, however, could be explicated through the measures of resource consumption and CO_2 savings in the process. Approximately 65 kWh of energy was saved for every kilogram of cotton replaced by used clothing, and 90 kWh of energy was saved for every kilogram of polyester replaced. The resource consumption for cotton and cotton/polyester t-shirts included water, fertilizers, pesticides, fossil fuels, and emission of CO_2 and other gases, while in textile upcycling the role of fertilizers and pesticides was eliminated. CO_2 emission was a major concern during the material production and transport life stages of a garment. Trivedi was looking at the comparative figures for CO_2 savings in the manufacturing of 100% cotton, 100% PET and 58/42% PET/Cotton, which showed considerable savings in the upcycling process.[8]

ROAD AHEAD

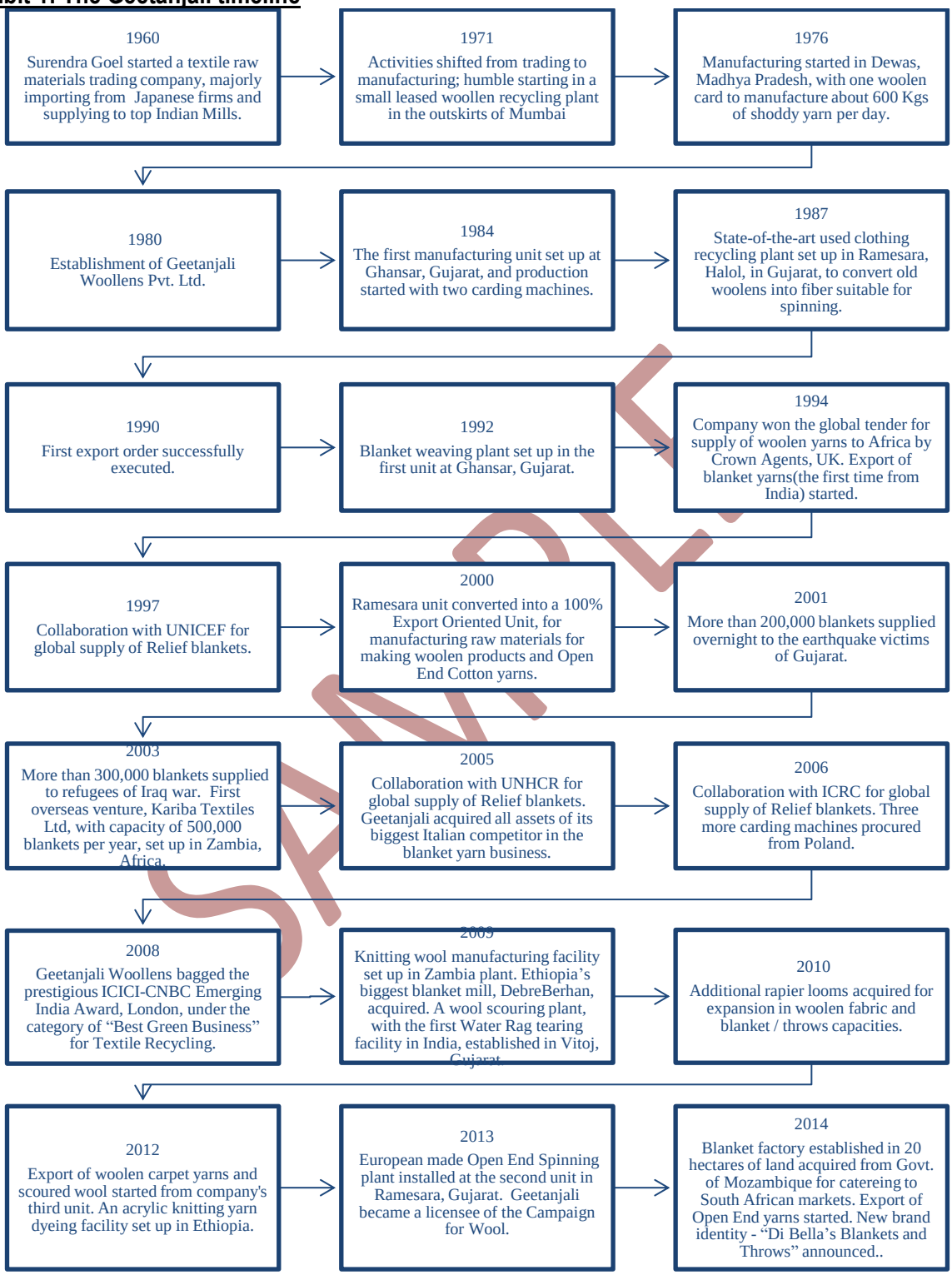
Life cycle assessment of upcycled vs virgin material had confirmed that the environmental burden of using recycled fibre was much less than that of virgin fibre.[9] This had paved way for closed-loop apparel manufacturing through recycling to emerge as a mainstream processing techniqueat Geetanjali. Many ambitious apparel manufacturers and brands had already initiated the closed loop manufacturing process. Accepting certain limitations, textile upcycling was a completely gainful endeavour for business success and environmental restitution. When materials were recycled, there was an environmental benefit because of avoiding the environmental burden associated with the manufacturing of new products and the disposal of wastes.

At the review meeting with Bhargav, Trivedi suggestedsome relevant long-term strategic solutions to the problems in the current context. Expanding the mechanical recycling business to Africa could be justified as a responsible and feasible move only if the challenge of buyer acceptance for post-consumer textile recycling was met in the present scale of operations. Since the coming times would necessitate environmentally sustainable dimensions in all businesses, Geetanjali had proactively initiated efforts in this direction well before many others. Top management intervention in designing solutions for the limitations, buyer support and consumer acceptance for upcycled products would be incremental in boosting the closed-loop manufacturing. Efforts of including the closed-loop technique into mainstream manufacturing would require global initiatives of moving from ‘intent’ to ‘action’ by activists, global foundations, designers, brands and government bodies. Trivedi was earnestly hoping that things would go well.

[8]Annexure 3is provided for details on resource consumption for cotton and cotton/polyester t-shirt and CO_2savings
[9]Annexure 4 depicts Life Cycle Assessment of Recycling cotton (mechanically) vis-a-vis Virgin cotton

EXHIBITS

Exhibit 1: The Geetanjali timeline



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