

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

Summary:

Sustainable manufacturing is the compelling need in the current times of depletion of environmental resources, increasing landfills due to fast consumption and irresponsible disposal. The case introduces circular economy and closed-loop manufacturing as remedies for the immediate problem of environmental sustenance. This case highlights the contribution of closed-loop manufacturing for recouping the eco-impacts, and alsoaccentuates the major limitations of the mechanical recycling. Further, the case points to the concerns that such limitations have for buyers, designers and consumers, and opens up these concerns for discussion for finding out innovative solutions.

Brief Synopsis:

The case of Textile Upcycling in GeetajaliWoollensdiscusses the importance of post-consumer textile recycling (mechanically)in wake of the environmental degradation, fast fashion culture, increasing landfills and the increased amount of chemicals in the post-consumer disposals. It provides an opportunity to explore the compensation of the environmental damage through this technique. The case also unveils some major concerns that are inherent to the process of upcycling, and that lead to limitations, challenging the designer and buyer acceptability of mechanically recycled apparel and textile products. The case begins with a situation of concern emerging from rejection of orders from key accounts, leading to managerial dilemma for recycling business expansion in Africa. The General Manager, strongly connected to the recycling business, has support from the CEO, but the irresolution regarding the defined norms for acceptance of mechanically recycled textiles were pushing the company to a Catch 22 situation where limitations lead to concerns resulting in non-conformance and order rejection. The case provides an overview of the major limitations in upcycled textiles and the concerns that this leads to at the buyer, designer and consumer end. Itinitiates discussion dealing with limitations and increasing buyer, designer and customer acceptability to boost the efforts of

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closed loop manufacturing. Short-term solutions for the concerns could be addressed by chemical treatment but Amrit Trivedi was deliberating on long-term strategic solutions that could accentuate the need for differential acceptability norms for mechanically recycled textiles.

The teaching objectives of this case are:

- To comprehend the contribution of textile recycling as a closed-loop manufacturing technique in recouping the eco-impacts of increased disposal of apparel and textile products.
- Tohighlight the limitations that recycled apparel and textile products have, and the concerns that emerge for buyers, designers and consumers, due to these limitations.
- To promote discussions, deliberations, innovative solutions for bringing mechanically recycled clothing into mainstream markets, and generate wider awareness and acceptability. The case can be instrumental in creating a system (voluntary or regulatory) requiring brands to include more recycled lines to their product portfolio, and to motivate consumers to consume more of recycled products.

Teaching Audiences:

 The ideal audience for this case study would beFashion Technology, Textile Technology and Textile Engineering students. The case can be discussed in courses of Sustainable production, Fashion merchandising, Innovation management, Apparel quality managementto discuss the basic Principles of sustainable production, different managerial approaches and business objectives.

Teaching approach:

This case can be effectively used in regular classroom discussion as well as distance learning programs. The instructor can guide the students to do an exhaustive reading of the case and then identify the macro and micro elements around which the case has been developed. He can initiate the dialogue by first discussing the concepts of circular economy and closed-loop manufacturing as a thorough understanding of these topics is a pre-requisite of the case. Later on depending upon the students involvement, research and class-room discussion, faculty can direct the students for detailed life cycle assessment of recycled fiber vs virgin fiber and compare the environmental impact and benefits in detail. Detailed LCA will help students to appreciate the lower environmental footprint of recycled fibers which they may cherish in their professional life as a buyer, garment technician or in other strategic roles as change managers and decision makers.

Session plan

The total time required to analyse this case is three hours, the minutewise plan is as under:

No	Activity	Time required
1	Introduction about the case by the faculty member	15 minutes
2	Case reading by students in group	40 mintes
3	Groupwise discussion and explorations of case	40 minutes
4	Case analysis (finding answers for questions)	40 minutes
5	Presentation by students	25 minutes
6	Debriefing and summing up by the faculty member	20 minutes
	Total time	180 minutes / 3 hrs

Suggested plans:

• The students may be encouraged to do field visits, consumer survey, designer interviews, brand studies and interpretation of analysis of test reports.

Case Questions:

 Identify the central issue of the case and suggest short-term and long-term strategic solutions for the challenges faced in mechanical recycling by GeetanjaliWoollens. Answer: The case underlines the importance of closed-loop textile manufacturing in light of the emerging environmental concern of higher disposal of clothing and increasing landfills. The central issue of the case revolves about sustaining the business of closed loop manufacturing through textile upcycling (reclaiming fiber from post-consumer textiles), in spite of some limitations of the recycled textile products. These limitations give rise to concerns such as presence of residual chemical in feed stock, batch to batch colors variation and fiber composition. Such concerns are inherent to the process of recycling and are majorly beyond the control of the manufacturer; still they result in non-conformance to the buyer specifications, resulting in order rejections.

Sustainability was at the core of GeetanjaliWoollens business philosophy. The current state of environmental deterioration due to textile wastes dumped in landfills, and the alarming signals for coming future, necessitated every individual and every business to initiate pro-environment efforts. Geetanjali had already taken up its responsibility, and was active in providing sustainable options through effective utilization of resources. The closed-loop recycling techniques had lesser environmental impacts as compared to manufacturing with virgin material. Trivedi recognized the limitations of recycled textile products, but he was positive that the changes in the perspectives of designers and buyers can facilitate the entry of recycled clothing into mainstream clothing market and increase consumer acceptability for the same.

The case very strongly highlighted the problem of presence of residual chemicals in the feedstock. The short-term solution could be in a form of fire-fighting by way of chemical treatment of final product to get the acceptable levels of AEPO/NPEO. However, long term strategic solutions are more desirable in context of environmental sustainability. This should include collaborative agreements amongst manufacturer, designer and brands, partnering between Government, NGOs, Sustainable Textile Associations and agencies, such as European Commission and REACH, to design and communicate clear protocol for mechanically recycled textiles regarding acceptance norms and regulatory requirements. There should be an understanding of the trade-offs between the environmental benefits of closed-loop manufacturing and the limitations that should be acceptable for lowering eco footprints.Mechanically recycled textile products should have distinct branding to generate effective market positioningand generating consumer awareness and interest.

2. Discuss the state and scope of closed-loop manufacturing in textiles and provide its benefits and challenges in comparison to the production with virgin material.

Ans. 2: Closed-loop manufacturing is a concept popularized under Circular economy. The circular economy is known to be restorative and the concepts of 'reduce, reuse and recycle,' 'make/remake,' 'use/reuse,' and 'repurpose' represent this system. Goals of a circular economy are to use products, components, and materials to their highest value at all times. Resources are recovered and restored in the technical cycle, typically requiring human intervention. The recovered materials are then reused many times and repurposed to create a product of value.Evrnu for example is chemically recycling cotton scraps into a new

manufactured cellulosic yarn and re:newcell and Saxion are also working on emerging technologies.

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. Textile Recycling or Upcycling is one of the methods of the closed-loop manufacturing. The closed-loop manufacturing has geared up as a movement in many industries, including the textile and apparel industry, with the objective of developing a circular economy for utilization of post-consumer waste and for re-couping the impacts of fast consumption and traditional linear economy. Historically, the textile and apparel industry has been an excellent example of the latter. The linear economic model is represented by concepts of 'take, make, and dispose,' 'make, use, dispose,' or 'more is better.' Closed-loop economy reduces the environmental impacts of manufacturing by creating a different system that relies on large quantities of low cost, easily accessible materials.

Tenjin, Aquafil, Martex fiber, Evrnu, EcoAlf, Timberland, Nike, Speedo, H&M and Patagonia are the major retailers who have embraced closed loop manufacturing through textile waste recycling. In 2013, H&M launched its in-store Garment Collecting Initiative and by 2015 they had collected 19,000 tons of discarded clothing. In 2014, they released the first products from a closed-loop system. These items were made with 20% of recycled materials. Also in 2014, 10 new denim styles were released that contained recycled cotton fiber from the clothing collected. This supported their goal to move from linear production model to a circular one by closing the loop for textiles.

Patagonia has several established recycling programs and actively uses recycled fiber in its products. Patagonia began making recycled polyester from plastic soda bottles in 1993 and was the first outdoor clothing manufacturer to transform trash into fleece. They started using fiber-to-fiber recycling system to keep used clothing products out of the waste stream and trash incinerators. Today, they not only use soda and water bottles, but they also collect post-industrial manufacturing waste and post-consumer worn-out garments for reprocessing and use in new apparel.

The future of recycling relies heavily on the development of new advanced technologies and approaches for material processing (without quality loss), collection, sorting, processing, and utilization in a new product that is also recyclable. Creating a demand for new products with recycled content is critical. It is important to include the recycled content in the design and product development stages of fashion and home products but there is also a need to encourage flows that promote recycling and reuse. Closed-loop manufacturing provides an opportunity to the companies to be inventive and innovative to survive and compete in coming future. This is also a requirement driven by media scrutiny and resource scarcity, but the challenge lies in the complexity of supply chain and supply chain partners' collaboration.

Some of the major benefits of closed-loop manufacturing are lower environmental footprint through less energy consumption, resource utilization and occupation of landfills. (Details provided as Annexure 3)

Closed-loop manufacturing has some challenges also in the form of (i)technical limitations, (ii) development of new advanced technologies and approaches for material processing (without quality loss), collection, sorting, processing, and utilization in a new product that is also

recyclable, (iii) customer awareness and acceptance, (iv) making the eco-gains quantifiable and visible to all stakeholders, and (v) acquiring collaboration in the supply chain.

3. The case mentions certain limitations of upcycled textiles from mechanical recycling.

a. Discuss the concerns for manufacturers, buyers and end consumers, due to these limitations.

Answer 3a: The process of textile recycling has some inbuilt limitations. These limitations can be broadly identified as:

- (1) **Presence of Chemical residue in feedstock:** Though the entire process of upcycling post-consumer textiles is highly sustainable however there could be presence of "Residual Chemicals" in the feedstock of the input raw materials. There could be some amounts of APEO / NPEO in a batch which again might vastly differ from batch to batch, formaldehvde and or other heavy metals. These residual chemicals could be present in the feedstock of the input raw materials and not added during the process of upcycling as this process of upcycling is done entirely without the use of dyes and chemicals. At present there is no proven technology to totally eradicate such residual chemicals from the feedstock though extensive R&D is being done to eliminate this too. Also batch to batch testing of the fibers for residual chemicals is an impractical and expensive solution. However, the presence of such residual chemicals, if any, is very low in the final product. Nowadays most of the discarded clothing available from the developed nations is anyways free from such harmful substances but there could be possibilities of households discarding older clothing or clothing purchased on "Foreign Trips" which may contain traces of such harmful substances. Even one such item of used clothing can spoil the blend and standout during chemical testing of the entire batch.
- (2) Composition: Due to certain labeling regulations in USA / EU a lot of brands and retailers are not sure of how to label the fiber composition of the made up articles. The composition of the yarn can vary from lot to lot and colour to colour. Though in principle it is known that the yarn is Cotton Rich or Wool Rich containing 30% wool, 50% wool or 65% wool however, the balance composition cannot be strictly controlled due to the varying nature of the raw materials. In order to solve this problem brands can either test each batch for the final composition and label their garments accordingly or alternatively follow the "Recycled Materials" labeling regulations which clearly state that articles made from recycled materials can be labeled with "100% Recycled Fibers" or "65% Recycled wool + 35% Recycled Synthetic Fibers". Such labeling regulations are already being published by the US and EU government authorities. But there are still so many buyers who are reluctant to follow that as it does not gives specific direction about the fiber content.
- (3) **Batch to Batch Colour variation:** As no dyes are used in the entire production process there could be batch to batch shade variation as only available used clothing is used to match colours. The entire colour matching process is done by highly trained experts by blending different colours to achieve the target colour, all manually. Though the colour variation can be commercially acceptable however any test under a light box will never be passed.

These limitations give way to certain concerns for the manufacturers, designers and also for the consumers.

Manufacturer concerns: Manufacturers need to maintain a conformance to the permissible limits of chemicals in the manufacturing process and also eliminate the use of restricted chemicals as prescribed by major regulations. REACH is a European Union regulation concerning the Registration, Evaluation, Authorisation and restriction of Chemicals. This single system, implemented on 1st June 2007, replaced a number of European Directives and Regulations. REACH regulation provides a list of restricted substances and the permissible limits. While doing business with Europe, manufacturers have to ensure that their product complies with the regulatory requirements. But in case of recycling, due to variability in the input material there is no control on the presence of residual chemicals in the feedstock. That results in non-conformance of the lot, which is rejected or sent for re-processing, increasing product costs and diluting the energy savings. In case of recycled fiber these regulations are playing the role of non-tariff barriers and suppressing the efforts of closed loop manufacturing. The case mentions the presence of APEO/NPEO in the upcycledtextiles. REACH restricted the presence of APEO/NPEO in concentration equal to or greater than 0.01% by weight of textile article, but has exempted products made from second hand clothing and recycled textile as per its amendment in annexure XVII released in January 2016. Buyers are following the restrictions, however there are cases visible where orders of recycled textiles are getting rejected due to presence of APEO in guantities equal to or greater than 0.01% by weight of textile article (100 mg/kg is the permissible limit). This is happening either due to buyer unawareness regarding exemptions or they conveniently continue following the in-house Restricted Chemical List (RCL) maintained by the company's sustainability department, with no inclination towards bringing system or process changes. In addition to this REACH has provided exemption on APEO but has not set guidelines for other restricted chemicals. In this ambiguity, buyers are playing safe; the risk avoidance attitude posing as hindrance in the efforts of closed loop manufacturing. In the case of Geetanjali also, the buyer was reporting non-conformance without considering the above mentioned exemption.

Buyers Concerns: The major concerns for buyers can be identified as-

 Presence of residual chemical in the end product is a major concern for buyers and brands. Currently, there are 59 categories of restricted substances in REACH Annex XVII, involving more than 1000 substances. These hazardous substances have specific restrictions, and as such certain chemical substances in the specific product are not allowed to be used, so as to avoid any unnecessary testing. Typical hazardous substances that are restricted in products include lead, AZO dyes, DMF, PAHs, Phthalates, PFOS, the nickel release and so on.

Brands with proactive environmental initiatives have accepted recycling as an effective sustainable option, and are ready to ignore the residual chemical present in the products made from recycled post-consumer textiles. However, brands are apprehensive that this movement could pose risks in the event of testing of a garment by an activist or competitor and detection of residual chemicals, which in turn may affect brand image, customer trust and sales.

2. Labeling of the clothing or textile product is an important aspect due to (i) communication about the fiber content, (ii) customer requirement, and (iii) country regulations. In case of recycled product, fiber composition differs from lot to lot which creates a difficulty in labelling of the product. Brands have certain country-based regulations for labeling the fiber content of the product, which generally require declaration of the exact percentage of each fiber. Fibers which are less than 5% in the lot can be labelled as others. In case of recycled products, as every lot differs in the fiber composition, it is very difficult to test and

label each lot separately. In case of recycled fiber first lot may be having a composition of 50% cotton 16% polyester 13% acrylic 11% viscose 7% nylon 3% wool, second lot is of the composition like 50% cotton 19% polyester 12% viscose 4% nylon 2% wool and the third lot having a composition of 53% cotton 16% polyester 16% acrylic 9% viscose 3% nylon 3% wool. Same order with different labeling will be a difficult proposition for buyers. Standard labels are difficult especially in case of recycled fiber from post-consumer textiles.

3. Textile manufacturing through recycling is a dyeing-free process, but this result in two limitations. First is batch to batch colour variation and second is limited colourpalatte. Batch to batch color variation may be considered as lot inconsistency. Absence of fashion colours or the non-availability of colours as per the season's forecast is another major concern, and is not much approved by the design team also.

Customers Concern:

Customers do not, generally, have much idea about the presence of residual chemicals; they get informed through media only when some cases of post-testing chemical detection get surfaced. Their main concerns are - (i) availability of limited colors, (ii) eco-clothing having limited styles in limited apparel categories, (iii) common perception that eco-clothing are marked-up at higher price margins in the name of sustainability. Such limitations restrict eco-clothing to niche segments and inhibit it to expand its market reach. Due to the limitations, recycled or eco-clothing majorly falls weak to establish a connection with the young consumers.

A large segment of consumers perceive recycled clothing as second-hand product, generally produced for secondary markets, or as relief or charity material, or for consumers in third-world or developing nations. As a contrasting belief, some consumers perceive recycled clothing as either niche or premium (high-value) products meant for specific set of consumers, using them for specific use on particular occasions, majorly portraying a pro-environment lifestyle or attitude.

Consumers' awareness and motivation to buy recycled clothing need to be increased by effective promotion, celebrity endorsement, quantifying and communicating the health benefits and eco-gains of recycled clothing and more informative labelling.

b. Discuss the role of buyers and designers in embracing the closed loop manufacturing and increasing its acceptability in the mainstream textile manufacturing. Ans. 3b: Buyers and designers have a very important role in bringing closed-loop technique into mainstream textile manufacturing.

- (i) Buyers can work in two directions -
- First, on the retail front to bring awareness in consumers about sustainable recycled clothing
- Second, in their own efforts of incorporating the recycled content in their offerings. This
 could be achieved by developing systems for collaborative participation of supply chain
 partners and incorporating a voluntary and regulatory framework guiding the
 manufacturing and promotion of recycled products.

Buyers can do powerful campaigning and create a special drive on different platforms of accepting a percentage of virgin fibers with recycled fibers first in selected product categories like curtains, rugs etc. and later on in their entire assortment. For this policy

decisions with regulatory bodies (REACH)and independent global campaigning organizations (Greenpeace, etc.) should be discussed upon and more research should be conducted to highlight the lower environmental impact of recycled fibers.

The concerns related to fiber content can be handled with declarations, presenting the recycled range accordingly, special marketing drives, distinct and specially designed hangtags with product information. The presumed weakness of recycled clothing and textile products could be converted into USP though innovative ways that need focused discussions, brain-storming and collaborative platforms.

(ii) Designers are the key people in manifesting the necessary changes across the whole industry. They play a very critical role in connecting consumers or markets with the brands. They should be the strategic people in understanding the environmental issues and limitations and be able to advise the supply chain partners to change. Designers should bring timelessness in the products; product lines should be contemporary but independent of colour variability, to appreciate the lower environmental impactof recycled fibers. "No Dyeing" process in case of recycled fibers allows unique product offerings and an excellent range of Melange yarns.