

## **CONNECTING PATHWAYS THROUGH A MÉLANGE OF REFASHIONING AND REPURPOSING FABRIC WASTE BY USING SUSTAINABLE STRATEGIES**

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### **Abstract**

Fashion is the subject of constant change but the only constant in fashion has been the depiction of culture in the various ways in which fashion reflects its deep-rooted connections with the history, social beliefs and inspirations drawn by an amalgamation of various cultural ingredients. India has always had an ancient tradition to preserve, mend, conserve and protect. In the era of resource conservation, the thought process of reuse and re-purpose is crucial and challenging, especially to attract consumers. Using old clothes as well as fabric waste scraps bound together by beautiful craft techniques can create something new and special which in most cases becomes an heirloom and is passed on to generations. However, somewhere along the way this tradition is lost with the consumer mindset shifting towards fast fashion which is heavily impacting the environment and screaming for change. The future is in the hands of the present and we, being a fashion institute, have the power to embed sustainability and inculcate the values of circularity through various pathways for a holistic approach to fashion.

This research addresses the problem of the environmental impact of fabric waste which can be intelligently reused by experimental diagnostic study. Through this qualitative research, the primary aim is to use the waste created at pre-consumer and post-consumer levels to explore different models for designing new products and techniques that will connect education with society, under represented artisans, community uplift, women empowerment and craft revival to sensitise future learners. Our objective is to reconstruct the concept of product development through techniques such as fabric manipulation like origami, innovative embroideries and the traditional quilting art called 'Godhadi' as at the institutional level, a lot of waste is generated. The outcome of the practices that we followed can not only connect to the grassroots of tradition and reinvent lost practices into relevant products, but can also uplift the livelihood of several skilled and unskilled human resources for social responsibility and set an example whilst contributing to the quality of life of the learner, making it more mindful.

The need for an alliance between sustainability and fast-moving fashion is a pressing priority that businesses, marketers, designers, artisans and users should understand, to bridge the gap

between supply and demand. This expedition is not limited to education but has a broader meaning to social sustainability which will provide an extraordinarily functional yet aesthetical prospect to reach the global market, bequeathing techniques to connect culture, people and practice and bring value to education by creating a responsible fashion ecosystem.

## **Aim**

The main aim of this research is to utilize the fabric waste created at various stages of the garment manufacturing process as well as post-consumer waste that end up in landfills, to create a range of creative and innovative products which appeal to today's consumers. The study focuses on following the cradle to cradle philosophy by inculcating encompassing strategies to blend education with society; focussing on uplifting community, women empowerment and craft revival, to embed these values in the minds of the future learners.

## **Objectives**

The prime objective is to design a strategy to embed sustainability and inculcate the values of circularity in learners, through various pathways for a holistic approach to fashion since the future is in the hands of the present. Spreading awareness about the waste generated in the fashion industry and sowing the seeds of sustainable practices in the young minds remains the focus of this research. Exploring and introducing ancestral techniques such as fabric manipulation, creative embroideries and traditional quilting art to the future generations to connect to the grassroots of tradition and reinvent lost practices into relevant products forms the core of this study.

## **Introduction**

In the era of resource conservation, the world has started shifting its top gear towards the circular economy by focussing on repurposing, reusing, recycling, remodeling and restructuring the product development process. In this context, this research aims to focus on implying sustainable strategies for development of new products from textile waste to resolve environmental issues impacting the fashion and textile industry globally; both in the processes that channel the supply chain and in relation to up-cycling, the pre- and post-consumer waste. The study outlines the methodology adopted by the institute through the description of research projects, aligning with the United Nation's twelve sustainable development goals (SDGs) (United Nations, n.d.).

The methodological approach adopted in a 'cradle to cradle' philosophy (EPEA, n.d.), in which the waste from one process becomes a new resource for another remains the focus of this research. This throws light on some open issues related to the limitations and scope of the use of waste generated at different stages of the life cycle of a product.

Different prototypes were explored as a tool to conduct a preliminary experimental research connecting education, society and industry.

In order to promote sustainability in the fashion and textile industry, it is essential to educate future generations about the methods for recycling textiles. This would increase the life cycle of manufactured textile products. However this research is not limited to education but has a broader meaning to social sustainability. As a fashion institute, a large amount of fabric waste is created which can be repurposed through strategies such as fabric origami, creative embroideries and the traditional quilting art called 'Godhadi.'

Inspired by paper origami, the concept of adding dimension to fabric and creating engrossing patterns and designs from scraps, makes fabric origami an interesting choice. Fabric waste is produced at every stage of garment production. The scraps left behind during the garment cutting process; of any shape and size, can be utilised to create fabric origami, which in turn can be used as a design concept for a variety of products. Fabric can go from flat to three dimensional thus creating innovative textile surfaces with embellishing effects. The ability to translate the fragile medium of paper into something wearable and durable in fashion is certainly appealing and exciting. Introducing fabric manipulation into origami with institution fabric waste is one way a circular economy aspires to repurpose existing materials.

India is famous for its textile and embroidery heritage. Skilled artisans are spread across every corner of the country and have been practising embroideries over generations. Owing to the lack of commercial interest and the industrial revolution, these hand skills have taken a back seat. Contrary to the wave of fast fashion, the values which were deeply embedded in Indian culture were to preserve, mend and use a product for its entire life cycle. However, this philosophy is getting replaced by fast fashion and consumerism. The traditional Indian embroideries reflect the emotions and culture of every region of India through their variety and uniqueness in techniques, motifs, stitches and colour expressions (Jaitly, 2007). These intricate and ornamental surface embellishments were used not only to add value to a new product but also to camouflage fabric joints or defects with an aesthetic essence. This approach to mending needs to be revived through new design perspectives, connecting artisan communities, future learners and consumers leading to holistic sustainability. Institutional textile waste creates the opportunity for innovative product development keeping commercial and circular aspects as a key focus.

Out of the many Indian traditional upcycling crafts, the Godhadi quilts from the state of Maharashtra are vibrant and aesthetically attractive. Godhadis reflect motifs inspired from daily objects and have an emotional value from fond memories of the women coming together and quilting them during their spare time while sharing life experiences. However, this technique is slowly losing its popularity due to low monetary value, lack of design intervention and awareness about the scope of this heritage. Since this technique does not require learning complicated skills, it can be easily spread in the community and help in uplifting well-being. As an institute of fashion and clothing, through this initiative, hoarded apparel can be re-loved and recreated into something new that can be passed on to generations owing to its durability.

Using the past to orient towards the future can be viewed as a significant and strategic contribution by education. The research aims at bequeathing these ancestral techniques to amalgamate culture, people and practice and bring value to education, to create a responsible fashion ecosystem through contemporary design.

## Literature Review

After studying various surface techniques, focus was narrowed onto three strategies as a tool to redesign and create value from waste.

1. Origami is a folding technique which does not require any tools and learners can be trained at very low expense.
2. Embroideries are a part of the rich cultural heritage of India and every region has skilled artisans with indigenous arts which are slowly dying out. Application of this embroidery skill can create a potential avenue for employment of these artisans and rebuilding their livelihoods apart from reviving these crafts.
3. Godhadi, a traditional quilting art, is a simple technique which requires very basic material and skill. It creates a pathway for unemployed women to have a source of income as well as unskilled labor to learn a simple skill and improve their quality of life, thus connecting communities with education and eventual industry prospects.

Origami is a creative form which is achieved by folding a sheet of paper according to a plan of lines and planes. This art has aroused deep interest around the world for some time and is becoming more and more popular. The significance of the Japanese ancient art of paper folding technique traces back thousands of years ago. Historically, origami was primarily used in religious or ceremonial contexts. Within a very less period of time, people became more interested in origami and started using it for decorative and artistic purposes. It was also used as a tool for teaching math and geometry fundamentals.

Before paper was invented, the process of folding was applied to other materials. That is why origins of recreational folding can also be seen in leather or cloth. In 1880, the paper folding art of Japan changed from 'orikata', which means 'folded shapes', to origami, where folding and paper are the Japanese words 'oru' and 'kami.' Regardless of its culture of origin in modern times, the word 'origami' is used as an inclusive term for all folding practices. As a concept, origami is fairly new in Indian history compared to other art forms. Today, origami lovers avoid making cuts, using glue, or making marks on paper. Basic origami folds can be combined in a variety of ways to make intricate designs, if organised intelligently for creating patterns and shapes. Square sheets of paper can be reconverted into designs in which the sides are printed, coloured or patterned differently (Boggs, n.d.; Robinson, n.d.; Wikipedia, n.d.). Thus fabric origami lends itself to this research as a no-tools-required surface technique that can be effectively employed to create a range of aesthetic products.

Needle crafting has always been one of the media of art expression. Since olden days, various embroidery needlecraft techniques have been practised all over the world. Reviewing the history of Indian traditional textile techniques, it was evident that embroideries have been used as an effective tool in up-cycling and recycling. India is rich with such examples like ‘Kantha’ from Bengal; which is a technique based on extracting threads from the borders of discarded sarees and dhotis by recycling, ‘Namda’ and ‘Gabba’ from Kashmir; that are vibrant floor carpets and rugs made by recycled wool, ‘Kasuti’ of Karnataka; a technique where silk threads are extracted from old sarees and ‘Pipli’ art of Orissa; which is an applique technique created by reusing fabric scraps (Crill, 1999). There are many families in India whose earnings are based on the craft industry and Indian embroideries are one of the biggest contributors. To add aesthetic value, Indian embroideries play a dual role as they are both decorative and functional. While enhancing and enriching surfaces, embroideries have also been used to blend joints and repair the old and waste fabrics (Singh and Rani, 2021). The use of motifs inspired by nature, symbols and culture, leads to incorporation of cultural heritage into the crafted textile. As author Judy Frater has rightly said,

The style with which a folk embroiderer expresses herself is not chosen, but assumed. A folk style evolves over generations of experiences largely shared, and it reflects the continued unity of a community in its perfect replication in each member’s embroidered art. (Frater, 1995, p.18.)

To maintain the identity of local communities, it is also imperative to protect and promote traditional culture and mastery.



Figure 1. Women sitting together and working on embroideries. Image source: *Threads of Identity* book by Judy Frater, p. 9, p. 73.

The third strategy explored by the researchers was to use the post-production waste as well as hoarded pre-used garments, to layer and quilt them using the traditional quilting technique of ‘Godhadi.’ This quilting has a different technique than western quilting wherein quilters begin from the center of the quilt and move towards the edge. In Godhadi quilting, the outer edges are quilted first moving towards the center which in turn causes puckering, adding a unique texture to the surface. The quilting is not very fine and done without the use of any tools which lends it a raw and rustic feel.



Figure 2. Women showing hand measurements used in Godhadi making, Image source: Godhadi of Maharashtra, Western India, book by Geeta Khandelwal (Quilt mania Editions)

Created without any professional design intervention or influence of urban life, the motifs used in these quilts were usually a reflection and interpretation of the life around the women making the quilts. Commonly seen motifs included checkered patterns, village scenes, cross shaped applique, noughts and crosses, names of the owner or of the person for whom it is created, *Swastik* (Hindu auspicious and religious symbol), concentric circles, squares or rectangles, florals, sun, and stars.



Figure 3.1. Beautiful Godhadi with concentric circles and saw tooth pattern: Image source: Ishan Kshirsagar Instagram



Figure 3.2. Godhadi with cross, checks and triangular pattern: Image source: Desihomemadequilts Instagram



Figure 3.3. Beautiful Godhadi with concentric square and star Image source: Godhadi of Maharashtra, Western India, book by Geeta Khandelwal (Quiltmania Editions)

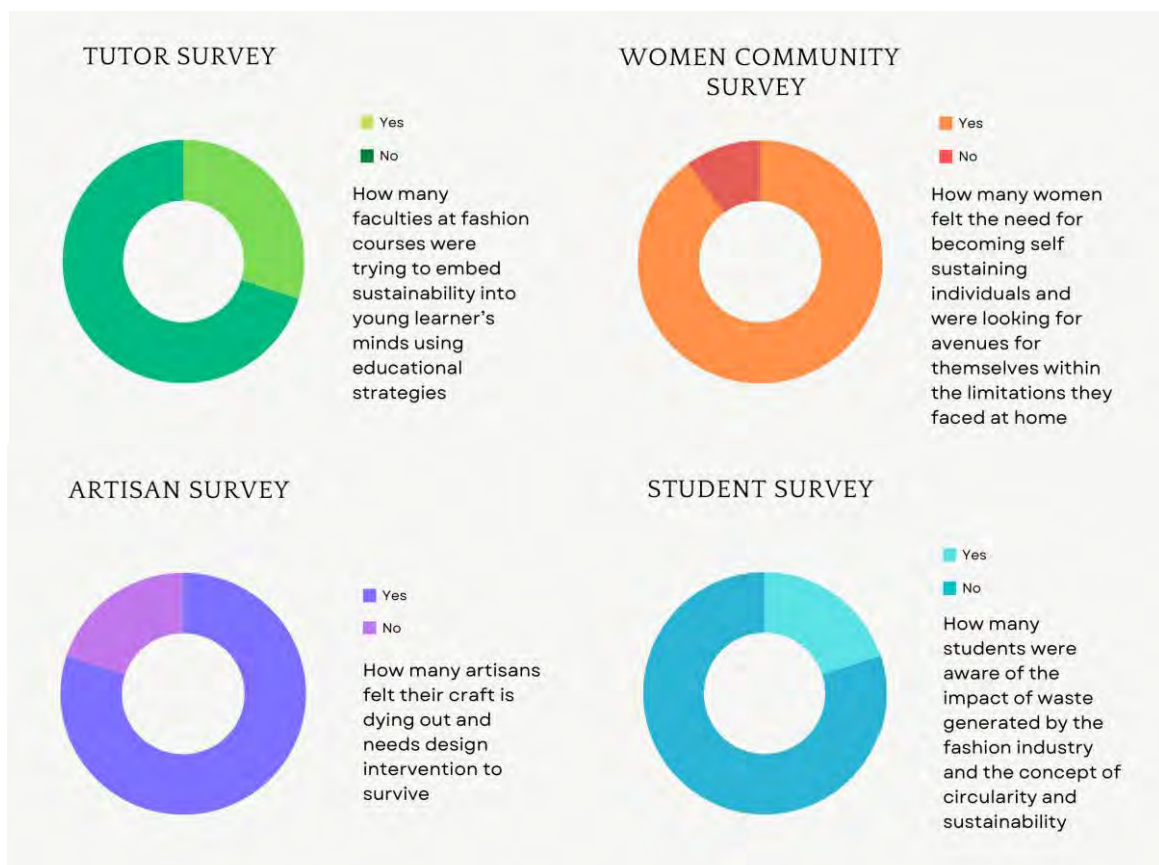
The process of making these quilts was fairly straightforward. First an old cotton sari, used as a base layer was laid out flat on the ground. The sari was then folded into the desired length. Then, wet small scraps of fabric, used as filler pieces were placed on the sari to avoid any gathering of the base layer, repeating the process till the desired thickness was achieved. Usually, six-eight layers were used for winter quilts and two-three layers for summer quilts. Once the layering process was completed, the topmost layer with the artistic motif which was made using *thigala* (patches of fabrics), was placed; also known as *pal laveli*.



Then the women would start adding hand stitches. At first, the edges were folded in and fixed with a running stitch. This step was called *kinara modhane*. After the edges were fixed in place, stitches were added to the rest of the blanket (Khandelwal, 2013). Owing to the use of running stitches, this quilt was mostly rendered reversible.

However, over a period of time these quilts are losing their demand as well as use. The multiple layers of fabric inside, makes them heavy and hence difficult to wash and clean. Since these quilts are laborious and time consuming, they are quickly being replaced by easily available and cheaper blankets from the market. With more and more women beginning to step out of the house for work, the investment of time in making quilts which do not fetch an equivalent monetary reward, is discouraging women from taking up this art. A few years ago, the Godhadis were considered prized possessions but are now associated with the social stigma of being from the lesser developed sections of society, further reducing their demand.

It is observed through the ‘Review of Literature’ that the chosen craft techniques would be an ideal pathway to create an educational strategy while integrating society, artisan community and industry to address the issue of waste management and sustainability. To strengthen this perspective, the researchers interviewed the various stakeholders as seen in the charts below:



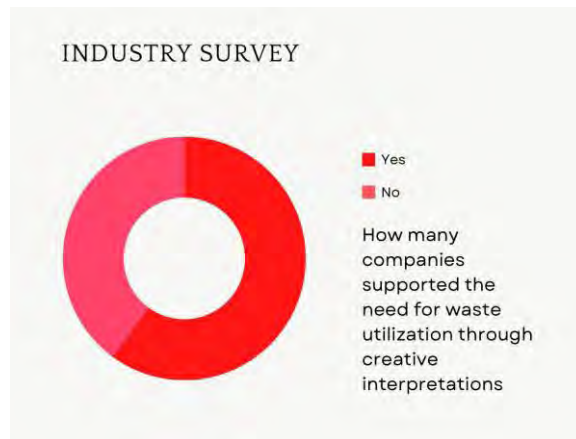


Figure 4. Survey conducted to analyse the need for this research and response of all stakeholders.

The survey suggested that the majority of all stakeholders had a positive response and showed interest in being part of this strategy for their individual benefits which could lead to the objective of achieving sustainability through cohesion and collaboration.

### Methodology

Being from the fashion industry, the pressing need to up-cycle waste is a constant area of research. The first step was to collect all the fabric scrap waste generated in the institute and sort it according to size. The bigger pieces were kept aside for making jackets from the ‘Godhadi’ technique. Medium size scraps were collected for origami products and smaller size scraps for embroidered products and decorative patchwork. These pieces were then sorted according to weight. The heavier pieces were kept aside to be used for jackets and medium weight fabrics were kept to be used for the product base. The lighter fabrics could be used for patches. Further sorting was done as per colour and material which were then identified for decorative designs.



Figure 5.1: Identifying the waste around the institute



Figure 5.2: Waste sorting as per size



Figure 5.3: Sorting the pieces according to colour, type and weight



## ***Fabric Origami***

Based on a secondary survey and analysis of designer brands, it was observed that very limited application of folding techniques is seen in apparels, home furnishing and accessories where fabric origami could be introduced to ensure maximum use of waste fabric. Unused fabric waste appropriate in size for various folding had been collected and segregated accordingly. Product prototypes were then made for consumer acceptance. Various inspirations drawn by the artisans in various Indian techniques for Indian crafts were incorporated in fabric origami techniques for new and innovative results.

In order to develop the product range, key points, elements, and consumer demand were considered. Products like a variety of bags, earrings, jewelry pieces, and lamps were developed by using various folding techniques that were converted into motifs.



Figure 6. Initial sketches of various designs.

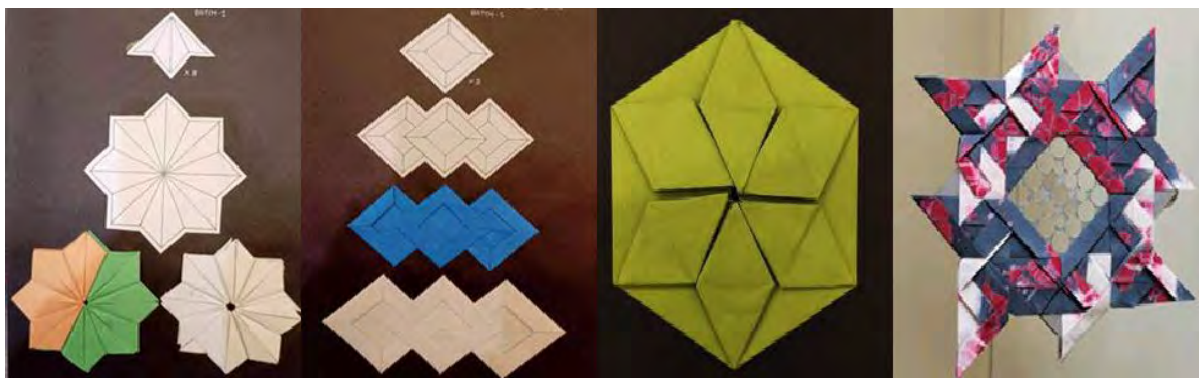


Figure 7. Various folding patterns created on paper and fabric swatches.



Figure 8. Various folding patterns created of fabric swatches.



Figure 9. Various products developed by using various folding techniques

Key elements of this technique are the three dimensional effects and various patterns created through folding. Colour variation further creates interesting patterns and looks. A combination of solid and printed pattern together folded creatively creates interest in the look of the product. These products were then decorated with necessary elements to enhance the look.



### *Creative Embroideries*

During the study, it was discovered that many Indian traditional embroideries are used actively in the apparel industry, including those that are used to enhance recycled garments. It was found that the effectiveness of traditional embroideries could be increased by integrating other hand embroidery techniques into a range of products, keeping circularity in mind.

While conducting the process of segregating fabrics, the researchers discovered that there are still numerous fabric scraps of a variety of sizes that can be utilised in different ways. The waste fabric pieces were studied and segregated as per their size, colour schemes and their sameness and then put together by using various traditional embroideries and other supporting hand embroidery techniques to enhance the surface. In the beginning, designs were made considering the placement of fabric within the design and embroidery techniques were chosen as per the prints, patterns and characteristics of the fabric. Comparatively bigger fabrics were chosen to make diaries, jewelry boxes, laptop covers by incorporating techniques like patch work, applique and quilting by joining fabrics together.



Figure 10. Fabric swatches segregated as per colour combinations and preparations.

Diagnostic study of fabric scraps helped in understanding how scraps can be best put to use to accommodate them into designs. Initial designs were made considering various techniques of joining fabric. And to bring the authentic essence of traditional embroideries the base colours of the products were selected accordingly.

The initial designs were created by focusing on variety, salability, circularity, aesthetics and most importantly use of traditional embroidery techniques.



Figure 11. Sketches of products developed based on segregated swatches.

Traditional embroideries were studied to identify the patterns of various communities performing these crafts for years and used effectively in the form of motif selection and appearance as per the requirement of the design. These embroideries were combined with the other enhancement techniques to add design aesthetics for improved product development.

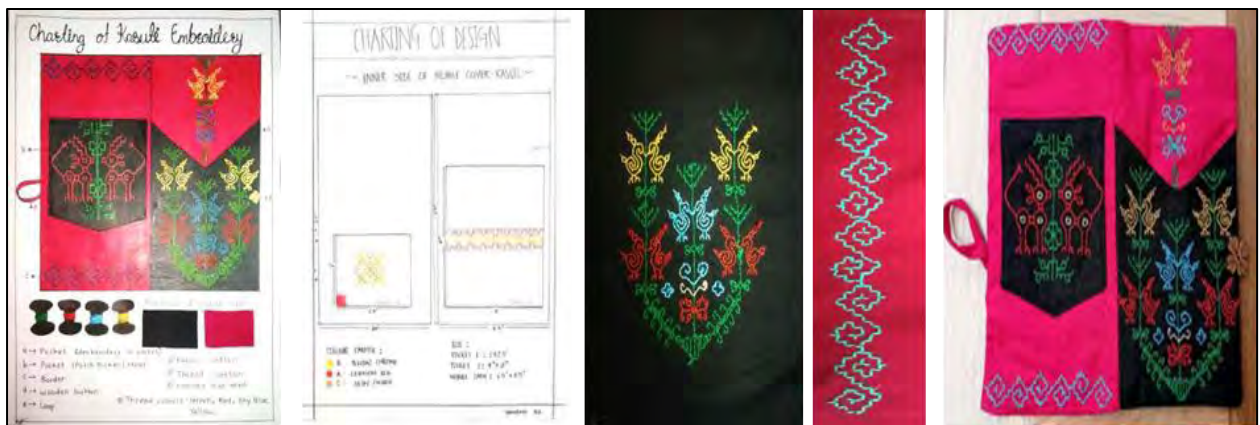


Figure 12. Planning and charting of embroidery on fabric swatches for product

As seen in Figure 12, various products were designed, the process of embroidery was charted on paper to analyse colour combinations and techniques to be added, and as per the plan each swatch was embroidered.

Embroidery of Kasuti was used to enhance the jewelry box made up of Khan fabric scraps. Straight fabric straps were used to create diary covers by using darning stitches from Kantha of Bengal and quilting was added to enhance the look. Fine borders were embroidered to mend the joints. Small scraps were used to develop jewelry pieces by adorning with embroidery of Gujarat. Bias cut fabric scraps were used to add finishing by adding cord piping.

As a part of experiential learning, incorporating classroom-based learnings into an outcome based product, various products were developed. The product range included a variety of items such as jewelry boxes, diary covers, jewelry pieces, mobile pouch, laptop covers and so on.

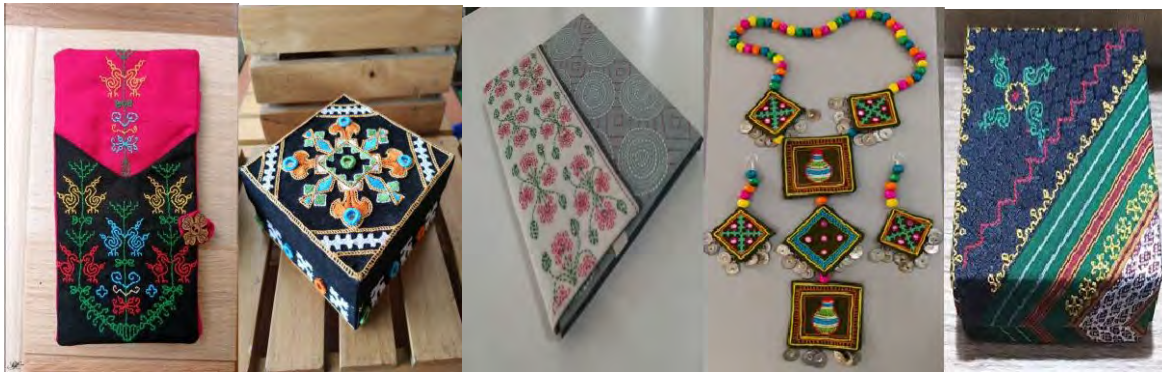


Figure 13. Variety of products developed by using Kantha, Kasuti, and embroidery of Gujarat by using different fabric swatches.

### *Godhadi*

After conducting an initial study of existing products available in India, the product range and price range, the researchers also surveyed of the situation of Godhadi making today and why the craft was dying out. From this understanding, a gap and an opportunity of making up-cycled quilted jackets was realised. The currently available options and services lacked emotional warmth associated with pre-loved clothing. These jackets would be long lasting and durable, creating the probability of them becoming heirloom pieces, connecting the warmth of the past with the present and passing it on to the future.

For this experimental study, the waste generated from toiles made in a fashion institute could be used as fillers and combined with fabric scraps generated during the garment cutting process to create beautiful patterns on the surface, leading to the creation of jacket prototypes that would provide warmth physically as well as psychologically, owing to its coziness like warm hug, mirroring the effect of using a Godhadi.

Initial designs for jackets were sketched, followed by pattern drafting and the making of mock-ups. A few women from the surrounding neighborhood of the institute were identified for doing the Godhadi stitches on the prototypes. These women were used to making Godhadis from their childhood and were now living in bigger cities. This work would provide them an extra source of income. This process also highlighted another potential for employment of unskilled labor that can easily learn this technique and become self-reliant.





Figure 14: Initial sampling by the community women at the institute campus

The jackets were designed to have a loose fit so they could adapt to multiple body types. Motif development for the jacket was done by connecting them to cultural and traditional stories and themes that are observed in original Godhadis. One of the most important details was that the jackets were made reversible just like Godhadis, making the design more versatile and flexible.

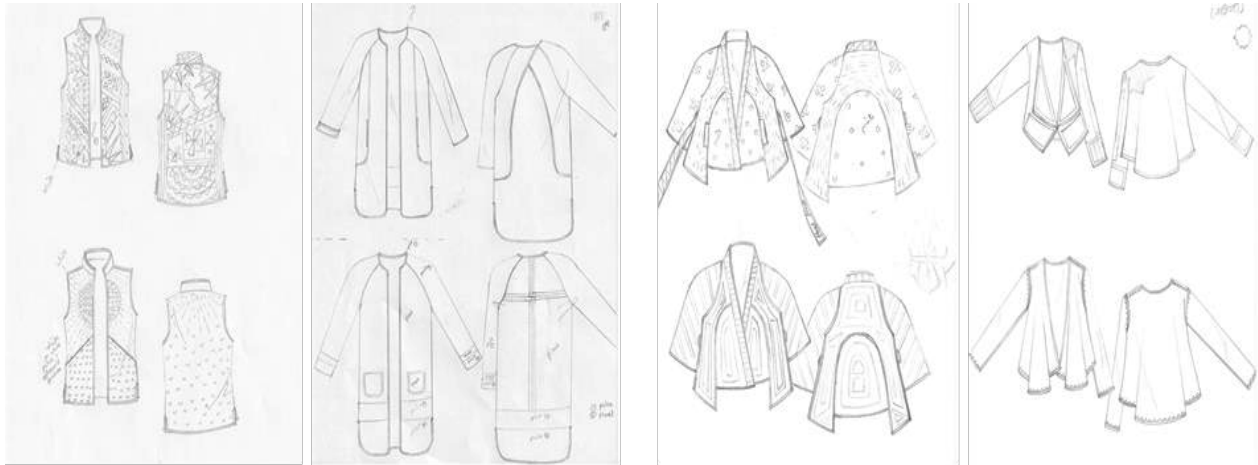


Figure 15. Initial sketches designed based on colours and patterns.

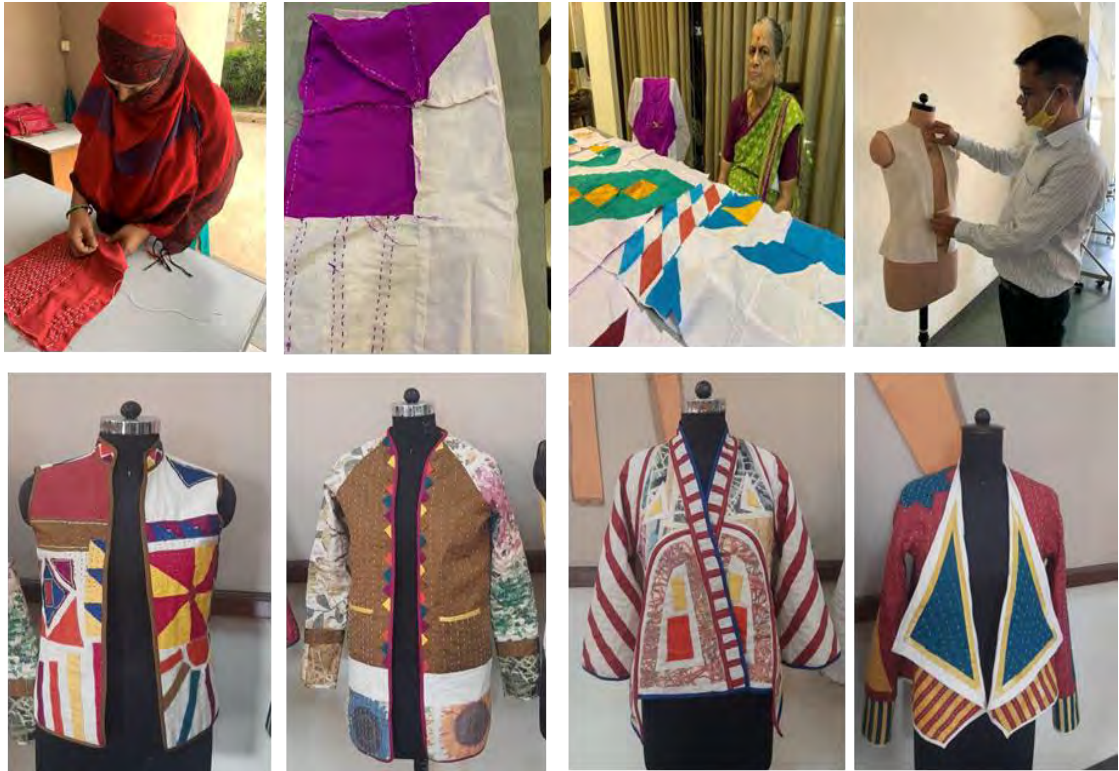


Figure 16. Pattern making, sample development and final designs



Figure 17. Behind the scenes of the shoot with the community women who hand stitched the jackets: Mrs. Rajeshree Ghodke (left) and Mrs. Jyoti Nivangune (right)

In order to execute this project, a group of students were identified and made aware of the concept of circularity. These students were trained and educated about the various techniques and then made a part of the entire process of product development along with the researchers.

## Findings and Analysis

Post creation of prototypes, interviews of all the stakeholders were conducted to analyze the feasibility, design acceptance and scope of the project to be converted into an industrial practice or mainstream product. A group of 30 stakeholders were asked for their perspectives:

S. no.	Stakeholder	Perspective	Response	Inference
1	Researchers	Accuracy of study objectives and methodology	8 out of 10 respondents considered the approach affirmative	This can open a scope for implementation in education to lead to a wider application in the future of fashion, connecting the various pathways of stakeholders.
2	Designers	Scope of implementation in practice	6 out of 10 designers considered the project as feasible for implementation.	The response was positive, leading to the possibility of streamlining the process.
3	Artisans	Willingness to identify the opportunities created through design intervention	7 out of 10 artisans showed enthusiasm towards the proposed strategy	The artisan community can be supported by revival and modernization of these crafts
4	Community Women	Benefits and scope of work opportunity created and willingness to participate	9 out of 10 women gave a positive response and inclination to train and use this as an additional and independent source of income.	The implementation of this project can lead to community uplift and women empowerment with the possibility of women working from the comfort of their homes and at their convenience.
5	Students	Awareness of sustainability, upcycling and creative problem solving for future implementation	9 out of 10 students felt they were enlightened by the scope and possibility of their creativity to make a bigger impact in society and the environment and would go ahead to pursue similar practices.	The model can successfully help achieve the objective to spread awareness in young learners and inculcate values of circularity through participative education.

6	Industry / Companies	Scope of study for percolation into the industry	7 out of 10 companies showed keenness in the project and considered a scope of incorporating into the industry	There is a positive response creating the scope of this project not being limited to the institute but going beyond into the mainstream companies, creating commercially valuable and innovative products from waste.
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Table 1. Analysis showing responses of various stakeholders on feasibility, design acceptance and scope of the project.

### Discussion

The experiments with institutional waste resulted in the creation of relevant products in various different categories. This opens the future scope for using waste generated in the industry at different stages for innovative products to balance the fashion ecosystem and reduce the waste created by the fashion industry. Incorporating this study as part of institutional projects, the values for sustainability can be embedded at the very foundation of fashion education and create a link between local communities, institutes and industry. By creating and using pre-designed prototypes, prices can be lowered and the project can be developed into a profitable business model. The learners will hold a value system of circularity and responsibility towards the environment and incorporate the same in future practice. These products will not only help in waste management, but also create new avenues and prospects for employment at diverse stages; from unskilled human resources to skilled labor and artisans to designers, manufacturers, marketers and the entire supply chain. Revival of the ancient craft techniques will create a bridge between the rich cultural heritage and modern markets. Through the incorporation of technology and advancement in social media, these products can be made available globally. Apart from the products, the entire strategy can be revisited according to local strengths and techniques and adapted in any part of the world with countless possibilities.

### Conclusion

The strategies applied and techniques chosen for repurposing waste can be effectively used for scaling up the project and penetrating into the industry and consumer markets. Simultaneously, implementation of this in the institute will spread awareness about circularity and inculcate these values in young minds which will form the foundation of a sustainable future. As collateral of this project, there will be community uplift, craft revival as well as conversion of unskilled to skilled human resources leading to an improved quality of life.

Mindfulness in process, people and practice along with contribution towards SDG 12 (United Nations, n.d.) will form a bridge that connects diverse pathways and will confront the growing issues caused by the fast paced linear fashion model, redefining the triple bottom line by connecting the pathways of past, present and probability.

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