Reviving Fashion: Weaving Life Back into Discarded Textile Waste

Michelle Yatvitskiy[1], Diadem Abayode[1],
Mentors: Kelly Cobb[1], Kedron Thomas[1], Nicole Jordan Haddad[2]
University of Delaware[1], Lobo Mau[2]

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Introduction/Concept/Context: Currently, the fashion industry lacks formal procedures to operationalize the use of textile and material waste in apparel product development. About 15% of the fabric used to create a garment is wasted during the cut-and-sew process since the pieces are usually irregularly shaped offcuts (ElShishtawy et al., 2021). Brands like Reformation acknowledge the need for solutions in post-industrial waste management as they currently waste 10-20% of the fabric roll (The Sustainability Report Q3, 2023). While pre-consumer textile waste is easier to reuse than post-consumer textile waste since it has fewer contaminants (Lau, 2015) some cutting scraps that have a high % of elastane or other contaminants like plastisol screen pigment are hard to recycle causing the elastane or contaminants to have to be removed from the fabric before recycling (Harmsen et al., 2021). Lobo Mau, a company that produces clothing from knit fabrics containing spandex and screen printing design done in-house, wanted to identify methods to reuse, remanufacture, or recycle their pre-consumer textile scraps.

Waste-led design (WLD) is an approach that considers the end of life of materials at the beginning of the design process (Semaan, 2019). The researchers build off WLD in product development-sourcing and solution finding based on the waste-at-hand through waste-led product development (WLPD). A redesign process aligned with Zero Waste Fashion design in that the focus shifts from mere aesthetics to material conservation and appreciation (Niinimäki, 2013).

While zero-waste design has been achieved through pattern making, draping, and knitting (Ibid) zero-waste-shaped weaving is rarely explored for sustainable fashion. This design artifact demonstrates a WLPD method aligned with the C2C concept of waste=food, i.e. waste as a raw material (McDonough and Braungart, 2002). **Aesthetics:** Applying WLPD, aesthetics like color and texture of the artifact were material-led, guided by the Lobo Mau printed jersey offcuts in black, orange, and blue. The colors reminded the researcher of the last minutes of a sunset against an ocean background where it is mostly dark outside but some orange from the sun is still visible, the phenomena of twilight inspired the wave motif. To further portray this ocean landscape the goal was to create a tactical sensorial fabric. While the color can't be controlled,

the texture of the artifact can be altered using different weaving techniques, emphasizing the wave creates movement across the bodice.

Methods: Process, Technique and Execution The researchers developed yarn using two methods from (Cao et al., 2022): one acquiring a sweater from Goodwill of Delaware and unraveling the yarn for reuse and two cutting fabric ribbon using scissors and a rag cutter (Bliss Model A) from pre-consumer textile waste acquired from Lobo Mau into various widths of yarn including ¼, ½, and 1 inches. For fabric development, a waste-led zero-waste process was used where the garment construction was approached as an experimental creative process that encouraged accidental or intuitive design (Niinimäki, 2013). The size, color, and the amount of fabric yarn available determined the weaving pattern of the artifact. The top was made using shaped weaving with a pin-loom weaving method where the dress form is used as a "one-of-a-kind-loom" and the pins are placed facing each other ⅜" apart creating the shape of the halter top. To create a zero waste top that is all one panel. The yarn from the disassembled sweater is used as the warp yarn wrapping around each pin as seen in Figure 1. The 1" Lobo Mau yarn is then used as weft yarn using soumak stitches to create depth and a 3D texture and the ¼" and ½" yarn is used to create tabby weave in a "wavy" pattern to create a tapestry effect. All of the fabric yarns were used continuously throughout the top where the colors were connected with floats in the back to not create any waste. The scrap fabric yarn was used to create the braided halter ties and the corset ties for the back. The skirt was woven using a frame loom creating a rectangle piece for the front and a trapezoid for the back where the black Lobo Mau fabric yarn was used as the warp yarn and blue, orange, and black Lobo Mau yarn was used as the weft yarn. The weft yarn was woven using plain tabby weave as well as knotting for the fringe on the waist and hem of the skirt to imitate faux fur.
Cohesion: The concept of this design is to create a cohesive ensemble from Lobo Mau pre-consumer textile waste using waste-led zero-waste design. This was achieved by creating fabric ribbons from Lobo Mau's fabric and using shaped weaving to create a fully woven piece with no resulting cutting scraps or textile waste. The skirt's fringe accents and plain weave in a similar palette offer variety in color and textural elements. The resultant halter and skirt are cohesive in color while adding variety with textural interest.

Design Contribution: This design contributes to circular design by demonstrating a waste-led product development approach (WLPD) to maximize the useful life of a textile. This design case offers a solution to work through contamination (spandex and plastisol) which complicates mechanically recycled pre-consumer textile waste. The design is faithful to the C2C concept of waste=food. Waste is a resource and raw material, demonstrating through shaped and frame weaving techniques how embodied energy and the useful life of waste can

be reclaimed.

			
Lobo Mau Fabric cut into Fabric yarn	Warping the pin-loom weaving	Wavy pattern of the shaped weaving	Frame Loom weaving

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