

CIRCULAR ECONOMY AND FASHION UPCYCLING: ELIMINATING WASTE BY BRINGING UNSOLD APPAREL AND POST-CONSUMER TEXTILE WASTE BACK TO THE SUPPLY CHAIN

AUTHORS

Mx Irina Milke Pavlova
Kent State University, Kent, OH, USA
ipavlov1@kent.edu

Professor Gargi Bhaduri PhD
Kent State University, Kent, OH, USA
gbhaduri@kent.edu

KEYWORDS

Upcycling, Zero waste, Closed-loop design, Postconsumer waste, Pre-owned

ABSTRACT

Purpose

Today's fashion industry is contributing to catastrophic negative impacts to the planet through industrial and post-consumer textile waste and consumes more than 98 million tons of non-renewable resources every year (Gazzola, 2020). In the current conventional take-make-waste model, only about 13.6% of fashion industrial waste is recycled or reused (Rauturier, 2022). One of the reasons for this low percentage is the lack of adequate technology to recycle industrial waste on a commercial scale (Chan, 2022). In addition, most of the recycling techniques involve downcycling methods of addressing fabric waste, where fibers are shortened, and some materials can only be used for non-woven or non-knitted applications (Bridgens et al., 2018). One method to prevent downcycling, incineration, and disposal of textile waste is fashion upcycling. One of the reasons impeding the implementation of upcycling into the existing supply chain is the lack of practice-based research on fashion upcycling and zero-waste design and production techniques that can be used on an industrial scale.

Method

Author uses a creative problem-solving approach to explore an alternate possibility of using pre-owned garments to prevent them from going to the landfill and limit use of virgin materials. This study seeks to address this area of sustainable production through the design of a capsule collection of upcycled and zero waste clothing, designed to be suitable for mass production and fit into a closed-loop design strategy.

To accomplish this, discounted and less-desirable thrifted garments were used in order to increase their aesthetic and retail value. Knitted items made of yarn of various qualities and woven items made from natural and synthetic blends were chosen since they are harder to recycle and are most likely to contribute to landfill. Emphasis was placed on accessible and universal materials in a solid color to make it easier to source and to recreate the design for different body types, ensuring the extended size range and making the production process more inclusive.

This study aims to answer following research questions:

RQ1. Can upcycling of unsold garments and postconsumer textile waste be used to produce designs suitable for mass production?

RQ2. Is it possible to fully eliminate textile, yarn and thread waste during design and production processes?

Results

During the design process three garments in total were developed: modular puffer pants, modular puffer jacket and a knitted bodysuit with a detachable ski-mask. CLO3D was used to develop patterns and conduct first fittings without creating excessive waste and unnecessary pre-samples. Knitwear programming software Stoll M1 Plus and an industrial Stoll knitting machine were used to develop and test the knitwear designs. Aforementioned technologies combined with textile shredder were used to develop a fully circular and zero-waste creative process.

Conclusions

The proposed research contributes to the field of circular fashion and primarily targets apparel designers, fashion product developers, and fashion sustainability researchers. The research is ongoing and will be continued by extending the range of the designs, testing the stuffing materials, and comparing how durable and insulating shredded wovens and yarns are compared to synthetic winterizer and goose down.