

Fiber Flow: Enhancing Textile Waste Reduction in the Fashion Industry through Material Flow Analysis and Life Cycle Assessment

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Abstract

Background - In addition to being a key driver behind global economic activity, the fashion industry has a significant contribution to environmental degradation, especially when it comes to the production of textile waste. Retailers and manufacturers have been the main focus of efforts to reduce the environmental impact, with less emphasis directed to how consumers could promote environmentally conscious choices.

Purpose - By integrating Material Flow Analysis (MFA) and Life Cycle Assessment (LCA), this study explores a consumer-based approach to textile waste reduction in efforts to evaluate the environmental effects of textile consumption.

methodology - As a main effort to facilitate the research, a Python-based application is developed where users can input garment size, material type, and garment color to identify the dyeing processes to generate outputs, which are textile waste analysis, carbon footprint, and water footprint. This application enables consumers to make more environmentally conscious decisions about sustainable fashion.

Findings - Preliminary findings demonstrate that providing consumers with real-time environmental feedback through the application has the potential to positively influence purchasing behaviors, reducing demand for fast fashion and promoting sustainability within the fashion industry.

Originality - Consumer-based approaches are heavily emphasized in this study by using Python-based tools to assist in a more sustainable fashion choice, which is an area that is less focused on compared to other efforts for retailers and manufacturers.

Keywords: Textile Waste, Consumer Behavior, Sustainable Fashion, Material Flow Analysis, Life Cycle Assessment
