ABSTRACT SUBMISSION
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Determining the environmental impact and carbon footprint of upcycled PVC flex banners using lifecycle analysis and understanding stakeholders' perspectives

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ABSTRACT

Polyvinyl chloride (PVC) serves as a primary raw material for numerous products, particularly flex banners. These banners, commonly used for advertising and marketing, are typically intended for short-term use and often discarded afterwards. Disposed PVC flex banners frequently end up in landfills, incinerators, or are buried in soil, resulting in significant environmental harm. This study presents a systematic literature review covering research from the past two decades and examines industry practices related to the production, environmental impact, and end-of-life management of PVC flex banners. The review also discusses reuse and recycling methods and proposes a conceptual framework for reusing end-of-life flex banners.

Additionally, a life cycle assessment (LCA) was conducted using openLCA software to compare the environmental and economic indicators of upcycled fashion accessories made from end-of-life PVC flex banners with those produced from conventional materials such as nylon and polyester. Six bags were designed and produced from end-of-life PVC flex banners and compared to nylon and polyester fabric bags. In 12 environmental categories, they outperformed nylon and polyester. The upcycled PVC [574.89 kg CO2 equivalent] had a low carbon footprint. The average cost of upcycled PVC bags [£49.86] was lower than that of conventional nylon [£66.80] and polyester bags [£67.09]. The LCA results indicate that upcycled PVC bags are more environmentally sustainable than conventional nylon and polyester alternatives. This strategy reduces plastic waste and supports the circular economy. Furthermore, the study explores global stakeholders' perspectives, based on 41 interviews with fashion brands, regarding the upcycling of synthetic textile waste into fashion accessories. The findings reveal that two-thirds of brands achieve high material recovery rates, and nearly half significantly extend product lifespans. However, upcycling remains largely artisanal and localised, with brands facing challenges such as resource limitations and insufficient policy support to establish upcycling as a mainstream practice.

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