

MIXED TEXTILE RECYCLING: OPPORTUNITIES FOR SUSTAINABLE PRODUCT DEVELOPMENT

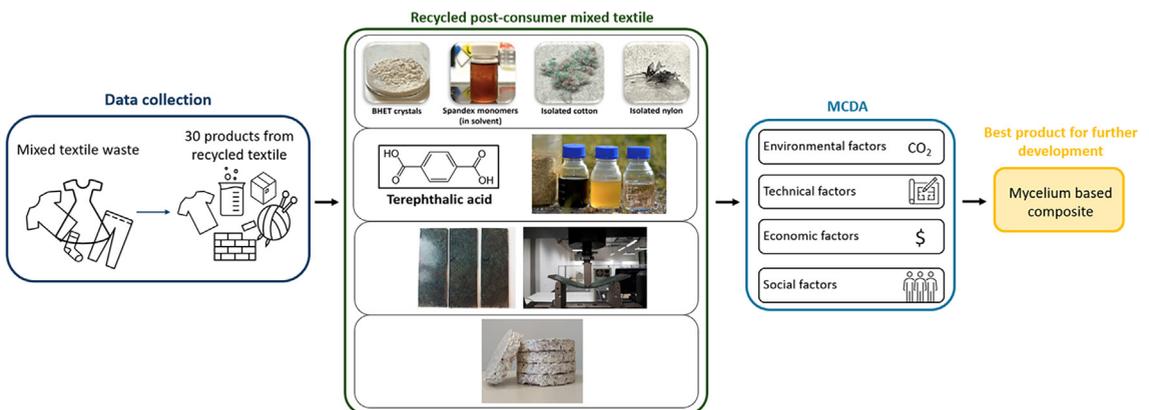
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Abstract – The Waste Framework Directive mandates that, starting from January 1, 2025, separate collection of textiles must be introduced in all Member States of the European Union. The aim of separate collection is to promote the circular economy in the textile system by creating favorable conditions for recycling and re-use. However, in order to promote recycling, there are still challenges in terms of textile variety and mixtures. Currently, there are no commercially viable technologies to recycle mixed textiles back into textiles or high value-added products. Therefore, the aim of this study was to determine if there are any products in the research process that could be obtained from post-consumer mixed textile waste and, if so, to assess which is the most suitable for further development. Two methods were applied: data collection and multi-criteria decision analysis. A total of 30 research articles were identified, but only four were selected for further analysis based on their relevance to the research objective. The products obtained in the selected studies were (1) bio-oil and terephthalic acid, (2) textile-reinforced composite for building applications, (3) mycelium-based composite for thermal insulation and (4) textile fibers (cotton and nylon), spandex monomers and bis(2-hydroxyethyl) terephthalate. The products were evaluated using nine criteria covering economic, environmental, social and technical factors. The multi-criteria decision analysis showed that at this time, mycelium-based composite for thermal insulation has the highest potential for further development. The results show that it is possible to recycle mixed textiles into high value-added products. Future research should focus on scaling up the production of mycelium-based material and conducting a more detailed assessment of the economic, social and environmental impacts.

Keywords – Circular economy; Multi-Criteria Decision Analysis (MCDA); postconsumer textiles; value-added products



Methodological framework for assessing mixed textile recycling