

## **Sustainable Innovation 2023**

*Accelerating Sustainability in the Creative Economy and Creative Industries*

24th International Conference

Online Conference: 20<sup>th</sup> – 26<sup>th</sup> March 2023

Business School for the Creative Industries

University for the Creative Arts

Epsom, Surrey, UK

### **Concept Development for Sustainable and Resource-Saving Fashion Design.**

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According to a study by the British Ellen MacArthur Foundation, the entire textile industry could be responsible for a quarter of climate-damaging CO<sub>2</sub> emissions by 2050. Currently, the textile industry produces 1.2 trillion tonnes of CO<sub>2</sub> annually - more than international flights and cruises combined. As part of the textile industry, the fashion industry alone is responsible for five percent of global emissions. They arise from the extraction of plastic fibres, further processing and long transport routes. There are two broad categories of textile waste in the garment sector: Waste generated by the industry and waste generated by consumers. Pre-consumer textile waste is generated during the production of fibres, yarns, fabrics and garments. This study deals with the prevention of preconsumer waste caused by the cutting of flat goods. The design process is at the beginning of the garment manufacturing process and has no influence on the material consumption of the yard goods. The next step is to create a pattern and cut the prototype. During cutting, when the pattern pieces are cut out of the fabric, up to 50% waste can occur. This value does not refer to the individual cutting of a prototype, but to the cutting of production layer patterns. This waste is made up of the selvedge and the unused space between the cut pieces. Due to its significance for overall waste prevention, this process step is examined in more detail in this research. Due to the fragmentation of the value chain, methods to avoid cutting waste that were used in the past can no longer be used. Iterative methods of the design process are reduced to the bare minimum in the globalised production chain, and an assessment of the prototypes takes place in a maximum of 1-2 loops. There is no coordination of material consumption with the design team and no adaptation of the design to reduce consumption. In-house prototyping allows communication and coordination between the parties involved in the process. In several iterative loops, the product can be adapted in such a way that a satisfactory compromise between consumption and design is found. The concept for waste prevention consists of different methods, which are verified by practical applications and expert testimonies. The hypothesis of this research is that by using these methods and using Virtual Prototyping, the process can be improved again. For this purpose, a quantitative study is conducted and expert testimonies are obtained. A concept for waste prevention is created, which is implemented in real time through virtual prototyping and serves as a basis for coordination between the participants in the process. In this way, everyone involved can use their expertise to achieve a more sustainable product and mitigate the disadvantages of the fragmented value chain. In an online survey, the designs optimised in consumption are presented to potential end consumers in order to find out whether these designs can lead to changes in purchasing behaviour.