

Extended Abstract: Dynamic Challenges of New Digital Technology-Based Business Models for Customer Diversity in the Fashion Industry

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Keywords: Digitalization, Microfactory, Business Models, Fashion Industry, System Archetypes

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The purpose of this paper is to contribute to the discussion of new, digital technology-based business models in the fashion industry by providing insights from the perspective of systems archetypes in order to uncover unfavourable dynamics and effects in advance.

Digitalisation offers enormous opportunities for the textile and clothing industries (TCI) to become more efficient and at the same time be more sustainable. This applies to digitalization within the companies as well as to the digital transformation of the entire supply chain. (2021 Euratex Vision on Textiles + Clothing). Digital technologies are increasingly entering the textile and clothing industries. Digital solutions for value creation networks and production using intelligent networking (Kiel et al. 2019), taking into account the possibilities of flexible production, adaptable processes, customer-centric solutions, optimised logistics, use of data for new services and resource-saving circular economy (Federal Ministry for Economic Affairs and Climate Action 2022), that have proven to be beneficial to other industries can also be applied to the TCI. (Winkler et al. 2022).

New completely digitized manufacturing systems have the potential to fundamentally change manufacturing structures and business models in the textile and clothing industry. (Artschwager and Tilebein 2017) Digitalisation paves the way for decentral, local production concepts that create and produce customer specific and co-created products near the point of sale or point of use. Fully integrated small-scale production units bear a vast potential for use in different business models for design-based individualised consumer goods. They are suited also for urban production that, compared to conventional production in global supply chains, can be much faster with less environmental impact. (Tilebein 2017)

Among these new digital technologies for manufacturing Microfactories have recently been subject to research and development (Montes and Olleros 2019) and offer new possibilities. For the TCI, this is related to the concept of a Digital Textile Microfactory (DTMF).

The basic principle of a Digital Textile Microfactory is a digitally networked end-to-end digital design and production process for textile and clothing products. Such a Microfactory can cover a

complete value creating chain comprising all design and production steps from the customer to the ready-made product. Its digital backbone allows for speed, efficiency, high quality, deep consumer interaction, and increased sustainability, which in turn bears great potential to meet new market trends in the fashion industry that are driven by customer diversity in terms of e.g. morphology, design and functionality preferences, or sustainability preferences. Thus, a DTMF can provide solutions for efficient development and production of individualised products in small lot sizes, being fast and flexible in a more sustainable production and supply chain and supporting new business models. (Winkler et al. 2022)

However, other than for established technologies, business models using new technologies come with higher uncertainties with regard to the different aspects (customer value proposition, key processes, key resources and profit formula) of the business model as well as their relations. From the perspective of systems thinking, it is therefore suggested to think more carefully from the outset about which interactions and developments are possible, and to consider not only obvious, proven and immediate mutual dependencies within a business model, but also its potential, possibly indirect, more far-reaching or more complex interaction structures that may come with additional delays.

Also in the case of the DTMF, in spite of the potential benefits of this new digital technology, the industry is still reluctant to adopt it. This can be related to perceived uncertainty with regard to the range of new business models a DTMF can support. To analyse their potential risks, a dynamic perspective can be helpful. System Dynamics can support this in two ways: with case-specific concrete modeling and simulation or, in a first step, with qualitative causal loop diagrams that are based on system archetypes as a starting point to support considerations.

In this paper, we go the first step and apply system archetypes to the topic of DTMF-based business models. We first describe the new technology of Digital Textile Microfactories as well as recent diversity-related market trends in the fashion industry. We then outline three different business models for Digital Textile Microfactories and propose related systems archetypes that offer a wider systems perspective on potential dynamic effects, e.g. we relate the limits-to-success archetype to DTMFs for individualization.

Of course, these are just first and qualitative insights from a broader systems' perspective into the potential downsides of using the new technology of DTMFs. More research is needed in order to further specify risks and to develop proper strategies in order to prevent adversal effects.

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