

META-ANALYSIS FOR ENVIRONMENTALLY SUSTAINABLE PRACTICES IN DIGITAL KNITWEAR

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ABSTRACT

Knitwear is often touted as the future of fashion with both mass-market and luxury brands regularly creating collections that involve knits (CBI, 2021). Thus, knitting, particularly digital knitting (DK), has become a popular method of clothing production for the industry due to its sustainability features such as zero waste and local production, as well as being energy and cost-efficient. However, conventional knitwear production is resource-intensive, which results in damaging environmental consequences (Chakraborty, 2016). Addressing sustainability is a critical component of developing the industry as a whole and essential for minimizing the impact imposed by knitwear industry practices on both resources and the natural environment (Conti & Motta, 2022). There are many best practices currently being implemented in the DK industry, but these are often focused on isolated issues without a holistic roadmap to guide decision-making, creating a patchworked approach. Therefore, this research aims to understand and synthesize contemporary best practices being used within the DK industry that are important to sustainable development within the industry, through a meta-analysis of literature on knitting and DK.

Based on the analyses of data, several themes emerged. The first theme identified is the importance of consideration of material selection when addressing sustainability in knitted garments (Nautiyal & Vasugi, 2018; Power, 2012). Research suggests that both natural fibers as well as synthetic fibers have their own merits and can be used for DK in the design stage. The second theme identified was how digital technologies such as Clo 3D and Create+, allow knitwear designers to manipulate their designs in high-resolution simulation software before engaging with physical prototyping, aiding in a reduction of materials needed to bring a product to market (Prahl, 2018). The third theme identified is the capability to knit in a zero-waste manner through seamless knitwear production. In this process, instead of knitting yardage to cut & sew, a garment can be knitted in whole or to the specifications of the pattern pieces required (fully fashioned garments) using one continuous filament or yarn (Kanakaraj & Rajagopalan, 2021; Power, 2012). The fifth theme identified is efficiency. Advanced improvements within DK allow the machines to change directions mid-stroke improving speed and reducing energy consumption needed to produce a garment by up to 8% (Power, 2012). The quicker response in these machines as well as the elimination of cut-and-sew production, increases the speed at which

garments can be produced by up to 30 to 40% (Bhosale et al., 2013). The sixth theme identified was mass customization, providing the ability to adapt garments to fit the needs of the consumer, often including touchpoints where consumers can make choices related to the yarn, aesthetic, and fit of a garment. The final theme identified is local production. The introduction of DK technology is beneficial because it can be produced in domestic factories where the standards of environmental policy can be enforced, resulting in increased transparency and an improved brand image (Nautiyal & Vasugi, 2018).