Challenges to the Adoption of Textile Biomaterials and the Potential Role of Digital Supply Chain Platforms.

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The damages of the textiles and apparel industry are well documented, with fibre choice having a significant impact. Biomaterials show strong potential for delivering lower production impacts while supporting material flows that sustainably integrate waste flows (Circular Economy). However, their adoption can be challenging for brands and suppliers. This qualitative case study investigated brands' and suppliers' experiences to identify the challenges in adoption of biomaterials, focusing on the needs and wishes that could inform a digital platform. The study considered factors from technology to honesty and transparency, standards, data, and communication. We specifically consider the so-called 'Industry 4.0' procurement platforms as key stakeholders for the research, as they hold the potential to provide the information needed to increase the adoption of biomaterials. We therefore selected one such platform as our single case study.

This qualitative study utilised 'design research' methods to seek novel perspectives on suppliers' and brands' experiences with biomaterials. This approach explicitly charts a path from practical problems to desired futures. Design research also aids strategy with deep, communicable, user-centred insights. However, limitations lie in reduced generalizability and bias from the small sample size. We chose a hybrid case-study approach composed of semi-structured interviews, user testing, and a concurrent think-aloud protocol. We validated the quality of our findings via an interview with a procurement specialist and a debrief with the [to be named] platform developer. We chose a single case study format to build a deep understanding of the Brands' and Suppliers' challenges surrounding the phenomenon in adopting biomaterials.

We invited twelve (12) participants. Eight (8) responded, with six (6) professionals joining. Participants were sourced by 'cold outreach' and snowball sampling to minimise bias. The following groups were represented: One (1) Material Supplier, one (1) Procurement Consultant, one (1) Freelance designer working with large performance brands, and three (3) purchasers from Apparel Brands. Participants represented senior roles at major brands and established start-ups across footwear, outdoor and performance, luxury accessories, and women's boutique apparel sectors. Computer-aided thematic analysis helped manage the large amounts of qualitative data collected, and in coding emergent themes.

For brevity here, one key theme that emerged from the study was the misalignment of expectations. Brands and Designers commonly perceive that novel biomaterials should act as a direct replacement for current stock (i.e. matching the performance of animal leather). This is highly unlikely given the range of performance parameters that are considered. The interviews also described multiple instances where Suppliers, hoping to secure contracts, would overpromise. In addition, there were multiple accounts of actors who actively misrepresented biomaterial composition or performance (specifically offering false promises on colour fastness or bio/recycled content). Hence, we identified that this misalignment of expectations is a key challenge in the adoption of biomaterials. Other key challenges we identified related to transparency, communication effectiveness, data burden and tactile experiences. However,

the research findings also suggested that digital platforms do hold some potential to tackle these named challenges. A full analysis, with further key insights, will be presented in the paper.