

RECENT TRENDS IN TRANSPARENCY IN THE APPAREL SUPPLY CHAIN AND THE DEMAND FOR BLOCKCHAIN IMPLEMENTATION; A REVIEW OF LITERATURE



“ The textile and apparel industry faces supply chain challenges due to increasing complexity. Consumer demand for transparency has emerged, making blockchain technology a promising tool for sustainable supply chain transparency. ”

The textile and apparel industry has emerged as one of the rapidly expanding global markets, exerting a significant economic influence worldwide. It plays a vital role in producing essential goods for people across the globe, ranging from fiber production to the manufacturing of clothing. Despite experiencing challenges during the COVID-19 pandemic in 2020, which led to a decline in apparel industry sales, there is an anticipation of a resurgence in global demand for clothing. The global apparel market is projected to generate approximately 1.5 trillion U.S. dollars in revenue in 2021, with an expected increase to around 2 trillion dollars by the year 2026 [1].

Thanks to the implementation of automation and digitalization in textile processes, production nowadays is more effective and efficient than ever be-

fore. On the other hand, with the familiarization of customized mobile apps the consumers could enjoy a wide range of product choices that offer hassle free transactions. However, the increasing complexity of the apparel industry has given rise to critical challenges in current supply chain management systems such as interfering of products, unsustainable production practices, failing to share real-time information, and poor traceability [2]. With the aforementioned challenges, the demand for transparency has emerged as a prominent requirement among consumers today. With due consideration, this article offers a concise review of the literature on recent trends in transparency within the apparel supply chain, as well as the growing demand for the implementation of blockchain as an emerging technological tool.

Need for Transparency in Apparel Supply Chain

Transparency in the context of the textile and apparel supply chains refers to the visibility regarding the processes, practices, and impacts of producing and distributing clothing items. It involves providing comprehensive information about each stage of the supply chain, from raw material sourcing to manufacturing, transportation, and retailing. Research indicates that transparency can serve as a vital tool for innovation in products, processes, and business models as well. Despite this, there is a lack of understanding on how transparency influences consumers' perceptions of a brand in the context of fashion [3]. Nevertheless, companies often consist of multiple applications that are individually developed, sourced from external providers, and integrated into existing legacy systems. Furthermore, these companies may operate across multiple levels of diverse manufacturing and information system platforms. Consequently, the scope of tracing products through a supply chain across multiple companies and encompassing the entire processes presents an inherently intricate design challenge, as stated by Cimino & Marcelloni [4]. Efforts have been made to address the above-mentioned trans-

parency issues, with the exploration of innovative tools and techniques to improve traceability and transparency. Based on the existing literature, there is an increasing number of studies being published on transparency and traceability. However, the current review studies indicate that the evaluation of the apparel supply chain lacks a comprehensive perspective on transparency.

Transparency throughout the supply chain has become one of the most significant demands of customers nowadays since the emergence of complexity, volatility, and competitiveness has made the apparel industry thrive towards a fast-growing global market. Despite this, research focusing on the transparency in the apparel supply chain has been observed to be scarce over the past years, suggesting a new scope to be contributed. While there has been a 122.22% increase in the number of publications within the defined scope, the relevant research communities have identified a scarcity in publishing within this domain. Notably, the existing review studies have not predominantly emphasized on the broader perspective of transparency within the apparel supply chain.

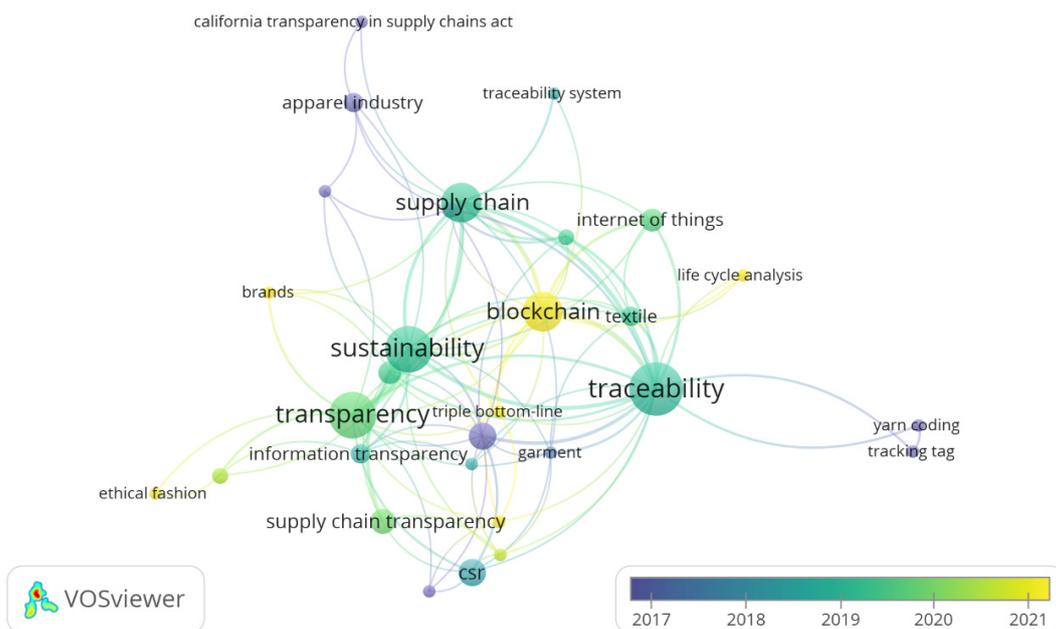


Figure 1: Evolution of transparency in the apparel supply chain

Evolution of transparency in the apparel supply chain

Figure 1 demonstrates the evolution of the emphasis on transparency in the apparel supply chain over time. The timeline is color-coded based on the average year of publication. Before 2015, the trend primarily emphasized broader aspects including fashion industry, supply chain management, and social responsibility. From 2015 to 2017, the focus shifted towards specific areas like Corporate Social Responsibility (CSR), supply chain transparency legislation, manufacturing, tracking tags, and yarn coding. Between 2018 and 2020, a significant trend emerged in various domains, encompassing supply chain transparency, fashion supply chain, sustainability, information transparency, traceability systems, and Internet of Things (IoT). During the recent years, particularly from 2020 to 2022, there has been a notable rise in the importance of subjects such as life cycle analysis, sustainable supply chains, ethical fashion, modern slavery, brands, and blockchain technology. This indicates a change in the emphasis on transparency within the apparel supply chain, moving from broader scopes like fashion industry, supply chain management, and social responsibility towards more specialized and niche areas in recent research publications.

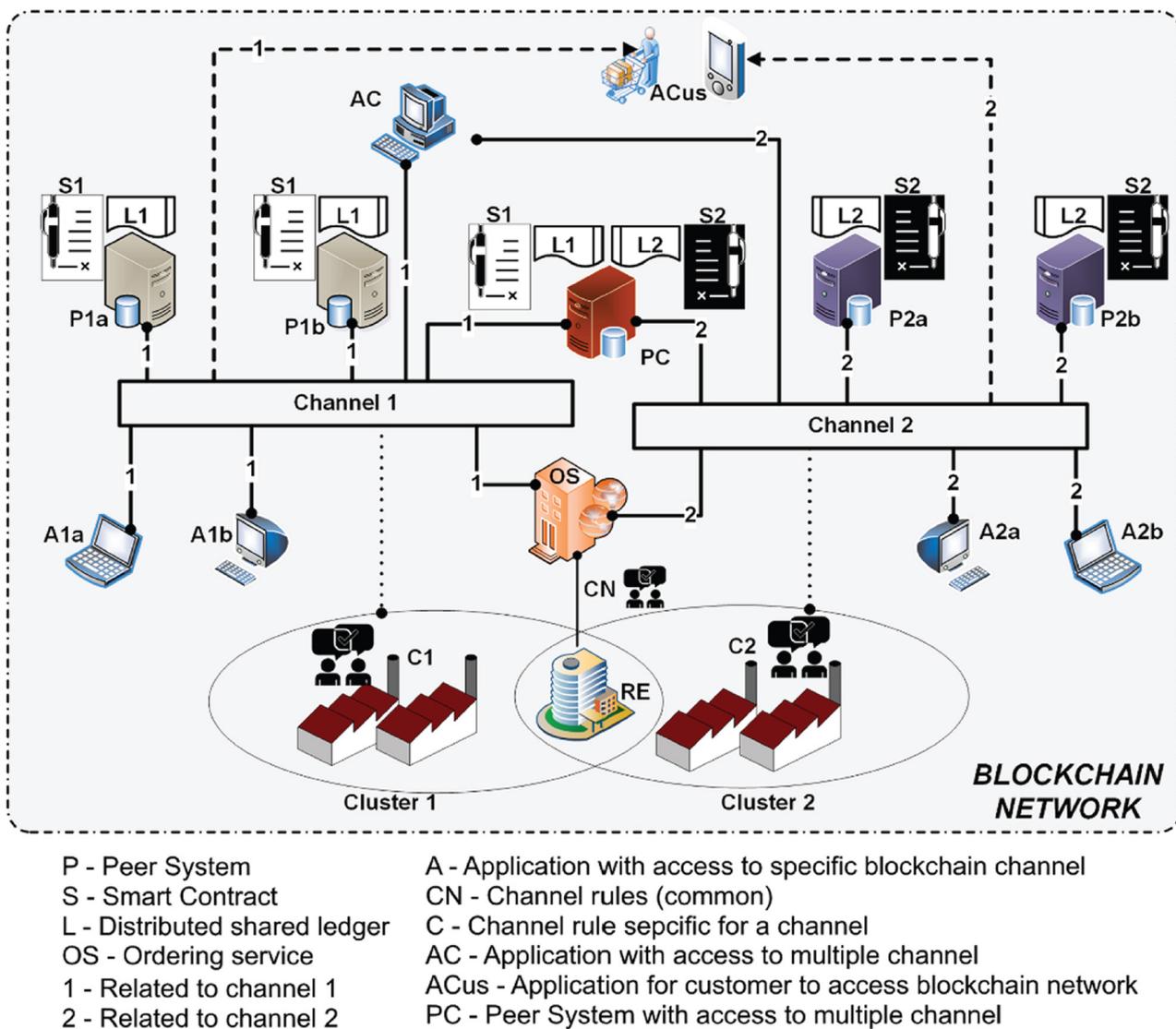


Figure 2: A Proposed blockchain network for apparel supply chain [7]

Demand for the Implementation of Blockchain Technology

The emerging need for improved monitoring systems to fill up gaps in the flow of information along supply chains has led to a rising demand for feasible technological tools capable of advancing communication to foster transparency. Blockchain technology holds significant promise as a tool for enhancing transparency in sustainable supply chains. The study of Saberi et al. [5] demonstrates that one of the highly anticipated applications of blockchains is that their ability to record data that can provide information on the environmental and social sustainability practices of supply chain partners. Despite the publication of blockchain-based studies related to product traceability in agriculture and food supply chains, the potential applications of this technology in the apparel industry have not been thoroughly examined [6]. Pérez et al. [6] introduce a novel traceability scheme with a proposed framework tailored for ready-to-wear clothing which aims to enhance the transparency in supply chain and validate the authenticity of retail products. Agrawal et al. [7] present a blockchain-based framework for supply chain traceability in the apparel industry. Their approach involves a simulation-based network design and a partner interaction protocol tailored to address the intricate nature of multi-tiered supply chains (Figure 2).

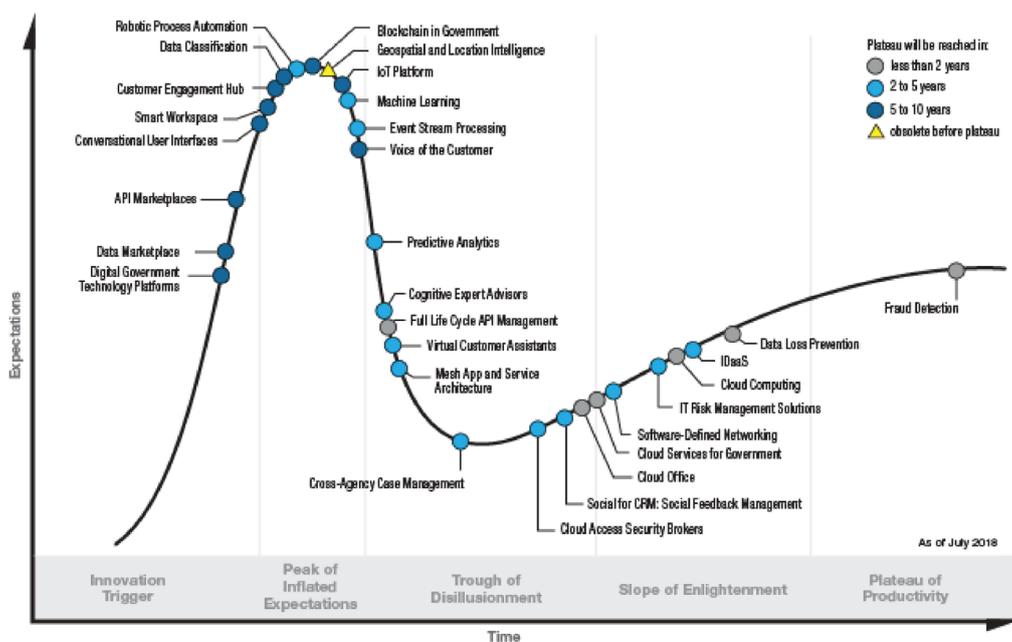


Figure 3: Gartner's Hype Cycle for Digital Government Technology, 2018 [10]

Gonçalves & Silva [8] investigate various methodologies for assessing the sustainability of fashion products, with a focus on environmental footprint, social issues, and transparency. Nevertheless, their findings also underscore a significant deficiency in effectively communicating sustainability-related information to consumers in a manner that is easily comprehensible and guides them towards the most sustainable products [8].

The Gartner's hype cycle designed for digital government technology in 2018 (Figure 3) depicts that the future for blockchain technology looks promising, and it estimates that it will take at least 5 -10 years for the technology to grow and begin to yield benefits [9]. As further stated by Gartner [10], although decentralized public blockchain applications are flourishing, there is a scarcity of successful permissioned enterprise blockchain projects. Leaders in applications and software engineering need to understand how recent advancements are enabling the integration of enterprise needs with innovations in public blockchain [10].

Consequently, it is apparent that the emphasis on industry-academia collaboration is notably inadequate within the specified scope, despite the increase in publications in recent years. Therefore, it is imperative to conduct more empirical research that involves industry collaboration to investigate the importance of potential challenges and uncover the relationships among them. Furthermore, research efforts should prioritize understanding the practical limitations of real-world implementations, thereby ensuring a holistic comprehension on the current state-of-the-art.

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