Contribution to development of a secured traceability system for textile and clothing supply chain

Tarun Kumar Agrawal

Thesis for the degree of Doctor of Philosophy in Textile Management at the University of Borås to be publicly defended on **June 14th 2019, 10:00 a.m**. in Vestindien B, Textile Fashion Center, Skaraborgvägen 3, Borås, Sweden

Language: English

Faculty Opponent is:
Prof. A. Blanton Godfrey
Joseph D. Moore Distinguished Professor, TATM
North Carolina State University, USA

THE SWEDISH SCHOOL
OF TEXTILES
UNIVERSITY OF BORÅS

Abstract

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Secured traceability implies not only the ability to identify, capture, and share required information on product transformation throughout the supply chain (SC), but also the ability to ensure the security of the traceability data. Due to information asymmetry and lack of transparency, textile and clothing (T&C) industries often face challenges in implementing and maintaining sufficient traceability. The SC actors find it difficult to identify and track the suppliers and sub-suppliers involved. Additionally, the opaque and largely untraceable structure of the SC has enabled the easy intrusion of counterfeits. Hence, a secured traceability system is imperative to ensure that the required traceability data are captured and shared among SC actors, thereby allowing the tracking and tracing of the products in the SC. Further, a secured traceability system helps organizations in various decision-making processes and protects customers from counterfeits.

This thesis contributes to the development of a secured traceability system for the T&C sector. It examines traceability at product and information levels, based on the system-of-systems approach. At the product level, the thesis introduces a secured traceability tag that can be printed on the textile surface. The secured tag is hard to copy and is durable enough to withstand normal textile use, thus providing sufficient security besides product tagging for traceability implementation. At the information level, the thesis explores and classifies traceability data that can be shared at business-to-business and business-to-customer levels for the implementation of secured traceability. Subsequently, a blockchain-based traceability framework is proposed for the T&C supply chain to systematically capture and share data in the supply chain network. The proposed framework demonstrates the applicability of shared data infrastructure to traceability without a central authority and develops technology-based trust among the supply chain actors. It relies on no central authority, and has customized data privacy and accessibility rules, thus providing a unique opportunity, flexibility, and authority to all supply chain actors to trace their supply chains and create transparent and sustainable supply chain networks.

Keywords: Traceability, Textile and clothing, Supply chain, Secured tag, Blockchain