Chapter 3
Blockchain Storage With Sharing of Internet of Things Data in Textile Production Supply Chains

Kamalendu Pal
https://orcid.org/0000-0001-7158-6481
University of London, UK

ABSTRACT

Internet of things (IoT) technology is poised to change the flow of data handling for tangible and intangible assets in textile production and utilization industries. It is reinventing global textile manufacturing operations, product distribution, and how manufacturers exchange value. For example, IoT technology helps gather operational data, store it, process it, and improve business efficiency. However, IoT technology-based textile production and its supply chain's information systems are highly vulnerable to security, privacy, and trust-related issues. This chapter presents the basic design and operation constraints that intelligent textile industries expect to experience within modern wireless data communication networks (e.g., 4G, 5G) with IoT technology and how blockchain technology can mitigate these constraints (e.g., privacy and security). The advantages of blockchain-based computing are its ability to scale rapidly, store data remotely, and provide service in a dynamic environment. Finally, this chapter presents a hybrid (i.e., IoT, blockchain, service-oriented computing) data processing architecture for the textile industries.

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INTRODUCTION

Textile production and distribution industries are an integral part of modern society. However, its evolution has been taking place for a long time. Since the first industrial revolution about two hundred and fifty years ago, global production has experienced revolutions. For example, very recently, the fifth industrial revolution (or industry 5.0) has attracted the interest of academics and practitioners to use the innovative ideas of artificial intelligence (AI) to eradicate global technological poverty. At the same time, practitioners are expressing their views of the future of the production industry over the coming decades, which will not be a linear extrapolation for the current business practice. Instead, there are many scenarios – each with multiple paths to get from where the production industry is today to an unknown tomorrow. The scenarios arise from the complex interplay between a range of future factors: (i) socio-demographic changes and rapidly evolving values, needs, and expectations of the general public and societies, (ii) political and economic shift, (iii) alternative possible trajectories for energy, resources, the environment, biodiversity, and sustainability, (iv) new system science-based business thinking and the consequences of an increasingly globalized business landscape, and (v) progressive and innovative developments across different disciplines supported by modern science and technology with potential disruptive impact.

Today production industry's evolution is centred on information technology (IT), information and communication technology (ICT), and operation technology (OT). It is ushering conventional computer-aided production to 'smart production' featured with data-driven decision-making (Pal, 2021). During this change in thinking, the internet of things (IoT) technology plays a vital role in connecting the physical production workplace to the digital information systems in the cyberspace of computing systems. This way, a new generation of cyber-physical systems (CPSs) control industrial production and its supply chain management (SCM).

In a typical production supply chain, raw materials are purchased from suppliers and products are manufactured at one or more production plants. Then the product moves to an intermediate storage space (e.g., warehouse, distribution centres) for packing and sending for shipping to retailers or customers. In this way, a production supply chain consists of network business partners, suppliers, transporters, manufacturers, distributors, retailers, and customers (Pal, 2019) (Pal, 2017). Different researchers reported various aspects of supply chain operations management-related issues. Academics (Gao & Li, 2018) reported the importance of supply chain coordination. A group of researchers (Lebosse et al., 2017) reviewed the concept of agility in supply chain operations. Artour Taghipour highlighted the importance of planning a manufacturing network with non-integrated business units (Taghipour, 2014). The importance of negotiation-based coordination has been presented by a group of