Chapter 4
Ensuring Robust and Secure Supply Chain: Deploying Blockchain

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ABSTRACT

Transparency, visibility, security, source-to-store traceability, and rising customer expectation are the critical points in the retail supply chain. The global supply chain involves a nexus of manufacturers and suppliers who urge for a robust network addressing the above challenges in the supply chain. A better provenance tool can benefit retailers, as customers are more concerned about the retail journey of the product start from its origin. Within the small span since its inception, blockchain has revolutionized the businesses and shown promising result in reshaping the supply chain. Blockchain in retail can provide evidence for the authenticity of product, tacking details for reliable retail delivery and enriching customer experience through product provenance. This chapter aims to explain to retailers the challenges, opportunities, and potential application of blockchain in the retail supply chain.

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1 INTRODUCTION

Globalization and increasing supply chain interlinking have led to more uncertainty, intricacy, and susceptibility in supply chain. The scale of businesses, the number of geographical locations and product portfolios have expanded over the last few decades. Consequently, the traditional supply chain has grown to a gigantic modern network involving multiple products and need cooperation among various stakeholders (Farooq S, 2012). Moreover, demand for product traceability and visibility right from supplier to customer has increased. However, information gaps in recent supply chain networks has vividly affected the operations of all stakeholders involved right from suppliers, manufacturers, distributors, wholesalers and retailers and simplifying the process of tracking product histories and providing personalized goods. Supply chain needs to become smarter to meet these challenges. Efficient and effective supply chain management is vital for survival and accomplishment in this tempestuous world. To overcome these challenges, organizations have analysed innovative technologies which aid collaboration among various stakeholders, increase supply chain performance and make it more efficient and effective (Williamson EA, et. al. 2004).

A new technology called blockchain makes distributed ledger technology (DLT), a network in which all transactions are authenticated and apparent to all parties without involving intermediaries (Christidis K, Devetsikiotis M., 2016).

Blockchain technology has been utilized in several sectors, including financial services, manufacturing, food, agriculture, pharmaceuticals, hotels, airlines, healthcare, government, and supply chain management. Blockchain enhances the ability to track, observe, verify, validate, consolidate, automate, withstand challenges, make precise and prompt decisions, lower expenses, enhance supply chain efficiency, and increase customer contentment (Babich V, Hilary G., 2018). Blockchain reduces the transaction settlement and authentication time because the transactions are documented and distributed more efficiently along supply chains. Blockchain can be used as a means to track record of every movement of goods along the supply chain.

Though many contemplate about the effect of blockchain technology on supply chains but present awareness of its potential continues to be narrow. Given that the advancement and widespread adoption of blockchain technology is still in its early stages, conducting a comprehensive analysis of current developments in this field can provide valuable insights for both scholars and professionals in the sector. This chapter commences with a detailed discussion on the architecture of blockchain technology, supply chain overview and challenges, blockchain algorithm for retail application cases, trailed by a research framework, future directions and conclusion.

2 BLOCKCHAIN TECHNOLOGY

2.1 Basic Architecture

Blockchain technology is an innovative new technology which provides secure and efficient operations and also augments customer service. Blockchain got popularity with its use in cryptocurrency like Bitcoin and proved to be an effective and safe way of trading money. Blockchain is a revolutionary technology drastically improves transparency and security in transactions, generating innovative prospects for growth and reduces business operations risk and cost. Blockchain was conceptualized