Utilizing Blockchain Technologies in Manufacturing and Logistics Management

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Blockchain technologies have lately risen to the top of the academic and industry agendas, owing to their potential advantages across a wide range of sectors. This is due to their practical skills in resolving many problems that are presently impeding progress in different industrial sectors. These problems include securely capturing and exchanging transactional data, creating automated and efficient supply chain procedures, and improving transparency throughout the whole value chain. Blockchain provides an effective method to address these problems using distributed, shared, secure, and permission transactional ledgers. The uses of blockchain technology in the manufacturing and logistics sectors have been examined in this chapter. The study shows many possibilities for using blockchain in different industrial sectors; nevertheless, certain obstacles must be solved before this technology can be fully used. This chapter also covers case studies and difficulties encountered in the industrial and logistics sectors while using blockchain.

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The internet of things (IoT) represents rapid development in research and industry that enables both virtual and physical objects to be linked and transfers information in order to produce various services that enhance our excellence of life. Traditional security and privacy methods are not applicable for IoT, mostly due to their topological constraints and versatility of IoT devices. Blockchain technology has started to fascinate younger generations because it works especially well in the digital world. Blockchain is suitable for internet of things applications. Advancements in IoT have propelled distributed systems. The

blockchain concept demands a method for exchanging and storing data that is managed by a decentralized network. The rise of IoT applications is hindered by these obstacles. One option to fix these problems is to use a distributed ledger technology using blockchain technology. This chapter gives a comprehensive overview of blockchain's strengths and weaknesses with its applications.

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The chapter's fundamental goal is to discover and feature the job of blockchain technology in inventory networks including its benefits and impediments. The idea of the examination depends on auxiliary information and data. The necessary information and data have been gathered from different sites, magazines, and media reports. Supply affixes the need to confront difficulties as far as quality, cost, and speed. These boundaries can be accomplished effectively with blockchain in the inventory network of the executives.

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This chapter studies blockchain technology logistics and supply chain adoption in four manufacturing firms. Semi-structured interviews are conducted, and the results are analyzed using case study methods. Four manufacturing firms are selected for the study. First firms deal with consumer electronics manufacturing, second firms deal with auto components manufacturing, third firms deal with paint manufacturing, and fourth firms deal with consumer electronics, manufacturing, wearables manufacturing. The case study is analysed using cross-case analysis and withing case analysis.

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The main purpose of this chapter is to present the need to use the mutual recognition mechanism (MRM) of electronic signatures based on the DVCS oracle in the blockchain platform for the global supply chain. The authors begin their research by comparing a single-domain traditional supply chain with a multi-domain global supply chain. In the second case, the necessity of using an MRM electronic signature based on the DVCS oracle is justified. Various options for constructing MRM are discussed. The chapter provides a comparative assessment of the electronic signature validation protocols and the rationale for using the DVCS protocol to implement the blockchain oracle. As a result, the authors propose to use a well-tested software and hardware complex of the Litoria DVCS as a DVCS oracle and illustrate its use with practical examples.

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Supply chain management (SCM) is a system to manage the flow of goods and services, and from transforming the raw into finished products, it has challenges that are needed to be achieved like good quality services to the consumer, reducing labor cost, etc. Industries need to digitize real assets and make distributed, immutable transactions possible to trace assets from manufacture to supply. To overcome the lack of transparency and traceability of the products in the enterprise resource planning system in supply chain (SC) and logistics issues, there is a solid need to employ a method that can efficiently track assets from production to supply decentralized, immutable records of all transactions. A blockchain (BC) is a decentralized software network that follows a digital ledger to exchange entities digitally and a way through which it makes secure transactions. Thus, this chapter proposes integrating BC in logistics and SC monitoring by giving a template on how Python and Flask can be used for BC with the SCM system to improve traceability without involving any intermediary.

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As logistics companies continue to expand due to the revolution of Logistics 4.0, the complexity of the multiple connected organizations makes it impossible for a clear view of logistics operation. Since customer information is shared between companies, unauthorized access to personal information is inevitable, and it poses several threats to customers. To address this challenge, blockchain with some fascinating properties like enhanced security and transparency will be deployed. Blockchain is a technology that can be used to improve efficiency, visibility, and security in logistics management. This chapter will explore the current applications of blockchain in logistics management based on an analysis of the findings of several scholars. The change from traditional logistics to digital logistics, digital logistics issues, as well as blockchain principles, this study also provides useful insights into how blockchain can disrupt conventional operations in logistics management. It also lays the groundwork for future study into blockchain's applicability in digital fleet management.

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As supply chains become more dynamic, incorporate a scope of partners, and intensely depend on an assortment of outside counterparties, blockchain has arisen as a feasible possibility to de-tangle all information, archives, correspondence exchanges that exist inside the production network organization. Each production network will have enormous measure of information being traded between different

stages in a supply chain network. To deal with colossal of measure of information and guarantee its security, supply chain can consolidate IoT and blockchain. This will help in further developing security, usefulness, proficiency, and benefit of the production network. This chapter examines the foundation of blockchain, IoT, and a portion of the issues confronting present day supply chain. The significant advantages for supply chains utilizing IoT and blockchain are analyzed, and future examination heading for Integration of IoT and blockchain for supply chain management are discussed.

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The concept of blockchain is prevalent globally in today's times. It has shown remarkable growth and has shown a lot of achievement by executing systems of peer-to-peer cryptocurrency. The cryptocurrency was introduced in 2009 but created hype about digital currency around the world in 2017. Blockchain works on the concept of a "distributed ledger/database." The transactions are recorded and replicated to all the participating parties chronologically. Blockchain has verified to be immutable and provides accountability, integrity, and quite a lot of confidentiality through a pair of private and public keys. Various sectors have started using blockchain due to its salient features. Asset management is also one of the areas where blockchain can reduce transaction costs, approval waiting time, and increase transparency. The complicated processes of asset management can be automated by unifying permissioned and permissionless blockchain. This chapter discusses how asset management firms can use blockchain opportunities to harness its benefits.

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Poshan Yu, Soochow University, China & Krirk University, Thailand
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Emanuela Hanes, Independent Researcher, Austria
Jabir Mumtaz, Capital University of Science and Technology, Pakistan

This chapter will focus on the combination of supply chain management and digital technology. Starting from the popular digital terms in the current market, the authors examine the current environment of the development, including Chinese government policies and the industry situation, and then compare the different characteristics of Industry 4.0 before and after digitization by combining the two digital technologies (i.e., blockchain and internet of things [IoT]). Moreover, the advantages of the integration of internet of things and blockchain in supply chain management will be highlighted. At the same time, according to the changes brought by digitization, the added value of IoT and blockchain integration will be analyzed from the perspective of different stakeholders. In addition, some Chinese case studies will be introduced to show the innovative performance of and benefits for enterprises, to provide references for enterprises, and to implement IoT for smart economic growth.

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Vladimir Nikolaevich Kustov, Saint Petersburg State University of Railway Transport of Emperor Alexander I, Russia

The author considers the main purpose of this chapter to be the presentation of a modern approach to the digital transformation of traditional business processes in the gas industry. Using the example of a pilot project successfully implemented in the gas industry, the author shows the process of synthesizing a high-tech supply chain infrastructure based on blockchain. The presentation begins with a description of the main business processes of the supply chain. The functions for all participants of the system are described and visualized in detail. The main components of the system are considered: digital dispatcher, supply monitor, interaction interfaces, and production environment. A comparative analysis of the security of modern blockchain platforms is provided. The author carefully analyzes the technologies for creating and ensuring the security of smart contracts and offers a step-by-step method for implementing secure smart contracts. At the end of the chapter, the results of choosing the most secure blockchain platforms are presented.

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The purpose of this chapter is to broaden the discussion about the various logistics solutions used by industrial firms to improve customer satisfaction and to assess their effect. This study seeks to discover and suggest new connections between logistics management solution theory and customer satisfaction using semi-structured interviews. Twelve small and mid-sized Algerian industrial firms from various industries participated in the semi-structured interviews. Their 22 top supply chain and logistics managers were questioned to determine their perceptions of what is essential to their suppliers and how logistics management is crucial for them to be happy customers. In today's highly competitive global economy, businesses are under increasing pressure to discover innovative methods to generate value and deliver it to their consumers.

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