

Editorial

# Blockchain Technology for Enhancing Supply Chain Performance and Reducing the Threats Arising from the COVID-19 Pandemic

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The blockchain is expected to radically alter people's real-time interactions and transactions, culminating in the birth of a new economy in a digital era. Its applications not only go beyond the simple concept of buying and selling in governments and private enterprises, but it also ultimately impacts and revolutionizes how these critical sectors can work [1] in better and more secure way than traditional business. Through the process of tracking and regulatory compliance reporting, blockchain technology improves supply chain performance through traceability, transparency, and trustworthiness.

In a traditional system, logistics services in the corporate environment are divided into the subcategories of product handling, storage, and transportation. This has further been strengthened by the seven delivery rights of logistics: the right product, the right condition, the right time, the right place, the right client, the right cost, and the right number [2]. These seven Rs can only be attained by strategically managing the transactions related to the delivery of commodities. As globalization has encouraged international trade, the material flow from manufacturer to end customer has become more complex. The flow of goods is accompanied by financial and information flows that are not always in sync. The most basic way to share information still requires a lot of paperwork, which can increase the shipping costs from 15% to 20% [3]. As a result, the digitalization of these operations will result in a notable increase in revenue as well as real-time information flow, which will promote customer satisfaction. Many problems, such as cultural and human differences as well as different regulatory rules make it hard to manage risk in global supply chains. Blockchain technology has been perceived to help solve these challenges.

With COVID-19 control protocols in place, human connections are limited, and firms are obliged to interact via virtual platforms. As a result, blockchain technology is becoming more and more popular with businesses because it can cut down on middlemen, make direct supplier–customer transactions easier, eliminate the need for reconciliation, and provide an updated system for tracking assets and making sure that data are accurate [4]. As product compliance and stakeholder needs are being monitored by regulatory authorities, the long-term performance of supply chains depends on quality, pricing, delivery, resilience, and adaptability. Following COVID-19, it is expected that e-commerce will continue to dominate, while last-mile deliveries and pay-per-service will gain traction. During the COVID-19 period, online buying patterns have increased by more than 50% in nations such as India, Vietnam, and China [5]. In this case, blockchain technology, which protects the supply chain process from tampering, cybercrime, and fraud, is likely to become more popular.

During the pandemic, various preventive measures such as social isolation, lockdowns, travel restrictions, and shutdowns have caused interruptions on supply chain activities



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across businesses, particularly in the health care sector. For example, healthcare providers had to close their outpatient services in order to prevent their employees from being inadvertently exposed to the virus. As a result, online communication channels serve as a bridge between patients and healthcare providers. Many pharmaceutical companies, such as Medplus and Apollo pharma, among others, have attempted to increase their market share through mobile app-based services. However, the widespread adoption of these technologies is mostly dependent on openness and data security. Thus, the use of blockchain technology will help telemedicine to grow in popularity.

Panic buying and irrational food stockpiling occurred due to perceived shortages during lockdowns and shutdowns, labour shortages, and restricted transportation operations. As a result, this interruption to the food supply created an urgent need to establish an innovative and robust food supply chain to prevent food shortages and waste. A significant number of stakeholders are involved in the supply of raw materials, seeds, equipment, finance, harvesting, temporary storage, warehousing, and shipping. Furthermore, regulatory and compliance reporting are critical in controlling the supply chain of perishable vegetables, pharmaceuticals, fruits, consumer goods, and so on. This is where blockchain technology might be able to help people work together more smoothly and make the supply chain more stable.

Blockchain technology can be examined in terms of its application in logistic management, information transmission, and data management in humanitarian relief, where it provides a traceable and responsible way to manage all financial expenses. It reduces lack of faith in companies and fund deviation, hence eliminating the most fundamental reason for the calamitous failure for the majority of supply chains [6]. Furthermore, the various contributors and donors can keep track of their gifts in a credible and transparent manner. Furthermore, by minimizing communication and transitional complications between suppliers and procurement officials, there can be a significant reduction in supply delays, the timely refilling of inventories, and accelerated purchasing of items [7].

Five pieces have been published in this Special Issue.

Sudhanshu Joshi, Manu Sharma, Rashmi Prava Das, Kamalakanta Muduli, Rakesh Raut, Balkrishna Narkhede, Himanshu Shee, and Abhishek Misra wrote the first paper, "Assessing Effectiveness of Humanitarian Activities Against COVID-19 Disruption: The Role of Blockchain-Enabled Digital Humanitarian Network (BT-DHN)". This study aims to identify and provide insights into important aspects that may improve the efficacy of human activities (HAs) during a pandemic. To investigate crucial factors, a systematic literature study was conducted and evaluated by experts using the fuzzy Delphi approach. The fuzzy decision-making trial and laboratory (DEMATEL) approach was used to further evaluate these factors to determine the cause-and-effect link. According to the findings, the most important component during a pandemic is the establishment of a blockchain-enabled digital humanitarian network (BT-DHN). The utilization of digital platforms for real-time information sharing improves the effectiveness of HAs. This study allows stakeholders, politicians, and decision-makers to evaluate these elements during strategic planning for pandemic disruptions.

Nesrin Ada, Manavalan Ethirajan, Anil Kumar, Vimal K.E.K., Simon Peter Nadeem, Yigit Kazancoglu, and Jayakrishna Kanadasamy wrote the second paper, "Blockchain Technology for Enhancing Traceability and Efficiency in the Automobile Supply Chain—A Case Study". This study investigates the issues that the automotive sector has with its supply chain operations. Traceability concerns and waiting times at various supply chain nodes are regarded as key issues affecting overall supply chain efficiency in the automotive supply chain. This paper suggests a novel blockchain-based architecture to improve traceability and to reduce waiting times for the automotive supply chain after examining existing blockchain architectures and their deployment techniques. A hyper ledger fabric-based blockchain architecture was created to manage ownership transfers in incoming and outbound logistics. The simulation results of the proposed hyper ledger fabric-based blockchain architecture show improved item traceability at different supply

chain nodes, improving the Inventory Quality Ratio (IQR), and the mean waiting time was reduced at the factory, wholesaler, and retailer, improving overall supply chain efficiency. A blockchain-enabled supply chain is better suited to removing the risks and uncertainties that are associated with the automotive supply chain. The advantages of implementing blockchain technology in the automobile supply chain are also discussed. The established blockchain-based architecture can provide greater visibility into the movement of items and inventory status in automotive supply chains.

Sumit Kumar Rana, Hee-Cheol Kim, Subhendu Kumar Pani, Sanjeev Kumar Rana, Moon-II Joo, Arun Kumar Rana, and Satyabrata Aich wrote the third article, "Blockchain-Based Model to Improve the Performance of the Next-Generation Digital Supply Chain". Emerging technologies affect all parts of the industrial realm in the fourth industrial revolution era. A digital supply chain is used by businesses to track the delivery of their products or supplies. The digital supply chain is still plagued by difficulties such as a lack of provenance, a lack of transparency, and a lack of confidence. One of the developing technologies, blockchain technology, can be linked to the supply chain to address existing difficulties and to increase performance. In this study, a concept for integrating blockchain technology into the supply chain to increase performance is provided. The suggested model maintains the supply chain's traceability, transparency, and trustworthiness by combining the Ethereum blockchain and the interplanetary file system.

Mohammed Alkahtani, Qazi Salman Khalid, Muhammad Jalees, Muhammad Omair, Ghulam Hussain, and Catalin Iulian Pruncu wrote the fourth article, "E-Agricultural Supply Chain Management Coupled with Blockchain Effect and Cooperative Strategies". The agriculture industry is largely underdeveloped and requires technological change to ensure food safety and reliability. Blockchain technology is being used in the digital realm to successfully establish sustainable e-agricultural supply chain management (e-Agri-SCM). With the current blockchain breakthroughs in digital marketing, product website design (web design) is critical to streamlining client requirements and supply chain partner expectations. The blockchain effect has been introduced into this research study using web design features in the agricultural supply chain management (Agri-SCM) study. Furthermore, partners in the digital marketing supply chain (DM-SCM) are struggling to discover significant site design element-based blockchain technology to maximize profit. In this work, a cooperative (Co-op) sustainable e-agricultural SCM model is established by taking the web design index and variable demand into account to determine shipments, selling prices, cycle time, and advertisement costs for agricultural products. The application of the fuzzy system addresses the uncertainties in the model caused by intangible web design aspects and fundamental prices, while carbon emissions are also taken into account to provide a greener output. The suggested model is used in real-time by running five different examples based on the mutual shares, demand curves, and advertisement budgets among the participants. Sensitivity analysis is also used to find critical elements influencing total profit. This study's findings include major web design elements (WDEs), such as web visuals, search engine optimization, cyber-security, rapid loading, and navigation, as essentials for digital marketing to persuade clients to buy a product in a global SCM. The numerical results and management insights are useful for managers in terms of profit maximization through cooperative and digital marketing methods to achieve e-Agri-SCM.

Muhammad Nabipour and M. Ali Ulku wrote the fifth paper, "On Deploying Blockchain Technologies in Supply Chain Strategies and the COVID-19 Pandemic: A Systematic Literature Review and Research Outlook". The advent of a new pandemic, known as the COVID-19 pandemic, has impacted numerous supply chain segments (SC). Numerous studies on the subject have been undertaken since the beginning of the pandemic, but the need for a comprehensive review study that identifies the gaps and limitations of existing research as well as opportunities and agendas for future investigations, is obvious. This study aims to add to the content of previous studies by conducting a systematic literature review on blockchain technology (BCT) implementation in supply chain management (SCM) in the context of the COVID-19 pandemic. Using a number of resources, relevant documents

were discovered (Scopus, Google Scholar, Web of Science, and ProQuest). Seventy-two publications were selected systematically using the PRISMA approach and were thoroughly assessed based on BCT, methodology, industrial sectors, geographical context, and sustainability context. According to their findings, there is a substantial absence of empirical and quantitative approaches in the literature. The majority of studies did not take into account specific sectors. Furthermore, there are few papers concentrating on the sustainability context, particularly on social and environmental challenges. Furthermore, the majority of the publications assessed did not take into account the geographical setting. The findings show that the deployment of BCT in various sectors is not consistent, and that their utilization is dependent on their services during the COVID-19 pandemic. Furthermore, the focus of research on the effects of the BCT on SCM varies depending on the circumstances of various nations in terms of the implication of the COVID-19 pandemic. The data also reveal that in the context of the COVID-19 pandemic, there is a direct relationship between the deployment of BCT and sustainability considerations such as economic and waste issues. Finally, this study offers research ideas and agendas to help academics and other stakeholders better understand the current literature, find topics that need more research, and start new studies.

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