

Chapter 7

Blockchain–Based Medical Supply Chain Management Collaboration: Exploring the Advantages and Drawbacks

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ABSTRACT

The effective management of supply chains presents pervasive challenges across industries, with healthcare bearing additional complexities and risks due to the direct ramifications of supply chain integrity on patient well-being and health outcomes. Blockchain technology (BCT), heralded as a cutting-edge instrument for fostering sustainable advancements in supply chain management (SCM), has garnered considerable attention. However, scant scholarly attention has been dedicated to its role in fostering supply chain integration and collaboration within the healthcare domain. This study aims to conduct an in-depth exploration of the potential advantages and drawbacks associated with the application of BCT in collaborative activities within medical SCM. Through a methodical review of existing literature, the study aims to

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elucidate the prospects and impediments of integrating BCT in medical SCM from a collaborative standpoint.

1. INTRODUCTION

To remain competitive in today's global environment, organizations must embrace new technologies. With data emerging as a new asset of considerable value, researchers are exploring ways to generate value from it. Technologies like big data, artificial intelligence, cloud computing, the Internet of Things, blockchain technology (BCT), 5G, and nanotechnology present disruptive opportunities that can create new employment opportunities while rendering others obsolete. These frontier technologies are projected to experience an impressive market value growth from \$1.5 trillion to \$9.5 trillion and BCT alone is poised to contribute \$3.1 trillion to business revenues by 2030 (UNCTAD, 2023). Further research on BCT forecasts that out of 603 corporations spanning the United Kingdom, China, and the United States, 87% of them will invest in BCT-based solutions (Trends, 2022).

The healthcare sector has demonstrated a keen interest in utilizing BCT due to its many benefits. Essentially a digital ledger that operates on a peer-to-peer network, BCT provides decentralized, transparent, traceable, immutable, and cryptographic security features (Gökalp et al., 2022). By incorporating BCT into healthcare, there is potential for more personalized care, better patient health tracking with increased privacy and security, improved management of the medical supply chain, and secure exchange of health information (Abu-elezz et al., 2020; Çaldağ & Gökalp, 2023). Furthermore, BCT's decentralization can be especially advantageous for clinical trials (Kuo et al., 2019). Given the sensitivity of healthcare data, it is crucial to have swift and secure data transactions to maintain confidentiality and integrity, thereby preventing unauthorized access and data breaches (Abu-elezz et al., 2020).

Supply chain management (SCM) involves managing the flow of materials from suppliers to end-users in the production of goods or services. Collaborative activities in a supply chain commonly include multiple stakeholders with different interests and expectations and that makes it rather complex to manage (Shiva et al., 2023). With the advent of BCT, the adoption of a decentralized open-network model has become a game-changer for businesses (Gökalp & Özer, 2022). It has the potential to revolutionize SCM by providing a secure and transparent means of data and information exchange through public network platforms. By leveraging BCT, businesses can greatly enhance the cooperation between supply chain stakeholders, which can ultimately lead to greater trust, transparency, and efficiency in SCM while also reducing costs and mitigating risks. As such, integrating BCT technology into

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