

Chapter 96

New Era in the Supply Chain Management With Blockchain: A Survey

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ABSTRACT

The results show that transparency and auditability, security and indelibility, and distribution and sustainability are the key attributes of blockchain-based solutions in 56% of the articles reviewed. These three aspects represent the foundation of blockchain technologies which may contribute positively to improve supply management processes. Moreover, immutability, tracking and tracing, and smart contracts are also included in nearly a third of the cases. Moreover, efficiencies and costs through this technology would reduce the costs in payment of intermediaries, reduce paperwork, and help in the shipment of physical documents. Supply chain plays a critical role in the global trade and urgently needs to reassess its models in searching for greater efficiencies. Moreover, better results in visibility across the chain will increase trust for the customers and all interested parties. Secure transactions, strong security mechanisms that prevent fraud and illegal practices, could be achieved through the blockchain.

INTRODUCTION

The term blockchain first actualized by Nakamoto (2008) to exchange money between peers known as Bitcoin. It utilizes blocks to store the data and implement specific cryptography strategies to keep up the privacy of the data. In the last decades, the role played by supply chain management in the business world has become critical. World trade is evolving at an accelerated pace, and this requires more demands from the organizations for more rapid responses and efficient solutions according to the expectations of

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the market (Xu et al., 2017). Supply chain in addition to its elemental functions, such as ordering/receipt of goods or services, handling physical cargos (Nakasumi, 2017), acts at the heart of the business and is responsible for managing information flows and supporting core activities such as planning and forecasting, procurement, customer service and performance measurement (Xu et al., 2017). Furthermore, information is the central axis around which all supply chains work (Khadraoui, 2018). In the supply chain, information flow is the key element required between stakeholders to trigger new processes or visualize their current status. In addition, with each movement of products, a record of entry and exit times is made as well as the location of the goods, legal documentation and other procedures which are inherently necessary at each stage (Khadraoui, 2018). Therefore, interested parties can obtain information about their products and services throughout the process.

The supply chain is an essential component in the business structure for modern organizations to deliver customer value (Kshetri, 2017). Previously, companies produced their own goods, but globalization and the increasingly challenging demands of the market have caused drastic changes in the way they operate. As a consequence, today large manufacturing companies outsource a significant part of their processes and concentrate exclusively on the critical activities of their business (Nakasumi, 2017). Under these new scenarios, different companies are responsible for providing various kinds of goods or services within supply chain, which requires them to incorporate their own business strategies at both operational and strategic level to meet the demands that the market imposes and achieve their own benefits. Supply chain management has been an area of research and constant evolution over time; numerous applications have been developed, making it an exciting market for software companies. On the other hand, some research proposes incorporating new technologies such as GPS or RFID sensors into the logistics chain (Xu et al., 2017).

However, technological efforts and innovations have helped alleviate inefficiencies; business operations remain inefficient, expensive and vulnerable within the supply chain (IBM Institute for Business Values, 2017). Some issues affect the current supply chain systems. First, the significant number of third parties involved in the life cycle of a product means divided interests are higher (Xu, 2017; Chen et al., 2017). Second, there is likely to be a technological gap between the diverse parties and their capacity to collect, process, analyze and share information following the real needs of the supply chain. This is reflected in inefficiencies, over costs, lack of transparency and confidence along the supply chain (Korpela & Hallikas, 2017; Pilkington, 2017). Third, interoperability of the current supply management system is another issue, as a majority of solutions may not offer end-to-end tracking and information sharing. When information is centralized, issues regarding the integrity of the information may rise (Khadraoui, 2018). In addition, lack of trust is evident since the information shared is not immutable. Data integration and non-repudiation properties cannot be assured. Companies which possess sensitive information may not be prepared to reveal and share it with others due to the fear of opportunistic behavior of its partners generating uncertainties (Xu, 2017; Khadraoui, 2018; Kshetri, 2017). Fourth, like any other IT system, supply chain management system is prone to new threats like cyber-attacks, which leads to security breaches of the integrity of the information. This may result in fraud, economic losses and breach of commercial agreements (Xu et al., 2017; IBM Institute for Business Value, 2017). Finally, when there are conflicts of interest between the parties involved, the quality of information is affected by the given inputs along the process. Consequently, the outcomes at the end are entirely different as initially expected. It seems that many actors of the supply chain are still tied to ineffective and obsolete procedures that do not allow real progress in this field (Chen et al., 2017).

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