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BLOCK CHAIN IN SUPPLY CHAIN- A REVIEW

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Abstract–
Objective: Mapp the role of block chain, in Supply Chain in Empirical Literature
Methodology: A review of 10 Research Papers on Block Chain in Supply Chain
Expected Outcome: Mapping the outcome of Review Papers on AI, ML and Block Chain in Supply Chain
Key Findings: The reviews indicate that there is little or no evidence of the application orientation of block chain in the bitcoin industry. There seems to be tussle for transparency and confidentiality between the academics and the industry. While the academic articles focus on the transparency issue. The industry practitioners seem to be aghast at the demand on the USP of the bitcoins.

Keywords—Block Chain, Supply Chain, Logistics, Transportation. Asset monetization

INTRODUCTION

Blockchain, an open-source technology, has facilitated the commencement of a new era of tokenization. Its applications are diverse, but this paper centers on its utilization within supply chain management. To grasp blockchain's potential in this context, it's essential to first examine the comprehensive scope of a company's supply chain. Following this, the next step involves pinpointing the components where blockchain can be effectively implemented.

Figure 1 Process of Supply Chain System

Effective tokenization can facilitate the monetization of bundles or coins. This paper aims to review the existing literature on supply chain management and blockchain models that can be utilized. It seeks to interpret the empirical insights gained from the application of blockchain technology in supply chain systems. The authors have conducted a comprehensive review of the current literature on both supply chain and blockchain technologies to present their findings.

REVIEW OF LITERATURE

Ju Myung Song et al. (2019), in their research paper utilized a cloud-based unified platform to integrate legacy enterprise information systems. This integration enhanced supply chain traceability and transparency. The improved traceability also contributed to better environmental sustainability, as demonstrated by a real-world case study of a leather shoe supply chain. Maxmillan Rolinck et al. (2021), in their article "A Concept for Blockchain-Based LCA and its Application in the Context of Aircraft MR," explored a product-oriented data structure for aircraft. This structure is adaptable to various configurations and will be further investigated within the aerospace sector.

Edward Probir Mondol (2021), in his work revealed that blockchain technology is increasingly becoming a real-time necessity for the retail industry, significantly improving its efficiency. Anmol and Anju (2021), in their research "Blockchain and IoT-based Inventory Monitoring System for the Retail Industry," proposed a system that provides an immutable and decentralized historical log of shipped inventory as it progresses through different stages of the delivery process

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Figure 2 -What can be tokenized & bundled in supply chain?

Francesco Longo et al. (2021), in their article demonstrate that blockchain technology serves as a valuable tool to address collaboration and trust issues within supply chains. Their findings indicate that blockchain can enhance overall supply chain performance, mitigate the negative impacts of information asymmetry across different levels, and discourage unethical practices such as data falsification or inaccuracies.

Yuncheng Qiao et al. (2019), in their work propose a novel inventory financing model leveraging blockchain technology. By recording all transaction information on the blockchain, which is publicly accessible and immutable, the model enhances mutual trust and reduces credit costs.

Kolb Julian et al. (2018), in their paper discuss the essential processes and transactions in Vendor Managed Inventory (VMI) that demand transparency and trust among participants. They have developed a proof of concept utilizing blockchain to address the shortcomings of current VMI solutions, implementing a method based on smart contracts.

Padalkar et al. (2020), in their article compare the cost differences between existing technologies, such as EDI, and blockchain. They argue that employing blockchain and smart contracts fosters a more transparent, sustainable, and resilient supply chain.

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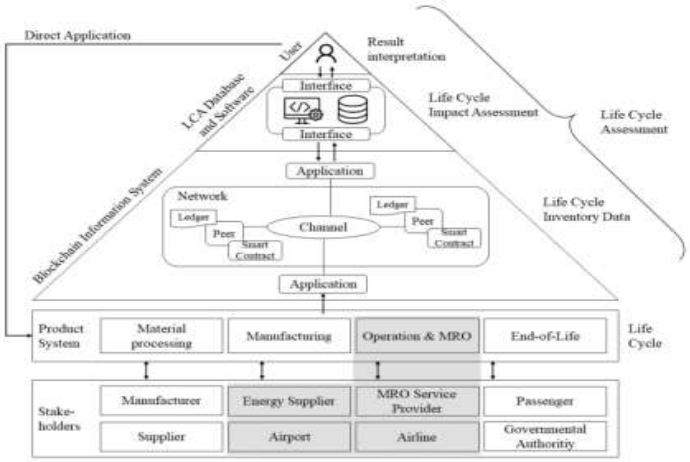

Figure 3 Concept of a blockchain-based data management system for LCA

David Billard (2019), in his paper introduces a Digital Evidence Inventory (DEI) integrated within a broader framework named 'Aldiana.' This framework includes a Forensics Confidence Rating (FCR) structure, allowing experts to assess the confidence level of each piece of evidence, and a Global Digital Timeline (GDT) to chronologically organize evidence.

Manupati et al. (2019), in their research present blockchain alternatives for a distributed ledger approach. Their method aims to monitor supply chain performance while optimizing emission levels and operational costs simultaneously, resulting in enhanced supply chain outcomes.

Tom Dasaklis and Fran Casino (2019), in their paper address a gap in the literature by proposing a distributed, trustless, and secure architecture for VMI implementation using blockchain technology. They highlight the potential for further research in utilizing this blockchain-enabled architecture alongside supply chain optimization approaches.

Adithya Haribabu Vangari (2019), in his paper designs a proof-of-concept for incorporating blockchain technology into the reverse logistics process at Volvo GTO, specifically targeting the North European markets.

Tiago M. et al. (2018), in their article present the design and preliminary results of a UAV-based system. This system aims to automate inventory management and maintain the traceability of industrial items attached to Radio-Frequency

Identification (RFID) tags. The blockchain technology used validates and ensures the trustworthiness of the inventory data collected by UAVs, making it accessible to relevant stakeholders.

Figure 4 Focus of the literature studies 2020-21

Reza Lotfi et al. (2022), in their research compare issues in scenarios with and without blockchain technology (BCT). Their findings reveal that the cost function of the primary problem without BCT is higher than with BCT, with a gap of 0.61%.
Tiago M. et al. (2019), in their paper present the design and evaluation of a UAV-based system to automate inventory tasks and maintain the traceability of industrial items attached to RFID tags.
Ilhaam A. Omar et al. (2021), in their article propose a decentralized application to facilitate communication between retailers and suppliers, promoting inventory sharing among stakeholders.
Edvard Tijan et al. (2019), in their paper highlight that blockchain can streamline logistics tasks, track purchase orders, order changes, and freight documents, and enhance information sharing about manufacturing processes and deliveries.
Elham et al. (2021), in their research developed a VMI system for managing inventory with multiple suppliers and customers. Their model shows that implementing this structure reduces total inventory holding and back-order costs compared to having separate VMI systems for each supplier.

Conclusion

Ju Myung et al. (2019) utilized a cloud-based unified platform to integrate a leather shoe supply chain. Maxmillan Rolinck et al. (2021) investigated blockchain solutions for a product-oriented data structure in aircraft adaptable to various configurations. Edward (2021) revealed that blockchain is increasingly crucial for the retail industry, significantly improving efficiency. Anmol et al. (2021) demonstrated that their system provided an immutable, decentralized log of shipped inventory throughout the delivery process.

Francesco et al. (2021) found that blockchain technology effectively addresses collaboration and trust issues in supply chains, discouraging unethical practices like data counterfeiting or inaccuracy. Yuncheng et al. (2019) presented a blockchain-based inventory financing model, enhancing trust and reducing credit costs through immutable transaction records. Kolb et al. (2018) developed a proof of concept addressing VMI weaknesses with blockchain-based smart contracts. Padalkar et al. (2020) showed that blockchain and smart contracts enable a more transparent, sustainable, and resilient supply chain compared to existing technologies like EDI.

David Billard (2019) described a Digital Evidence Inventory (DEI) within the 'Aldiana' framework, incorporating a Forensics Confidence Rating (FCR) and a Global Digital Timeline (GDT) to organize evidence chronologically. Manupati et al. (2019) developed a blockchain-based approach for monitoring supply chain performance and optimizing emissions and operational costs. Tom Dasaklis et al. (2019) proposed a secure VMI architecture using blockchain technology, suggesting further research on combining this architecture with supply chain optimization methods. Adithya Haribabu Vangari (2019) designed a proof of concept for integrating blockchain in Volvo GTO's reverse logistics process in North Europe. Tiago et al. (2018) presented a UAV-based system for automating inventory and maintaining traceability of industrial items using blockchain to validate and share data.

Reza et al. (2022) compared scenarios with and without BCT, finding that costs are higher without BCT by 0.61%. Tiago et al. (2019) evaluated a UAV-based system for automating inventory tasks and maintaining traceability. Ilhaam et al. (2021) proposed a solution to improve communication and inventory sharing between retailers and suppliers. Edvard Tijan et al. (2019) emphasized blockchain's potential in facilitating logistics tasks. Elham et al. (2021) demonstrated that their VMI system reduces inventory holding and back-order costs compared to separate systems for each supplier.

Figure 5: Interesting & Strange vs. Missing Words in the Literature

In the industry, blockchain technology is open-source and recommended for traceability, transparency, and trust. However, sectors like aerospace and retail emphasize confidentiality, creating a contradiction. Key financial terms like syndication, monetization, and coins are notably absent in these reviewed papers, highlighting a gap between inventors and users.

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