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Block Chain Technology in Supply Chain Management: A Review

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ABSTRACT
Blockchain technology has a wide range of applications, including supply chain management (SCM), where it may replace mid-size activities in many transaction-based processes throughout the supply chain. Blockchain technology has a disruptive effect on the growth and operation of the supply chain, making it extremely essential to investigate future possibilities for usage. Supervision and monitoring are becoming very complex as proper utilization become increasingly globalized. Blockchain platform, as a decentralized digitized advanced technologies that assures accountability, authenticity, and privacy, has the capacity to solve various global supply chain administration concerns. Distributed supply chain coordination, material and data flow coordination, virtual companies, agile supply chain management, supply chain management flexibility, supply chain measurement, supply chain resilience, risk and reel effect, real-time controls, and supply chain-based service are all technical potential problems associated with blockchain advancement discussed in this study. This research looks at a variety of sectors, including shipping, manufacturing, and automotive, aviation, finance, technology, energy, health, food and farming, e-commerce, and education, to see how blockchain technology may help with visibility and business process management. In addition to future theoretical studies, technical and engineering research is critical for a variety of supply chain issues.

Keywords
Application, Blockchain, Management, Supply Chain, Transactions.

1. INTRODUCTION

1.1. BlockChainTechnology
Blockchain is essentially a distributed database system that saves, encrypts and regulates transaction data, or other information[1]. Developed in 2008 by the mystery person or persons behind the White Paper from Satoshi Nakamoto, the data format mixes data logs in a chain called blocks. The chain is an electronically distributed directory or list of entries kept by users or members over a computer network.Blockchains, in particular, employ encryption to process and verify transactions. In a business environment, where no particular organization has any authority, a distributed system offers the basic benefit of solving problems of disclosure and responsibility between individuals and institutions that do not always line the interests of the parties.All parties' critical data may be updated in real time to remove from the internal registries of each party the necessity of lengthy, error-prone reconciliation processes[2]. It therefore gives each network member far more and more time view of the network activity.It may be a source of large data that is very useful for companies and supply chains, so that OSCM researchers are currently paying considerable attention. The encryption of data on a blockchain enhance transparency, effectiveness and confidence in the exchange of information.

There are four main characteristics or qualities of a block chain. For example, it encourages firms to exchange information because it was created for networked redistribution and synchronization, makes it perfect for multi-company economic stations like value sequence and finance consortia. Secondly, blockchain technologies have decentralized applications, a prior mutual understanding, and a network arrangement. A computerized payment platform that electronically enables, validates, and executes contracts conditions, enabling for secure payments without the use of a third-party automatic process.

These protocols may decide whether or not a certain activity, such as a payment, is permitted. Intelligent contracts may create functions and criteria, including the validation of assets via a succession of non-monetary element interactions, in addition to the payment itself, possibly through crypto-currency. This provides assurance to the program's various constituents that everybody is obeying the regulations. Furthermore, in need to prevent inaccurate or possibly malicious operations out of the databases, a cryptocurrency is established using peer-to-peer networking and all relevant stakeholders accept that a payment is valid.Fourth, data immutability refers to the ability to record and not change agreed-upon transactions. This provides assets with information on where they are, where they have been, and what has happened to them during their lifetimes.

There are two types of blockchains: private and public (e.g. Bitcoin). The most significant distinction is who is permitted to join the connection and who is not. Anyone can connect to the community and engage in it for free. A system is usually in order to promote new users to engage the connection. At the present, Bitcoins is one of the world's largest accessible different blockchains. The requirement for a big dispersed leadership is one of the disadvantages of a database platform.

1.2. BlockChain-BasedSupplyChain Management
Blockchain technologies might be a game-changing instrument for supplier network planning, governance, and mangers. Cryptographic capability to secure the dependability, transparency, and authenticity of material, around each other with smarter legal arrangements for a turbulent world, all urge a thorough reworking of supplier relationships and supplier

administration. In this part, we will examine in further depth the value proposition and the application and structure of the blockchain technology for products and manufacturing supply chain, and potential new supply chain components as shown in Figure 1.

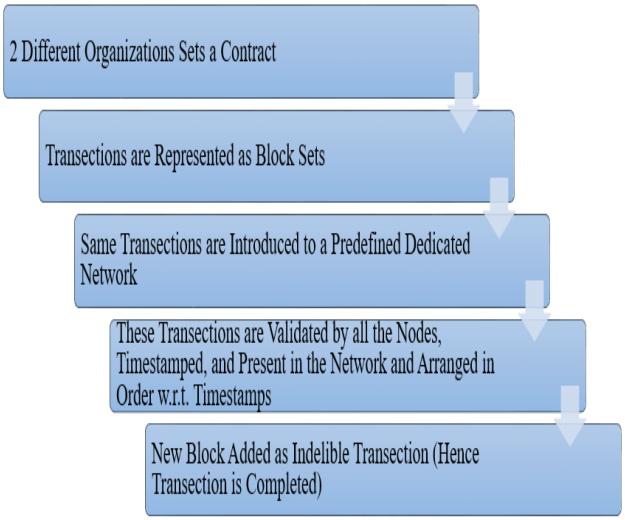

Figure 1: Blockchain over View Work Flow Diagram Showing the Networking Distribution

1.3. BlockChain and Sustainable Supply Chains Management

Through the dissemination, immutability, openness, and trustworthiness of community-shared datasets, blockchains may have an effect on sustainable SCN. A primary operational emphasis area for cryptocurrency is the monitoring of possible physical and economic variables that may cause sustainability, healthcare, and social hazards. There are several real-life instances.

Sustainable supply chains have piqued the attention of academics and practitioners alike. The emphasis on environmental and social dimensions has made the supply chain more broad-based and comprehensive, in addition to being critical for sustainable supply chains for economic elements. The breadth of Blockchain technology may be shown through the selection and identification of examples for sustainable supply chains. Data collection, storage, and administration are made easier using blockchain technology, which supports critical information in the product and supply chain.

Transparency, impartiality, and safety may be accessible to all supply chain agents and stakeholders in this technological context. Concerns around supply chain sustainability plague the food and beverage industry. The intersection of radio frequency identification and blockchain technology is interesting to employ in the context of an exciting application to equip a food supply chain with a traceability system for real-time food tracking based on risk analysis and control point regulations[3]. It can capture events in the supply chain in farmers. Blockchain can support provider chains in the detection of unethical suppliers and fake items, because only authorized stakeholders may collect full information, which might result in severe societal harm to them.

Economically, a company and its supply chain from several aspects that impact economic performance may profit from the use of blockchain technology. We offer several instances, many of which show the economic case for blockchain technology in the supply chain. Blockchains may disconnect the supply chain by lowering transaction costs and reducing the time. Blockchain technological solutions can communicate data change immediately so that goods and processes may possibly be deployed quickly while human mistakes and transaction delays are minimized.

Blockchain technology can assure data security and authenticity, which reduces the cost of safeguarding data from purposeful and capricious changes, which increase supply chain risks and diminish reliability in company. Customers and public authorities are increasingly now requesting openness in the supply chain.Increasing consumer confidence in the buying more and benefiting firms financially led pioneering companies achieved the competitive advantage of transparency.

Given that information cannot be changed without permission from authorized parties, blockchains can impair the unjust seizure of people's assets by unscrupulous individuals, governments or agencies. Technology blockchain can prevent negative actors, holding corrupt individual and society crimes responsible. Blockchain traceability contributes to sustainability through greater human rights protection and fair and safe work practices. Like, detailed product history documents enable buyers to rely on the ethical sources of the items being purchased.

1.4. Preparation For BlockChain Technology In the Supply Chain – Recognizing Obstacles

Innovations and benefits were highlighted. Consider some of the problems relating to the adoption of supply chains, blockchain technology and sustainability in this context. Successful use of blockchain technology to traced sustainable practices and manage supply chain operations and goods via the supply chain begins when difficulties are identified and impediments are identified. These challenges to blockchain technology acceptance and application must be understood by Supply Chain Partners.

1.4.1. Intra-Organizational Barriers

These obstacles arise from organizations' internal operations. Support for high-level management is a critical component for the success of any supply chain activity. However, there is little long-term commitment and support from some management to adopt new technologies and adhere to sustainable ideals. Management failure hinders the integrity of sustainable development processes through supply chain processes. Management awareness and engagement in the supply chain would threaten the allocation of resources and finance choices.Acceptance of Blockchain technology demands investment into new information collecting gear and software that costs companies and network participants.

Lack of the new organizational policies necessary to define the use of technology blockchain might be a barrier. Adoption of blockchain technology may disrupt or revolutionize present corporate cultures. Organizational culture offers guidance on working cultures, values, and proper behavior. In addition, blockchain technology has to be used in supply chain processing to promote various aspects of adopting technology roles, functions and skills.

1.4.2. Inter-Organizational Barriers

The primary elements in this category are the obstacles to relationships between the supply chain participants. The main

aim is to manage interactions between partners to produce value for stakeholders[4]. However, partnerships may be hard, particularly when it comes to the integration of IT and sustainability principles.Blockchain technology would facilitate supply chain information exchange. While openness of information and verifiability is necessary for the assessment of the sustainability performance of a supply chain, many businesses may consider information to be a competitive advantage that prevents them from sharing important and vital information. Hesitating to disclose information from some partners may limit the full advantages of blockchain technology and prevent this technology from successfully being used.

Various privacy regulations concerning the use and distribution of information and data in supply chains might lead to new problems for interpret data exchange between partners[5]. Information sharing rules and regulations should be created and controlled inside the supply chain network because of openness of information in the blockchain technology. Lack of sound information sharing rules ultimately has an impact on cooperation between supply chain stakeholders. Collaboration and efficient communication among supply chain partners with various and sometimes inconsistent operational goals and priorities are detrimental to sustainability and operations in the supply chain, and blockchain deployment to generate sustainable values. If the supply chain partners are physically spread across various cultures, communication problems are worse.

1.4.3. System-Related Barriers

New IT tools are required in order to apply blockchain technology and to collect information to manage the supply chain (e.g., the Internet of Things). Some supply chain players may face this problem. In order to take advantage of value saving possibilities in an integrated supply chain, all chain operators must have access to information. Thus, limiting access to technology to receive real-time data in a supply chain is an obstacle to the use of blockchain technology.

Blockchain technologies are immature technology in terms of scalability and managing a high number of transactions in its early development phase. Apparently, increasing the number and the size of blocks is a stocking challenge in Bitcoin for processing huge numbers in real time. For SCN, even greater data requirements are projected to extend beyond financial data and to incorporate process and practice-related data. Improved storage management and improved cloud computing architecture are therefore necessary[6].

With the use of blockchain technologies, any participant in SCN can check transactions, a consensus among the participants is still feasible(1). Data security, privacy and use of blockchain technology are additional problems. Some research has addressed the security problem of Bitcoin technology, including hacking and assault. Although several solutions were proposed to reduce blockchain security problems, they were not assessed for the effectiveness of these solutions[7]. However, blockchain technology is mainly linked with crypto-currencies such as Bitcoin and harmful actions, a reputation for the dark web.

1.4.4. External Barriers

This category presents problems arising from external actors, industry, organizations and governments that do not profit from supply chain operations directly economically. Outside pressures and assistance for the implementation of sustainable development and technology practices might encourage companies in their operations to integrate them. The absence and willingness to lead and promote sustainable and safe practices of suitable governments and business policies are an obstacle to sustainability and advanced technologies[8]. In reality, unfavorable rules established by various Bitcoin countries are a concern for markets and businesses that may impede the wider use of blockchain to achieve corporate goals. Therefore, the blockchain technology should be promoted by governments, NGOs, industries, communities and trade organizations, so as to generate a value in sustainability. Moreover, uncertainties in demand for durable products and ambiguities in customer behavior might impact market competition and hinder integration of sustainability and block chaintechnologies[9]. Organizations need to make sure that they recompense their consumers for investing in green products, sustainable processing, and innovative technologies such as blockchain.

This technology and its use are far more understood than traditional IT and internet integration in supply chains. This paper calls on institutions to examine and build on research projects. We encourage growing digitalization and supply chain research. Trans-disciplinary initiatives will be needed to comprehend the full consequences of blockchain technology in the supply chain. Professionals from the industry must engage, and collaborate with academics on emission criteria, and provide actual measurement of blockchains' efficiency. There is certainly a significant quantity in the field of future research[10].

2. DISCUSSION

Through the extraction of the articles needed to connect the above-mentioned blockchain characteristics to supply chain management issues, a general reference framework is developed to address the suitability of blockchain applications for supply chain management phases. Based on the above discussion of various proposed strategies for resolving supply chain management problems relating to distrust, undertaking, transparency, information exchange, and mitigation efforts in the BWE, most proposals still require an established trust basis, cooperation, and centralization of computer technology as well as common information. Blockchain technology, on the other hand, solves all of the aforementioned issues as well as the flaws in the current solutions.

On all levels of the supply chain, the challenges related to the need for trust and decentralized structures to qualify for the blockchain implementation leading to the framework were studied in literature. We will conduct a formal systematic study as part of our future effort to provide a complete framework for academics to design and evaluate if blockchain implementation technology will fit industrial supply networks. We will undertake a thorough evaluation as part of our review.Many of these impediments are based on disruptive technology concepts.

3. CONCLUSION

Beyond conventional information systems, such as web-based connection in supply chains, there is a lot of opportunity to understand and apply this technology. Transdisciplinary efforts are needed to properly comprehend the effect of blockchain technology on the supply chain. Practical performance measures should be made accessible to professional organizations, and standards should be developed in collaboration with such

academies. There is certainly a significant amount of work in the field of future research.

There are considerable possibilities of better understanding this technology and application than conventional information systems and online supply chain integration. We encourage institutions to review and build on research ideas. We assist supply chain studies and growing digitalization. Transdisciplinary efforts will be required to fully comprehend the implications of blockchain technology on the supply chain. Industry experts must engage as well as collaborate with academics to develop emission criteria and provide actual measurements of blockchain efficacy. There is certainly a significant amount of work in the field of future research.

In addition to future theoretical research, technical and engineering research on a variety of supply chain issues is also required. Distributed supply chain coordination, material and data flow coordination, virtual companies, agile supply chain management, supply chain flexibility, supply chain performance measurement, supply chain resilience, risk and reel effect, real-time controls, and supply chain-oriented service are all technical issues that could arise as a result of blockchain advancement.

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