iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.51928

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Study of Blockchain for Supply Chain Management

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Abstract: ***The market has seen significant change in recent years and has become more demanding and dynamic, creating a competitive atmosphere. The supply chain, which is heavily dependent on cooperation, integration, and flexibility, plays a significant part in helping the organization adapt to the changing environment. several business owners are interested in supply chain applications, and several specialized applications are used to better control the flow of the supply chain. Block chain technology has become one of the most significant new applications in the supply chain and has attracted the attention of many business owners due to its ability to be quickly adjusted to changing business environments and market conditions.One upon reading this will get to know about the effect of block chain technology utilization on this field.According to the study's findings, businesses should invest in block chain technology to make their supply chains more open, adaptable, and safe. There is no denying that block chain technology has a significant impact on building trust with supply chain stakeholders. The research paper also discussed several potential uses for the blockchain in the fields of collaboration and integration, as well as some positive implications.***

Keywords: Blockchain, supply chain Management, Industry 4.0, Smart Contracts, Transparency, Trust, Tractability, Flexibility.

I. INTRODUCTION

The majority of multinational corporations have traditionally had trouble managing their supply chains. The company has consistently invested a lot of resources, which results in several inefficiencies and the need to identify cost-cutting opportunities. The advent of blockchain technology has prompted businesses to consider the future. The development of the supply chain may benefit from this technology.

Analysts claim that through increasing supply chain efficiency, trust, and transparency, blockchain technology can improve the modern structure of the supply chain [1]. In addition, many supply chain leaders believe that blockchain solutions are the way of the future for the supply chain.

According to a PwC poll conducted in 2019 [2], more than 24% of the industrial manufacturing sector is interested in implementing blockchain technology in supply chain management.More than 55% of senior executives and practitioners viewed blockchain as their top priority, according to the 2020 Deloitte global blockchain study [3].As depicted in Figures 1, 2, and 3, blockchain technology is essential to the industry of the 4.0 era because of its distributed secure technology. Both academia and business are interested in the technology [4].

Blockchain is a distributed ledger technology that provides users with inexpensive, secure transaction and transfer settlement [5]. Additionally, blockchain is a relatively new technology in the realm of supply chain networks, which hold great promise for the future of business. However, it is not a new internet infrastructure.

A. Definition of Blockchain.

It is well known that it consists of a series of encrypted data blocks, each of which contains the data itself and is locked so that only the holder of the key may access it [6]. Each file in the chain contains information such as a timestamp that indicates when the data was createy4d and historical data about the blocks in the blockchain [7]. The chain contains numerous files that are linked to one another. The blockchain is the collective name for all the blocks.

B. Blockchain Infrastructure.

Only a computer, laptop, or server that is connected to the internet can access blockchain. When connected, all devices are referred to as blockchain nodes. In the study of blockchain in the supply chain, specific users are given permission to access the blockchain, which is held by the nodes [8].

When data is stored on the blockchain across nodes, which are recognized as a system where data is kept and shared across numerous sites, nations, or institutions [6], a ledger is generated. The distributed ledger, where digital data is contained in a single location and in blockchain, the nodes store identical data, is contrasted with traditional databases in this way.

C. Adding to the Blockchain.

It is necessary to send a node out a transition request with the data that is added to other nodes of the blockchain network in order to create the block in order to add data to the blockchain block [7]. Before a new block can be added to the blockchain, all parties involved must consent to its inclusion. The node mist verifies that the new block is legitimate at the time of validation and that there are no duplicate transactions in the block [9]. The other nodes in the blockchain network store the encrypted block that is added to the blockchain when it has been verified. There is a great deal of trust and confidence in the data that is stored on the blockchain because of the encryption nature of the blockchain and distributed ledger structure [10].

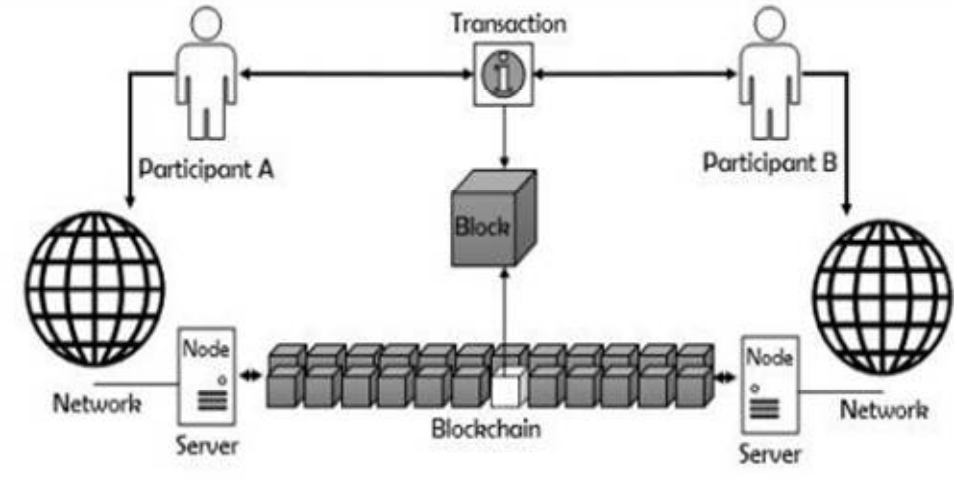


Fig. 1. Blockchain Concept [8].

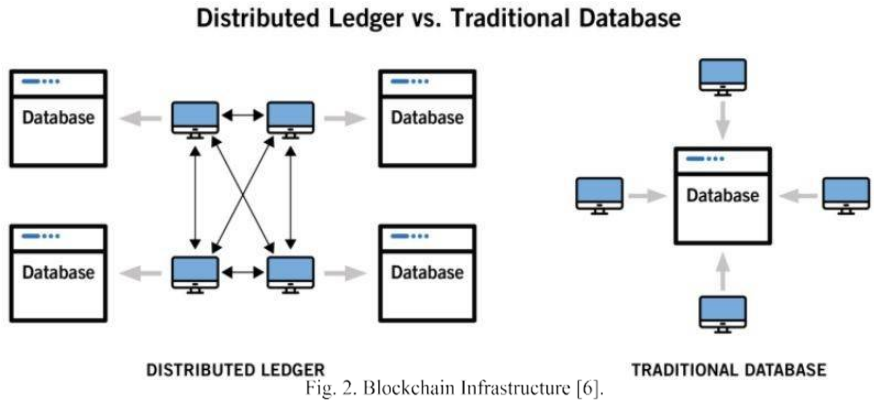
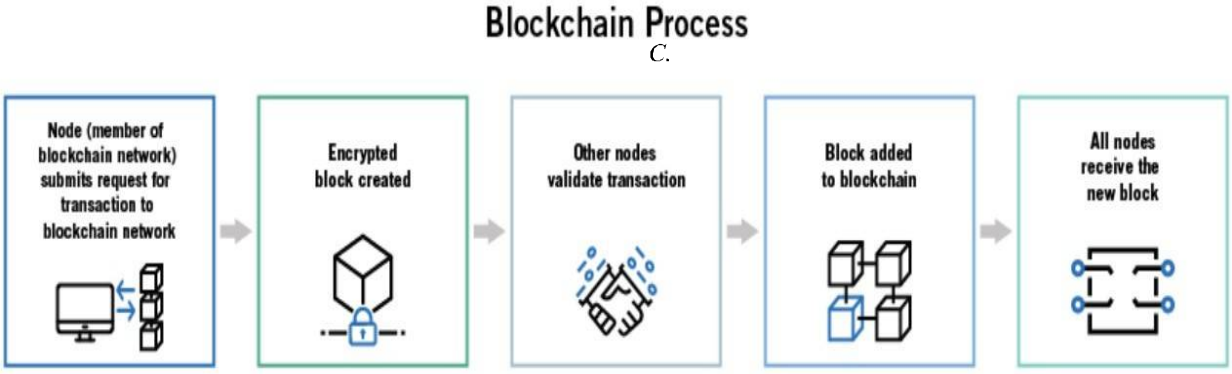


Fig. 2. Blockchain Infrastructure [6].



C.

Fig. 3. Blockchain Process [7].

A. Research Objective

The study's goal is to examine blockchain technology's potential benefits for logistic companies. Although most people are unfamiliar with blockchain technology because it is a new technology, this paper has helped readers learn about its introduction and how it might aid in supply chain management.

B. Research Question

How can technology help to find a solution to some of the supply chain challenges?

C. Research Motivation

There are numerous items in the supply chain that are delivered to the customer and consist of independent farms. Due to these factors, the company cannot compete on its own; nevertheless, it is a component of the vast supply chain network [11]. Due to globalization and high client expectations, businesses are also facing issues related to uncertainty. Additionally, there is intense market competition and a complicated supply chain that necessitates coordination among supplier networks. Because of internal competition and a lack of information sharing, supply chains are fragmented. In addition to this, these limitations also have a significant impact on business performance and result in difficulties and limitations like high operating expenses and storage capacity that can be easily resolved by blockchain technology [12].

D. Research Gap

Although blockchain technology has many advantages, it is not a complete supply chain management solution. The use of blockchain technology and other related technologies is fraught with issues. The project must recognize the difficulties in the supply chain system and supply change domains that arise from a blockchain-based system's need for several legislative measures. Furthermore, the current blockchain platform falls short of the supply chain system's high transaction throughput requirements. There are many different participants in the supply chain. As a result, it's important to offer incentives like efficiency improvements to increase liquidity and data security and keep players engaged. Security and privacy are two additional crucial blockchain-related challenges [13].There are issues with IoT data, and the current IoT system was built on a central concept where IoT devices are identified, connected, and verified. As a result, considering change is vital to identify blockchain technology.

II. LITERATURE REVIEW

A. Blockchain in Supply Chain Management

1) Blockchain technology definition and its boundaries

As was said above, a distributed ledger database known as a blockchain is made up of records, transactions, and other types of digital happenings that are carried out by members. Recently, a few papers have been released to explain blockchain technology and how it functions [14]. One of the most well-known applications of blockchain technology is cryptocurrency, which includes the term Bitcoin. Aside from these cryptocurrencies, the blockchain also has consequences for people in the areas of manufacturing, financial services, and supply chains. Instead of finishing the technical operation of the blockchain technologies, this research study has focused on the use of blockchain in supply chain management [15]. The paper omits discussing crucial elements of blockchain technology as protocols, algorithms, and wallet signature sand hash function.

2) Supply chain Management Definition and its Boundaries

The term "supply chain management" has several meanings to different people, but according to [16], it is the act of managing the full integrated flow of materials, from a source of raw materials to production, warehousing, and transportation to the end customers. Supply chain management uses a variety of techniques, thus it's critical to define its limitations [12]. All supply chain activities, from supply to production, distribution, and customer-related activities, have been covered in this study report. In addition, supply chain management explains how the study's complete chain is managed.

3) Blockchain-based Supply Chain

The adoption of blockchain is questionable, both globally and logistically [17]. The immaturity of blockchain is the cause because it aims to change SC activities by enhancing and increasing accountability. Transparency is a key component of the traceability level, according to [18]. But [19] has proposed three different openness levels for a SC. They consist of a variety of participation, transparency, and transparency goods.

As a result, in order to deploy blockchain-based SCs, it is required to examine the SC transparency factor and link it with list perspective analysis and opportunity analysis in order to help determine the mysterious profits or loses.

D.

To comprehend how blockchain technology applies to the supply chain. Interdisciplinary research must be taken into account in order to develop and construct blockchain technology theories [20]. Additionally, blockchain-based social responsibility and sustainability can assist businesses by increasing visibility and ensuring due diligence. It has been discovered that there is a knowledge and experience gap with regard to blockchain technology, as well as a competence gap with regard to this technology that needs to be closed. Furthermore, according to [17], blockchain technology for business and technology needs to be appropriately addressed because there are many expectations for this technology that could result in its field adoption in the industry.

The seven goals of SCM can be accomplished with the use of blockchain technology: their cost, quality, speed, dependency, risk reduction, sustainability as well as flexibility [21].has talked about how real-time data control, which is necessary for all trusted partners in the network, can help break down data silos and give a single data source in digitalization. In addition to this, there are corporate values that would contribute to developing trust with the aid of blockchain by enhancing efficiency, reputation, and responsiveness [17]. With the help of blockchain, trust and security may be readily improved. The performance of the supply chain is significantly impacted by the blockchain, but when it comes to operation management, the blockchain offers many advantages over the current solutions. Enterprise resource planning, RFID, and the blockchain are viewed as key technologies by [22] As complimentary technologies, corporate resource planning, radio frequency identification, and the blockchain must be studied to determine their ideal pairing in order to optimize impact. According to [20], there are four obstacles that prevent SCs from using blockchain technology for development: interest, organizational, technological, and external factors. Despite these obstacles, there is no denying that blockchain technology is very helpful in driving digitization in the SC[20].

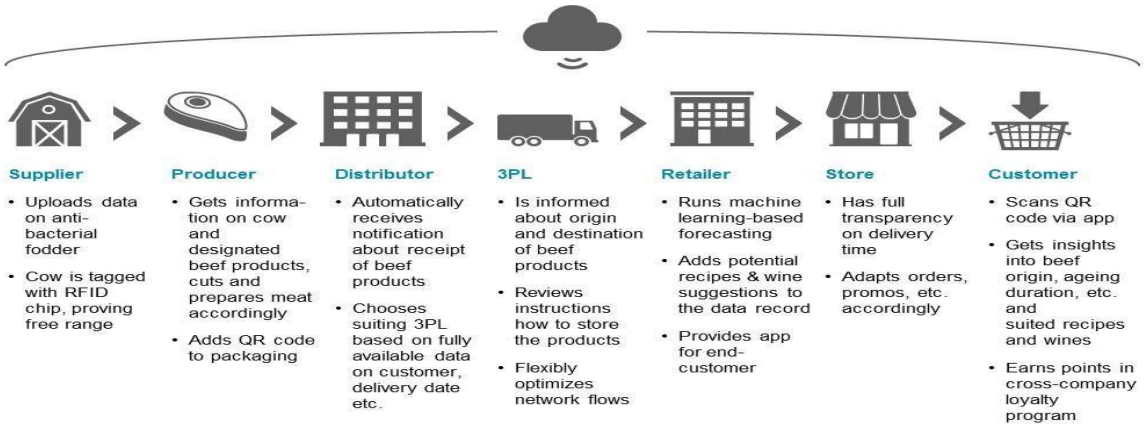


Fig. 4. Blockchain-based supply chain management [1].

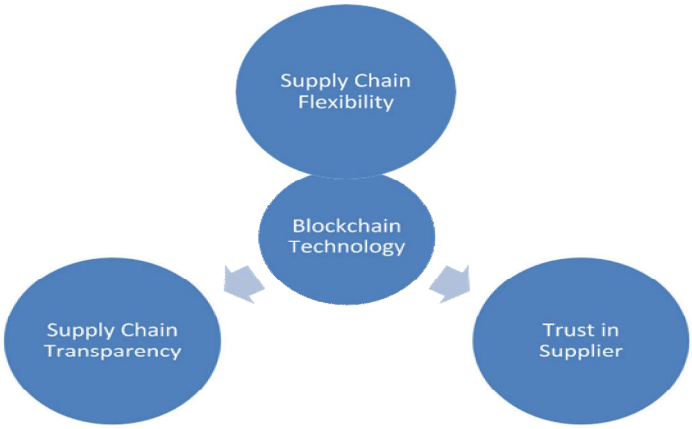


Fig. 1. Blockchain Utilization in Supply Chain [22].

4) Blockchain Technology and Suppy chain Transperency

In the supply chain, as seen in Figs. 4 and 5, blockchain is essential in addressing two pressing problems based on the transparency,

traceability, and irreversibility of transaction data. The inability to move and claim responsibility due to incomplete information transparency and the poor product quality that is difficult to eliminate due to the multizone and long-term characteristics of logistics are the two main problems of the supply chain [23].

Blockchain is essential for better tracking and reporting, and it also improves logistics transparency. Additionally, the business can gain from accelerating delivery [24].

The broad range of supply increases the likelihood of mismatch, conflict, and inconsistency in the traditional supply chain. Blockchain technology has a critical role to play in solving this problem, and it can be useful in implementing GPS-based vehicle tracking. Additionally, blockchain technology is an excellent choice for logistics because it involves truck location tracking, which lowers costs and boosts efficiency [17].

Blockchain technology has a lot of potential for the industrial sector since it guarantees security, stability, and data transparency without a centralized data storage facility [2]. Blockchain technology has the potential to outperform conventional methods. Centralized solution by offering promising result in the organization and economic criteria.

5) Supply Chain Flexibility and Blockchain Technology

Today's supply chain operations take place in a more complicated and unreliable business environment than in the past. Because of the variety of products and the short product life cycles, customer expectations are very high. All of these industries demand a flexible supply chain, and if the supply chain is flexible, the business and its supply structure must be able to adjust to environmental changes [25].

The ability to respond to a diverse customer base and meet their needs in order to outperform competitors is referred to as supply chain flexibility. There is no denying that due to constant transformation, the business has encountered an extremely ambitious position [26].The government can employ flexibility to quickly adapt to the significant change brought on by the lack of reliable information. In order for the business to maintain a competitive advantage in the current market, which demands dynamism, ambiguity, and unpredictability, a flexible supply chain must be established. Additionally, if the supply chain is flexible, the business may be confident of a faster delivery procedure and simple transportation of the product to the market in the appropriate numbers [27]. Moreover, because business transactions are becoming more volatile and international, an enhanced supply chain might aid in addressing environmental concerns. An business can attain flexibility across the whole supply chain to outperform the competition and meet consumer demand when it can appropriately respond to and adapt to disruption and demand. It is essential to concentrate on accelerating economic and technological development in order to obtain flexibility in internal and external supply chains [25]. Companies with flexible supply chains will find it simple to react more quickly in uncertain conditions. Additionally, a flexible supply change might improve the business's capacity to satisfy customers' expectations by clearly and effectively offering its goods and services to them [27].

Blockchain technology is one of the best options for obtaining flexibility since it makes tracking and tracing possible during all phases of production. Specific contact points in the supply chain are where blockchain technology will be implemented [28]. The firm will be able to manage data security for all the supplies involved in transactions thanks to blockchain technology. In addition, it can increase supply chain visibility and provide real-time data exchange on the network. Therefore, by addressing the varied numbers of stakeholders that are impacted by an outage, the blockchain can help with supply chain flexibility methods [29]. A more realistic supply and inventory management would result from the technology's ability to enhance manufacturing, combine different supply chain operations, and improve management. Using blockchain technology in the supply chain system has the additional benefit of enabling the provision of design-related documents that are to be shared and used [24]. Due to the ease with which all participants can access the various papers, all these aspects will assist the firm in making better decisions throughout the supply chain. An business can attain flexibility across the whole supply chain to outperform the competition and meet consumer demand when it can appropriately respond to and adapt to disruption and demand. It is essential to concentrate on accelerating economic and technological development in order to obtain flexibility in internal and external supply chains [25].

Companies with flexible supply chains will find it simple to react more quickly in uncertain conditions. Additionally, a flexible supply change can improve the company's capacity to communicate the goods and services to the client simply and efficiently, satisfy[27].One of the most suitable technologies for achieving flexibility is blockchain technology by facilitates tracking and tracing in the various stages of production. The implementation of blockchain technology in the supply chain lies at specific contact points [28].

Blockchain technology will allow the organization to control data security for all the supplies in transactions. Apart from this it can also enhance the visibility of the supply chain and offer real-time data sharing on the network. Therefore, the blockchain can assist

in supply chain flexibility strategies by meeting the various numbers of stakeholders that are affected due to an outage [29]. The technology can also integrate the various supply chain processes and can enhance production and management which would result in a more realistic supply andinventory management. Advantage of using blockchain technology in the supply chain system is that it can obtains the design-related documents that are to be shared and used [24]. All these factors will help the organization to improves.

6) Supply Chain Trust and Blockchain Technology

Without a question, the commerce network in contemporary society has grown significantly more complicated, forcing its many forms to deal with businesses they may not be familiar with. As a result, building trust between the enterprises is essential for the success of the supply chain, and optimal information success is required to guarantee trust [30]. By exchanging information, supply chain stakeholders hope to eliminate uncertainty risk. Dealing with ethical noncompliance, a lack of communication, and adultery follow from this. The two things that are necessary to do in the supply chain industry in order to eliminate the danger of damaging trust are connectivity and vulnerability.Finding a supply chain partner is one of the most crucial elements in the risk assessment process [31]. The supply chain map, which illustrates the pertinent information flows and how it is generated, is next shown. One may forecast the possible bottleneck, as well as study and attack levels, by determining the floors.

The supply chain process of information exchange is influenced by a number of significant aspects, but development is seen to be the most essential one, as shown in Figs. 6 and 7. There is no use in modifying the transaction once the appropriate parties have authorized the name since transactions in blockchain technology are identifiable in a time-stamped and viewable manner before being validated. Speaking of data security and integrity, supply chain transactions using blockchain technology are considerably more dependable, efficient, and transparent [32]. Since there is no way to alter a record on a blockchain, all transactions and decisions made by supply chain participants are correctly recorded and documented using this technology.

The supply chain participants are fully informed about the activities and transaction correctness, as illustrated in Fig. 8. The supply chain's participants may simply keep an eye on any circumstances that can produce contentious business outcomes, take the required action, and modify their operations when a subsequent transaction is finalized [33].Another component of the blockchain that builds confidence in the supply chain is a smart contract. Blockchain and smart contract applications may be used in a variety of contexts, including financial transactions, corporate transactions, insurance returns, and more [33].

Conflicting aims are things that can harm the trust between the customer and the provider [17].

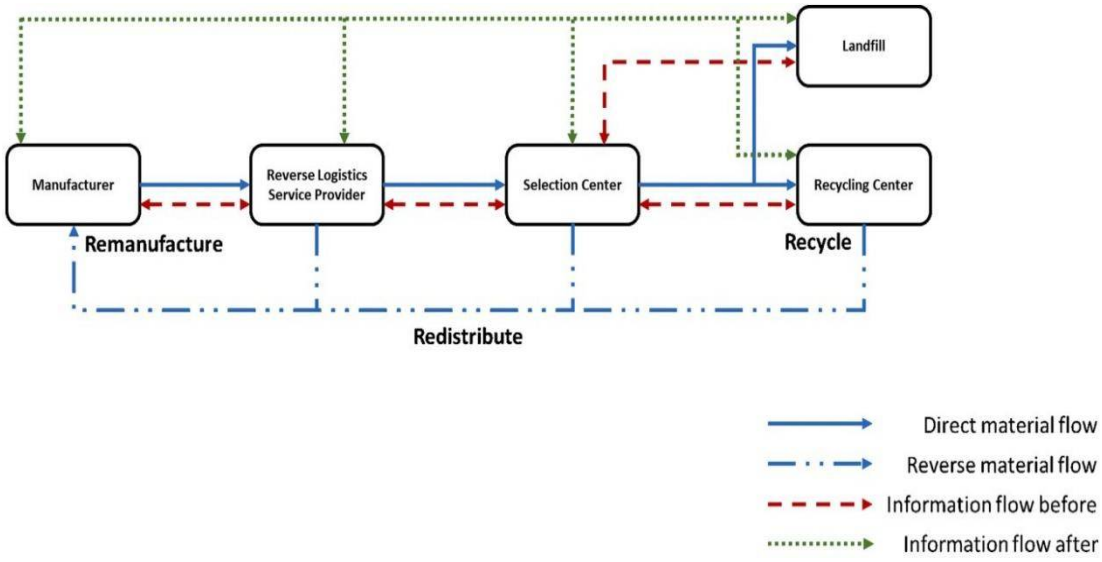


Fig. 2. Blockchain technology for bridging trust, traceability and transparency in circular supply chain [26].

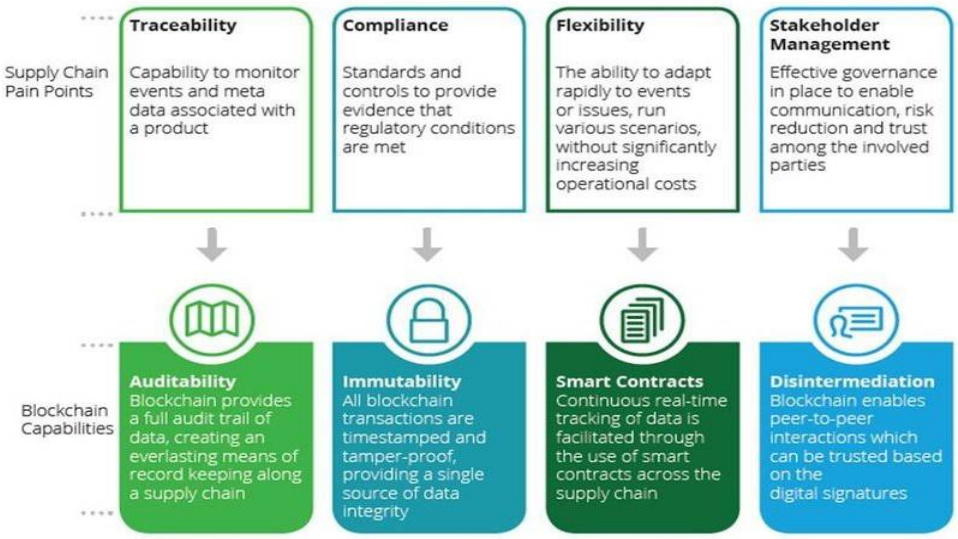


Fig. 3. Blockchain and Supply Chain Flexibility [29].

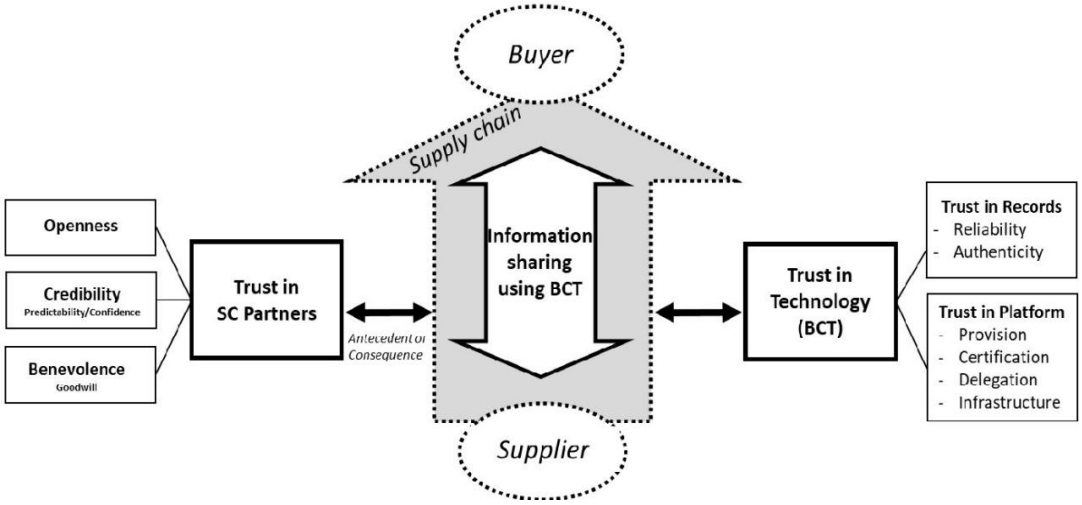


Fig. 4. Blockchain and Trust in Suppliers [13].

B. Current Challenges

The study indicated that supply networks might benefit from the use of blockchain. Although the blockchain is still in its infancy, a research has shown that its adoption will one day revolutionize the supply chain [17]. The use of blockchain in supply chain management is expected to have a significant positive impact [35], thus academics are hopeful about this technology. Supply chain management-related publications on the blockchain are gradually becoming more common [17].

There aren't many papers on blockchain technology in supply chain management. [20] has developed a research that has looked at the adoption of blockchain, and [36] has talked about the transparency and traceability that blockchain technology can provide to supply chain management. [21] investigated the tips' supply chain management. This technology has not only caught the interest of supply chain managers, but other technologies like smart contracts, the internet of things, and artificial intelligence also have the potential to drastically revolutionize supply chain management [37].

However, there is a dearth of studies that examine how blockchain technology works in conjunction with integrated technologies in supply chain management.

III. METHODS AND MATERIALS

A. Research methodology

In order to respond to the research questions, the literature review methodology was used in this work. The study work has emphasized how numerous review papers have discussed the technical features of the blockchain in the context of supply chains, but it hasn't come to any management-specific conclusions regarding the subject [35]. Only the research's basis has been provided in the research article. According to [31], a systematic, clear, and reproducible strategy for identifying, analyzing, and rating the body of the recorded documents is a literature review. The literature review on the use of blockchain in supply chain management is discussed in this essay [19].

Additionally, one will receive a thorough analysis of the blockchain and its practical application, which aims to provide a more comprehensive understanding of the blockchain and its impact on supply chain management.

B. Research Design

Any research may be conducted using any research method, including qualitative data, quantitative data, or a mixed-method approach.

The interpretivist research philosophy is used in qualitative research because this research methodology is appropriate for studies where it is necessary to draw new conclusions from preexisting information or when the phenomena is not well understood [38]. Therefore, the qualitative technique is the most appropriate research method to apply given the nature of the study of blockchain technology and its use in supply chain management. In order to study the effects of integrating blockchain in supply chain management, an exploratory research technique will be used [39].

C. Data collection

In the search process, the terms supply chain and blockchain are used a few times. The research article was selected using data from the preceding seven years with the intention of choosing comparable themes that are similar to earlier research papers. Research has been done using journals from sources like Google Scholar, Emerald, Science Direct, Research Gate, Taylor & Francis, Elsevier, Wiley Online, etc. More than 441 documents were discovered, however 285 and 116 of them were removed due to duplication and irrelevant information, respectively. Only 40 of the 156 potential papers were taken into consideration for the grey research paper's father discussion throughout the topic selection phase.Peer-reviewed journal papers of the highest quality that facilitate communication amongst the research fellows have been taken into consideration. The report also took conference papers, consulting reports, and third-party reports into consideration because the blockchain is still in its infancy and there aren't many published articles on the subject, and all of these sources would offer up-to-date knowledge on the subject [15]. Furthermore, when the study's abstract was not accessible, the paper read the entire article and evaluated its significance.

D. Study selection and evaluation

Based on established inclusion and exclusion criteria, the author has appropriately assessed the eligibility of the literature. The exclusion criteria have been used in the bibliographic manager before importing the literature. Where the author had consulted the study paper's abstract in the opening section, that is where the grey literature was evaluated. The full-text review came next, and several other papers weren't included in the study's documentation. Until agreement was reached, the conversation assisted in addressing any disagreement over the applicability of the items that were studied. Numerous research were furthermore disregarded since they did not concentrate on the technical features of blockchain technology and blockchain architecture.They were all used in the article introduction despite not meeting the introductory standards, which is why they are omitted.

IV. RESULTS AND DISCUSSION

A. Results

There is no doubt in the fact that the modern supply chain has benefited from the advancement in technology but there are still significant challenges the modern supply chain management encounters in functioning which are discussed below:

Complex ecosystem: there is an intricate web of suppliers as well as registered channels of the global enterprise that operates at regional, national, and international levels [16]
Lack of traceability: it becomes difficult for the supply network to pinpoint providence
Improper response: there can be delay experienced if the process mismatch in between the individual country and the operating company
Poor visibility: when the process is dispatched, [17] the company cannot keep track of the goods with the help of barcodes in the transit
Data reconciliation: there can be problems with data reconciliation because there is a different process that is likely to log data in various ways
Lack of trust: there can be a lack of trust in the system and the function when they are not transparent [40]

The study article has emphasized that the primary cause of all these issues is complexity. Because there were fewer suppliers in the past, businesses knew what to anticipate and who to contact when issues arose. The business ecosystem, however, has evolved over time, and the players are no longer aware of one another or able to see the multi-layered supply structure [36]. The company is also unaware of each other's claimed operations, which raises the risk. Due to the market's current size and complexity, there is no possibility for the company to resume its previous methods. But the difficulty may be overcome by coming up with a fresh approach that promotes openness and fosters confidence among businesses [35]. End-to-end monitoring is a critical issue for supply chain firms. This has made it impossible to accurately predict client demand, track the proportion of the transport's capacity, and determine the location and condition of goods [7]. When taking into account global supply chains and geopolitical upheaval, this also results in inappropriate end-to-end visibility and may put the business at risk of interruption. If a company's supply chain is opaque, they risk suffering significant losses because they lack the necessary knowledge to respond to disruptions.speedier delivery of products and identification of chain weaknesses.

There is no question that the technology would potentially provide total security and transparency. The businesses utilizing blockchain technology are able to keep track of modifications as well as document what has changed, who has changed it, and why [14]. They are able to trace changes since each item in the chain has a unique version of the registry, and there won't be any disputes about transactions in the supply chain, which speeds up the transaction process [21].n

The data is recorded in the ledger when the company's goods are dispatched and the smart contract is signed.The information is then properly kept together with details about who developed it, when it was made, and if it was difficult to forge. Additionally, the businesses with access to this ledger are able to read the items and determine who is now in possession of them [34].

Additionally, a real-time delivery monitoring system using blockchain, the internet of things, and mobile technologies has been explored in the study [6]. Digital sensors may be used to track commodities along the whole supply chain, eliminating the requirement for manual product tracking. Using blockchain and the internet of things together in logistical organizations can also assist to cut down on delivery times.In logistical organizations, the integration of blockchain and the internet of things can assist reduce delivery times as well as improve the logistical process for transferring it to carefully manage deliveries [17].

By connecting tiny sensors to the items, the organization will be able to maintain an accurate and current inventory [1]. The goods' historical locations, times spent being stored on-site, and other pertinent information may all be found in the smart inventory.

The supply chain may use digital ledgers since they provide other significant benefits. Blockchain guarantees transparency, security, authenticity, and visibility, according to a research by [19]. But [30] have investigated the different characteristics of the blockchain, like decentralization, security, and visibility. the features of the blockchain that have been discussed are its decentralization, permanence, anonymity, and different business aspects. Building trust is one of the critical factors for a business network that the blockchain may help with in the supply chain industry, as emphasized by [24].

Even though the prior research may have used a different term for that property, the literature blends qualities with similar names and also lists the essential blockchain attributes [11]. The section appropriately addressed and discussed the major qualities.

B. Discussion

As mentioned above, blockchain development is still in its infancy. In the 4.0 age, technology like robotics, 5G, the Internet of Things, 3D printing, and big data can be merged with blockchain technology [37]. Speaking about the Internet of Things system, it may be used with blockchain technology to improve traceability by gathering data that allows customers and retailers to track the whole supply chain process [22]. Other applications advise using machine landing models and keeping an eye on the delivery process to anticipate potential problems.

risk and tracing the origin of the raw material. their system can be used to its full potential by installing different types of sensors that can help in generating various traceability reports. Moreover, by integrating the above Technology with blockchain, many features can be benefited by arranging the resources of the logistics by the IoT system availability [10]. Hence the client can figure out the delivery status as soon as possible without any hassle.

V. CONCLUSION

A number of businesses produce supply chain management systems, which include several sorts of flow like information, money, and items. To improve overall performance and provide a competitive edge for different firms, it is crucial to work with different business models and combine the flows. The blockchain's strong properties that can be employed in many different industries were examined in the literature review. Additionally, the report has highlighted blockchain technology and the ways in which it will promote supply chain integration and cooperation. The fundamental issues of compliance, immutability, incapacity, and transparency are all combined in this essay. Additionally, it acknowledged that the blockchain's primary concepts exist and that supply chain management benefits can be gained from using it. The justification has also demonstrated that one of the developing technologies, the blockchain, must be given the opportunity to demonstrate that it can revolutionize the supply chain. The populace has also investigated smart contracts and how, when used in today's conventional system, they can actually be beneficial. Additionally, research has been done on smart contracts to determine how to add data to the blockchain. However, some of the experts disagreed that the deployment of blockchain is a separate piece of software that is essential in bringing down the price of traditional software. However, the majority of academics concur on a number of points, including the cost-saving benefits of blockchain adoption in IoT devices.

A. Future Work

Although blockchain is a new technology and can contribute to the improvement of the supply chain industry, it cannot fundamentally alter the business ecosystem on its own. However, the research article made clear that the technology would offer ideas and options for future research, and a few directions were given. The main goal is to keep track of the high level, capability-based business demands that have been specified. The second component is technology exploratory research, which will create novel services by incorporating new information and communication technologies. The authors concluded by saying that it is vital to combine blockchain with other technologies, such as the Internet of Things, smart contracts, 3D printing, etc., and that they welcome feedback from users. All of the studies will aid scholars and government managers in their understanding of blockchain technology and application to business and supply chain management.

B. Open Research Issues

The organizations are seeking networking opportunities with the corresponding groups on this topic as they currently have no idea about blockchain-enabled solutions. Businesses have been sluggish to adopt blockchain technology in the realm of supply chains for a number of

- The firms are currently debating which solution will provide the best scalability, integration, security, and privacy.
- The organizations are unsure of how the deployment will be applied in terms of compliance and regulation. Potential use cases have not been developed, and it has not been determined whether they can be all-inclusive.
- Due to the impending change in management and the considerable complexity of interaction, the business is unable to determine when to begin creating a consortium or to join an existing one.

Performance and scalability, data governance, corporate architecture, and business process design are among the emerging tactical and technological concerns that must be addressed.

REFERENCES

[1] Meidute-Kavaliauskiene I, Yıldız B, Çiğdem Ş, Činčikaitė R. An Integrated Impact of Blockchain on Supply Chain Applications. *Logistics*, 2021; 5(2): 33.

[2] PwC. How can blockchain power industrial manufacturing? www.pwc.com, 2019. [Online]. Available: https://www.pwc.com/us/en/industries/industrial-products/library/blockchain-industrial-manufacturing.html. [Accessed 22 February 2022].

[3] Deloitte Insights. *Deloitte's 2020 Global Blockchain Survey: From Promise to Reality*. Deloitte, 2020. [Online]. Available: https://www2.deloitte.com/content/dam/insights/us/articles/6608_2020-global-blockchain-survey/DI_CIR%202020%20global%20blockchain%20survey.pdf. [Accessed 22 February 2022].

[4] Wang M, Wu Y, Chen B, Evans M. Blockchain and Supply Chain Management: A New Paradigm for Supply Chain Integration and Collaboration. *Operations and Supply Chain Management and International Journal*, 2020; 14(1): 111-122.

[5] Swan M. Anticipating the Economic Benefits of Blockchain. *Technology Innovation Management Review*, 2017; 7(10): 6-13.

[6] Mansfield-Devine S. Beyond Bitcoin: using blockchain technology to provide assurance in the commercial world. *Computer Fraud & Security*, 2017; 5: 14-18.

[7] Chen G, Xu B, Lu M, Chen NS. Exploring blockchain technology and its potential applications for education. *Smart Learning Environments*, 2018; 5(1): 1-10.

[8] Lu Y. Blockchain and the related issues: A review of current research topics, *J. Manag. Anal.*, 2018; 5: 231-255.

[9] Wang Z, Wang T, Hu H, Gong J, Ren X, Xiao Q. Blockchain-based framework for improving supply chain traceability and information sharing in precast construction. *Autom. Constr.*, 2020; 111: 103063.

[10] Wang Y, Singgih M, Wang J, Rit M. Making sense of blockchain technology: How will it transform supply chains? *Int. J. Prod. Econ.*, 2019; 211: 221-236.

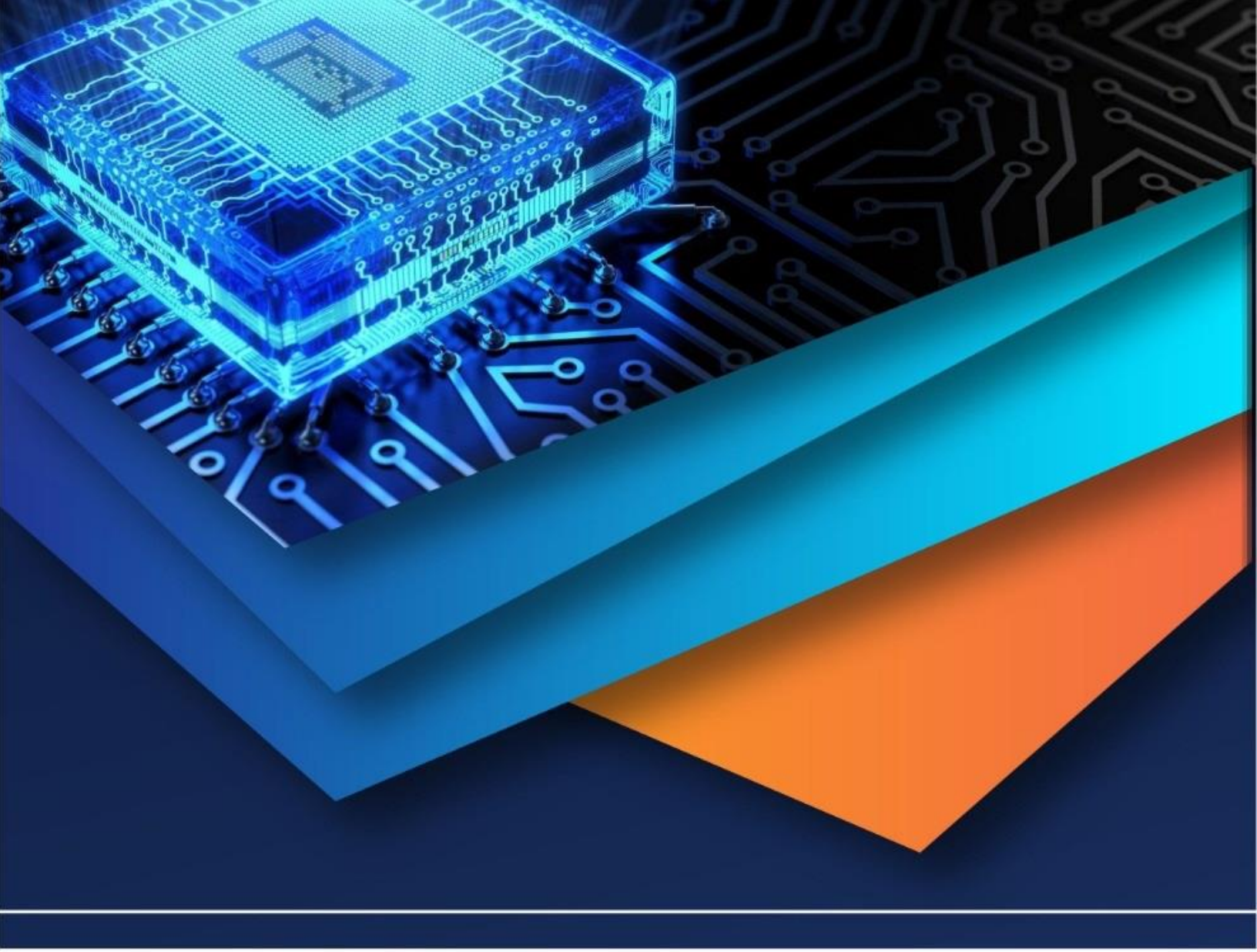
[11] Huddiniah ER, Er M. Product Variety, Supply Chain Complexity and the Needs for Information Technology: A Framework Based on Literature Review, Operations and Supply Chain Management: *An International Journal*, 2019; 12(4): 245-255.

[12] Xu P, Lee J, Barth J, Richey R. Blockchain as supply chain technology: Considering transparency and security. *Int. J. Phys. Distrib. Logist. Manag.*, 2021; 51: 305–324.

[13] Vacca A, Di Sorbo A, Visaggio C, Canfora G. Canfora, G. A systematic literature review of blockchain and smart contract development:

Techniques, tools, and open challenges. *J. Syst. Softw.*, 2021; 174: 110891.
[14] Nathani MU, Singh J, Singh K. Using Blockchain for Effective Risk Management in Supply Chain: A Qualitative Study. *Global Business and Management Research: An International Journal*, 2020; 12(3):60-76.
[15] Černý M, Gogola M, Kubaľák S, Ondruš J. Blockchain technology as a new driver in supply chain. *Transportation Research Procedia*, 2021; 55: 299-306.
[16] Moosavi J, Naeni LM, Fathollahi-Fard AM, Fiore U. Blockchain in supply chain management: a review, bibliometric, and network analysis. *Environmental Science and Pollution Research*, 2021.
[17] Pournader M, Shi Y, Seuring S, Koh S. Blockchain applications in supply chains, transport and logistics: A systematic review of the literature, *Int. J. Prod. Res.* 2019; 58: 2063–2081.
[18] Hastig, Sodhi M. Blockchain for supply chain traceability: Business requirements and critical success factors. *Prod. Oper. Manag.*, 2019; 29: 935–954.
[19] Bai C, Sarkis J. A supply chain transparency and sustainability technology appraisal model for blockchain technology. *Int. J. Prod. Res.* 2020;58: 2142–2162.
[20] Saberi S, Kouhizadeh M, Sarkis J, Shen L. Blockchain technology and its relationships to sustainable supply chain management. *Int. J. Prod. Res.*,2019; 57: 2117-2135.
[21] Kshetri N. Blockchain's roles in meeting key supply chain management objectives, *Int. J. Inf. Manag.* 2018; 39: 80-89.
[22] Cole R, Stevenson M, Aitken J. Blockchain technology: Implications for operations and supply chain management. *Supply Chain Manag. Int. J.*, 2019; 24: 469-483.
[23] Meidute-Kavaliauskiene I, Yıldız B, Çiğdem Ş, Činčikaitė R. An Integrated Impact of Blockchain on Supply Chain Applications, *Logistics*, 2021; 5(33): 1-18.
[24] Sheel A, Nath V. Effect of blockchain technology adoption on supply chain adaptability, agility, alignment and performance. *Manag. Res. Rev.* 2019; 42(12).
[25] Jangga R, Ali N, Ismail M, Sahari N. Effect of Environmental Uncertainty and Supply Chain Flexibility Towards Supply Chain Innovation: An exploratory Study. *Procedia Econ. Financ.* 2015; 31: 262-268.
[26] Yu K, Luo B, Feng X, Liu J. Supply chain information integration, flexibility, and operational performance: An archival search and content analysis. *Int. J. Logist. Manag.* 2018; 29: 340–364.
[27] Delic M, Eyers D. The effect of additive manufacturing adoption on supply chain flexibility and performance: An empirical analysis from the automotive industry. *Int. J. Prod. Econ.* 2020; 228: 107689.
[28] Wang B, Luo W, Zhang A, Tian Z, Li Z. Blockchain-enabled circular supply chain management: A system architecture for fast fashion. *Comput. Ind.* 2020; 123: 103324.
[29] Lohmer J, Bugert N, Lasch R. Analysis of resilience strategies and ripple effect in blockchain-coordinated supply chains: An agent-based simulation study. *Int. J. Prod. Econ.* 2020; 228:107882.
[30] Xu P, Lee J, Barth J, Richey R. Blockchain as supply chain technology: Considering transparency and security. *Distrib. Logist. Manag.* 2021; 51: 305–324.
[31] Min H. Blockchain technology for enhancing supply chain resilience. *Bus. Horiz.* 2019; 62: 35-45.
[32] Kamble S, Gunasekaran A, Kumar V, Belhadi A, Foropon C. A machine learning based approach for predicting blockchain adoption in supply Chain. *Technol. Forecast. Soc. Chang.* 2021; 163: 120465.
[33] de Giovanni P. Blockchain and smart contracts in supply chain management: A game theoretic model. *Int. J. Prod. Econ.* 2020; 28: 107855.
[34] Ante L. Smart contracts on the blockchain—A bibliometric analysis and review. *Telemat. Inform.* 2021: 101519.
[35] Hackius N, Petersen M. Blockchain in logistics and supply chain: trick or treat? Digitalization in supply chain management and logistics: smart and digital solutions for an industry 4.0 environment, *Proceedings of the Hamburg International Conference of Logistics (HICL)*, 2017; 23: 3-18.
[36] Francisco K, Swanson D. The supply chain has no clothes: technology adoption of blockchain for supply chain transparency, *Logistics*, 2018; 2(1): 2.
[37] Xu L, Xu E, Li L. Industry 4.0: State of the art and future trends. *Int J Prod Res.* 2018; 56(8): 2941–2962.
[38] Khatri KK. Research Paradigm: A Philosophy of Educational Research. *International Journal of English Literature and Social Sciences*, 2020; 5(5): 1435-1440.
[39] Silva C. Research Design-The New Perspective of Research Methodology. *British Journal of Education, Society and Behavioural Science*. 2017; 19(2): 1-12.

[40] Wang M, Wu Y, Chen B, Evans M. Blockchain and Supply Chain Management: A New Paradigm for Supply Chain Integration and Collaboration. *Operations and Supply Chain Management*, 2021; 14(1): 111-122.
[41] Shetty SK, Siddiqa A. Deep Learning Algorithms and Applications in Computer Vision. *International Journal of Computer Sciences and Engineering*, 2019; 7(7): 195-201.
[42] Dargan S, Kumar M, Ayyagari MR, Kumar G. A Survey of Deep Learning and Its Applications: A New Paradigm to Machine Learning. *Archives of Computational Methods in Engineering*, 2019: 1-22.
[43] Voulodimos A, Doulamis N, Doulamis A, Protopapadakis E. Deep Learning for Computer Vision: A Brief Review. *Computational Intelligence and Neuroscience*, 2018; 1-13.
[44] Sinha RK, Pandey R, Pattnaik R. Deep Learning For Computer Vision Tasks: A review. in 2017 *International Conference on Intelligent Computing and Control (I2C2)*, Odisha, 2017.
[45] Patel P, Thakkar A. The upsurge of deep learning for computer vision applications. *International Journal of Electrical and Computer Engineering (IJECE)*, 2020; 10(1): 538-548.
[46] Hassaballah M, Awad AI. *Deep Learning in Computer Vision: Principles and Applications*, CRC Press Taylor & Francis Group, 2020.
[47] Sharma N, Sharma R, Jindal N. Machine Learning and Deep Learning Applications-A Vision. *Global Transitions Proceedings*, 2021; 2(1): 24-28.
[48] Rajaraman S, Candemir S, Xue Z, Alderson P, Kohli M, Abuya J, Thoma G, Antani S. A novel stacked generalization of models for improved TB detection in chest radiographs, in *Annu Int Conf IEEE Eng Med Biol Soc*, 2018.
[49] Xu B, Chai Y, Galarza CM, Vu CQ, Tamrazi B, Gaonkar B, Macyszyn L, Coates TD, Lepore N, Wood J. Orchestral Fully Convolutional Networks forsmall lesion segmentation in Brain MRI. *Proc IEEE Int Symp Biomed Imaging*, 2018: 889-892.
[50] Reda I, Ayinde B, Elmogy M, Shalaby A, El-Melegy M, El-Ghar M, El-Fetouh A, Ghazal M, El-Baz A. A new CNN-based system for early diagnosis of prostate cancer, in *2018 IEEE 15th International Symposium on Biomedical Imaging* (ISBI 2018), 2018.
[51] Vicky M, Aziz G, Hindersah H, Prihatmanto A. Implementation of vehicle detection algorithm for self-driving car on toll road copulating using Python language, in *2017 4th International Conference on Electric Vehicular Technology* (ICEVT), 2017.
[52] Amritkar C, Jabade V. Image Caption Generation Using Deep Learning Technique, *2018 Fourth International Conference on Computing Communication Control and Automation* (ICCUBEA), 2018; 1-4.
[53] Park CC, Kim B, Kim G. Towards Personalized Image Captioning via Multimodal Memory Networks. *IEEE Trans Pattern Anal Mach Intell*, 2018.
[54] Wu Q, Shen C, Wang P, Dick A, Hengel A. Image Captioning and Visual Question Answering Based on Attributes and External Knowledge. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2018; 40(6): 1367-1381.
[55] Abbas Q, Ibrahim M, Jaffar M. A comprehensive review of recent advances on deep vision systems. *Artif Intell Rev*, 2019; 52: 39–76.
[56] Kaushal M, Khehra B, Sharma A. Soft computing based object detection and tracking approaches: state-of-the-art survey. *Appl Soft Compu*, 2018; 70: 423–464.
[57] Razzak M, Naz S, Zaib A. Deep learning for medical image processing: overview, challenges and the future. *Classif BioApps Lect Notes Comput Vis Biomech*, 2018; 26: 323–350.
[58] Kautz T, Groh B, Hannink J, Jensen U, Strubberg H, Eskofer B, Activity recognition in beach volleyball using a Deep Convolutional Neural Network: leveraging the potential of deep learning in sports. *Data Mining and Knowledge Discovery*, 2018; 31(6): 1678–1705.
[59] Zheng C, Wu W, Yang T, Zhu S, Chen C, Liu R, Shen J, *et al.* Deep Learning-Based Human Pose Estimation: A Survey, *arXiv*, 2021: 1-25.
[60] Chen Y, Tian Y, He M. Monocular human pose estimation: A survey of deep learning-based methods. *Computer Vision and Image Understanding*, 2020; 192: 102897.
[61] Zhao C, Chen K, Wei Z, Chen Y, Miao D, Wang W. Multilevel triplet deep learning model for person re-identification. *Pattern Recognition Letters*, 2019; 117: 161-168.
[62] Al-Faris M, Chiverton J, Ndzi D, Ahmed AI. A Review on Computer Vision-Based Methods for Human Action Recognition. *J. Imaging.*, 2020; 6(46): 1-32.



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