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| RESEARCH ARTICLE

Blockchain for Supply Chain Transparency: Enhancing Traceability and Efficiency in the US Logistics Sector

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| ABSTRACT
Blockchain technology is transforming supply chain management in the U.S. logistics industry by enhancing transparency, traceability, and efficiency. This study explores the potential application of blockchain technology in mitigating significant issues such as fraud, counterfeiting, and operational inefficiencies in logistics networks. As supply networks become more complicated, transactional records that ate safe and secure are therefore important. This is where blockchain comes into play as it offers data integrity while providing real-time visibility into the movement of the product with its decentralized and immutable ledger. Using real-world case studies that show its impact, this article will examine the basic principles of blockchain technology and its applications in the US logistics supply chain. Moreover, blockchain leading its way has a lot of challenges ahead including scalability, interoperability, a robust case of use, and regulatory concerns. The question was, "How can blockchain integration improve transparency, traceability, and efficiency in the US logistics sector?" is the focus of this paper. Blockchain is not only a new technology but will be an important element in developing a supply chain ecosystem that is more secure and effective, as we have shown by the end of this study.

| KEYWORDS
US Logistics, Supply Chain, Blockchain, Efficiency, Traceability, Transparency.

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1. Introduction

We all know that supply chain management plays a significant role in the smooth and efficient transportation of goods between various industries across the USA logistics industry (Al Mahmud, Dhar, et al., 2025). The competitiveness and operational performance of an organization are now largely affected by its ability to monitor, control, and optimize logistics networks (Ahmed et al., 2025). However, the growing opacity and complexity of supply chains have created a number of significant problems, including fraud, counterfeiting, inefficiencies and lack of real-time visibility (Al Mahmud, Hossan, et al., 2025). To solve these issues, new, more efficient, and more traceable and transparent approaches are required. This is the point where the transformative potential of blockchain technology offers a radical, new approach to supply chain modernization (Arpita et al., 2025).

Blockchain is an immutable decentralized digital ledger that securely stores transactions and is maintained by a network of computers that are spread out (Ahmed et al., 2023). It is strong in establishing confidence in a system that does not comprise middlemen because it guarantees that once a transaction is logged, it becomes an immutable block in the chain that is available to all degree holders (Bhuiyan et al., 2025a). This level of transparency and security is particularly beneficial in supply chain management, where the ability to confirm product authenticity, monitor shipments in real time, and ensure regulatory compliance is critical to effective operations (Bhuiyan et al., 2025b). Blockchain is an innovative technology which already transformed various industries and can impact the logistics sector of the U. S significantly (Chowdhury et al., 2023). An optimized supply chain is vital for their operational efficiency, be it for maintaining the sanctity of perishable goods, ensuring timely

delivery of medicines, or for streamlining complex logistics networks (Das et al., 2023). Traditional supply chains are plagued by inefficiencies, disjointed data systems and poor visibility, all of which escalate costs and introduce delays. Offering an immutable and real-time record of transactions, blockchain technology provides a compelling case in this regard, fostering greater accountability and trust amongst stakeholders (Chowdhury et al., 2023). Given the important role of supply chain management and the increasing application of blockchain technology (Ferdousmou et al., 2025).

As this study travels the intersection between supply chain management and blockchain, it will explore how blockchain has the potential to revolutionize logistics operations by eliminating inefficiencies and trust issues (Hasan, Farabi, et al., 2025). By the end of this study, to have illuminated the ways that companies and sectors can utilize blockchain technology to enhance logistics operations and build integrity and trust in the core of the US supply chain ecosystem (Das et al., 2023).

2. Materials and Methods

While blockchain was initially introduced as the underpinning of the Bitcoin currency, it has turned out to be an excellent technology with many applications from supply chains to other industries that are less related to digital currency (Hossain et al., 2024; Imran et al., 2024). The blockchain operates as a decentralized, verifiably secret digital ledger that can boost product operational efficiencies, traceability and transparency in the US logistics sector (Prova, 2024c). Unlike conventional, centralized databases, every participant has an identical copy of the ledger in blockchain, which is a distributed ledger system (Hossain et al., 2025; Johora et al., 2024).

With the use of Blockchain technology, transactions are organized into blocks containing multiple authenticated entries (Goffer, 2025). These pieces are linearly chained together to form an immutable ledger. Once a transaction is recorded, most network parties have to agree to change it (Goffer et al., 2025). This not only bolsters security, but it also provides real-time and verified data, which can be beneficial to various applications, like supply chain logistics, where accurate data is key to keep things running smoothly (Kamruzzaman et al., 2025; Khair et al., 2025). Fig. 1 shows how blockchain technology works. Table I presents a comparison between supply chain management challenges today and the solutions provided through blockchain (M. Islam et al., 2025).

3. Key functionalities of Blockchain in the US Logistics sector

3.1 Decentralization:

Unlike the centralized systems of a transaction where a single authority controls everything, the true power of the blockchain transaction comes from the consensus of the members of the network, which helps eliminate the risk of fraud and manipulation of data (Md Alamgir Miah, 2025).

3.2. Immutability:

Information, once recorded to the blockchain, is permanent and not subject to change (Kamal et al., 2025).

3.3. Transparency:

All consented users have a view of the same ledger designed to ensure trust, accountability, and enhanced coordination across logistics networks (Kaur et al., 2023).

3.4. Security:

Through various cryptographic techniques, transactions are secured and protected against unauthorized changes to ensure data safety (Khair et al., 2025).

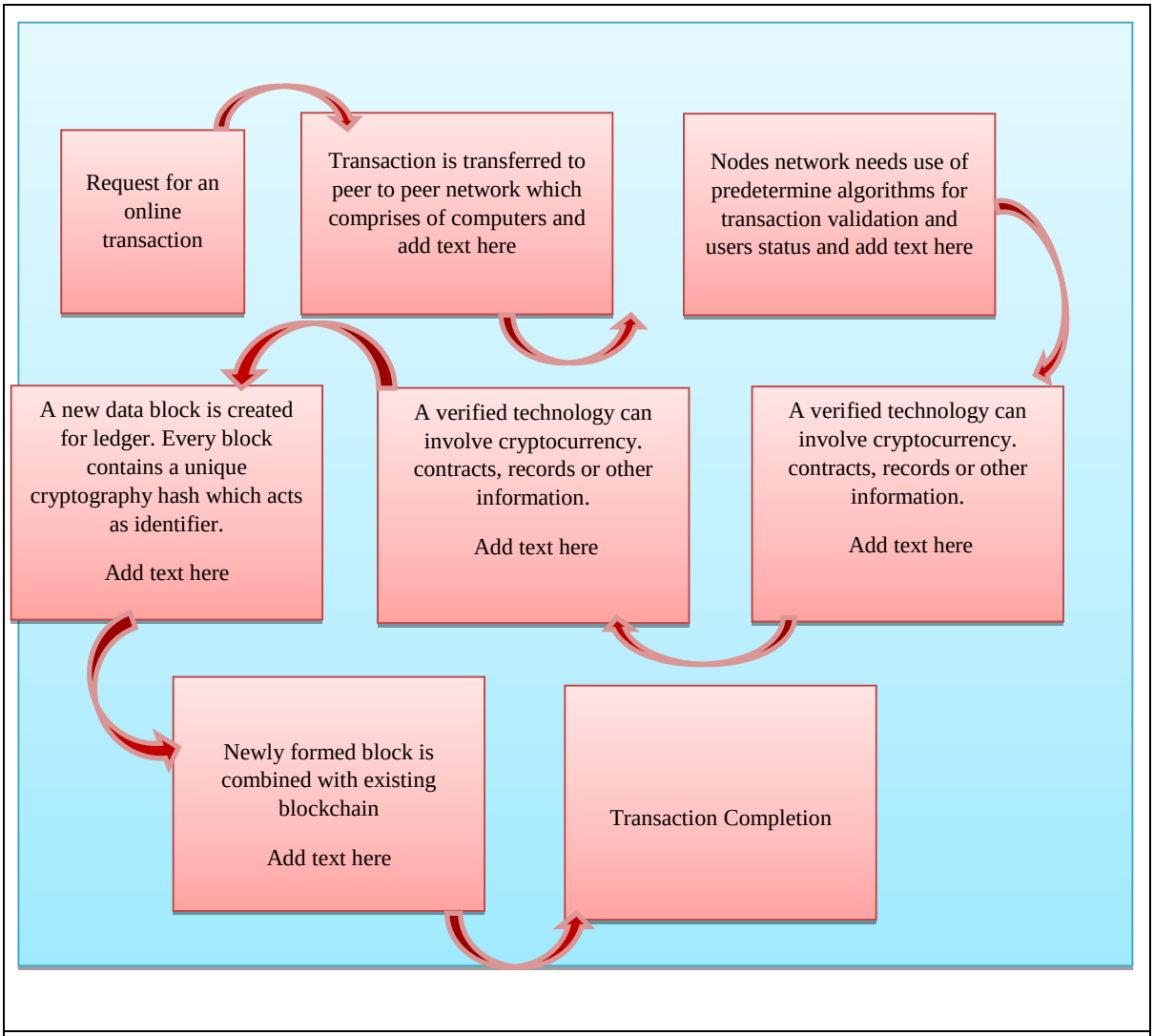

Fig. 1. How blockchain technology works (Prabha et al., 2024)

Table 1. Comparison between Blockchain and supply chain (Noor et al., 2024).

Modern Challenges of Supply Chain Management (SCM) & Halted by Blockchain	**Which challenges in supply chain management are currently present, And How Does Blockchain Address them**
Lack Of Transparency: **Lack of transparency is among the biggest challenges faced in supply chain management. In many cases, supply chains consist of multiple organizations and spread over a few geographical areas, it is challenging to have real-time visibility on the movement of items and its status. This lack of visibility hampers effective decision-making, generates inefficiencies, and increases the risk of errors.**	**Transparency:** Due to blockchain technology, all permitted participants in the supply chain ecosystem can view an immutable ledger. This transparency allows stakeholders to track the origin and movement of items in real time. This tamper-resistant record of every transaction reduces the risk of data tampering and establishes trust among participants.

Fraud and Counterfeiting:	**Fraud Prevention:**
Supply chains are under attack by fraudulent operations, including the manufacture of counterfeit goods and documents. Lapses in the system that illicit actors have exploited, resulting in lost revenues, reduced product quality and ultimately a potential risk to the safety of consumers.	The decentralizing nature of blockchain technology makes it more immune to fraud. Smart contracts, self-executing agreements on the blockchain, can minimize fraud by automating such procedures as quality control and payment upon delivery. Moreover, the traceability of blockchain makes it very difficult for counterfeit goods to enter the supply chain undetected.
Inefficiency and Delays:	**Improved Efficiency:**
Inefficient supply chain processes, such as bottlenecks in logistics, unnecessary documentation, and delays in customs clearance, lead to interruptions in supply chains and increased operating expenses. Such inefficiencies eat into business margins and impact the timely delivery of goods.	Blockchain streamlines operations in the supply chain by eliminating unnecessary paperwork, reducing the need for reconciliation, and providing a secure and efficient platform for data sharing. Smart contracts could eliminate errors and delays by automating activities such as payment processing, inventory management, and compliance checks.

4. Here's how blockchain is being used in supply chains in the real world

- ✓ A blockchain-based platform tool can be used to track the origin and movement of food goods by food manufacturers, retailers, and consumers (Khair et al., 2024).
- ✓ Trade Lens is a governance idea, partially built by IBM and Maersk, one of the world's largest shipping companies (Mahmud, Barikdar, et al., 2025).
- ✓ Pharmaceuticals detailed a blockchain pharmaceutical serialization solution used to combat counterfeit products (Mahmud, Orthi, et al., 2025);
- ✓ Walmart cited the I business network for a blockchain application for food safety that enabled fast identification of contamination sources in the realm of food safety (Manik et al., 2025). Fig. 2 shows the implementation of the blockchain in the supply chain. 2 (Prova, 2024a).
- ✓

Fig. 2. Implementing Blockchain in Supply Chain

5. Challenges in Implementing Blockchain in the US Logistics Sector

Data limitations are present in the US logistics industry based on the logistics market being very expensive, and this has been due to the integration of blockchain technology (Siddiqa et al., 2025; Tasnim et al., 2025). Traditional blockchain networks such

as Bitcoin and Ethereum are limited in their transaction processing speeds and scalability, which can be an issue in logistics, where there is a need to process high volumes of transactions and data in real time and efficiently (Md Ekrim et al., 2024). The integration into existing logistics systems is proving hard as many networks are still heavily dependent on legacy systems and databases, with consensus building across stakeholders throughout the network often being a long and complex process (Tiwari et al., 2024). When it comes to the logistics industry, privacy and transparency are both equally important, making for a perfect balance. The implementation and maintenance of a blockchain network can be expensive, especially for smaller logistics companies or suppliers (Md Habibullah Faisal 1, 2022). Participating in such a network can easily be out of reach for smaller or less capitalized entities in the logistics ecosystem, which could hinder the network effect of blockchain adoption (Ahmed et al., 2025). Today, various countries have their own rules and regulations around blockchain and cryptocurrency, which creates regulatory uncertainty and becomes a major challenge in the adoption of blockchain for global logistics (J. Akter, M. Kamruzzaman, et al., 2024). Finally, the absence of standardized protocols and industry-wide agreement on standardized blockchain also proves as a barrier for widespread adoption in logistics (J. Akter, S. I. Nilima, et al., 2024). Common standards are obligatory, and in the absence of them, logistics networks do not interface with each other, where the supply chain partners have a tough time in data sharing and working together on a blockchain. Fig. 3 shows the benefits and advantages of implementing Blockchain in Supply Chain Management (Al Mahmud, Dhar, et al., 2025).

Benefits	An explanation
Transparency and Visibility	Blockchain technology provides a transparent and immutable ledger with access for all authorized parties
Enhanced Traceability	Every product or component can be assigned a unique identifier, which is stored on the blockchain.
Lower Chance of Fraud and Counterfeiting	Due to blockchain security measures that include consensus processes and cryptographic encryption, it becomes almost impossible for unauthorized parties to modify data.
Improved Efficiency	Using smart contracts to automate jobs, blockchain can make supply chain processes more efficient.
Cost Savings	Cost savings can flow throughout the supply chain, potentially thanks to increased efficiency and reduced fraud.
Improved Trust and Working Together	Because anyone in the supply chain accesses the same transparent ledger, blockchain the confidence.

Fig. 3. Benefits and advantages of implementing Blockchain in Supply Chain Management

6. US Logistics Industry Impact of Blockchain Technology

Blockchain technology has a bad reputation when it comes to the environment, especially for proof-of-work (PoW) consensus blockchains like Ethereum and Bitcoin that consume a lot of electricity (Al Mahmud, Dhar, et al., 2025). Mainnet PoW blockchains validate transactions and protect the network using the network's computing power. Since fossil fuels are used to produce most of the electricity required to run mining facilities, where greenhouse gases are released into the atmosphere, this excessive energy usage greatly raises carbon footprints (Al Mahmud, Hossan, et al., 2025).

Also, the quick lifetime of hardware applied in blockchain mining creates ecological challenges if not properly managed, therefore e-waste disposal is a possible risk to the environment. As the environmental impact becomes more understood, blockchain networks are going into greener and less energy-intensive modes of operation (Ali Linkon et al., 2024). The Ethereum

2.0 upgrade, for example, is transitioning the cryptocurrency over to a Proof-of-Stake (PoS) consensus system. With its PoS-based network, the business is focusing on energy efficiency and lowering environmental impact, in line with the sustainability trends that are gaining momentum in the logistics industry. Table 2 presents use cases demonstrating how blockchain enhances traceability and transparency (Arpita et al., 2025). Fig. 6 represents the challenges and limitations of blockchain in supply chain management. 4.

Table 2. Use cases highlighting how blockchain enhances transparency and traceability.

Use Cases	Industry	Traceability	Traceability Example	Transparency	Transparency Examples
01	Food Industry	Food Traceability: Blockchain is used to improve traceability in the food industry. Each product is assigned a unique identifier recorded on the blockchain.	IBM Food Trust is a blockchain platform used by companies like Walmart and Nestlé to monitor the movement of food items.	Blockchain helps in identifying contamination or foodborne illness sources quickly.	Walmart and IBM utilize blockchain to enhance food safety by enabling fast recalls and tracing contaminated products to their origin, reducing risks for consumers.
02	Logistics and Shipping	Cargo Tracking: Blockchain tracks cargo containers during their journey. Smart contracts automatically update when containers reach set waypoints or experience delays.	Maersk's Trade Lens platform, powered by blockchain, enhances the tracking of cargo.	Shipping involves numerous documents, such as bills of lading, customs papers, and certificates of origin.	The Singaporean government uses blockchain to verify trade documents, streamlining processes and reducing trade fraud.

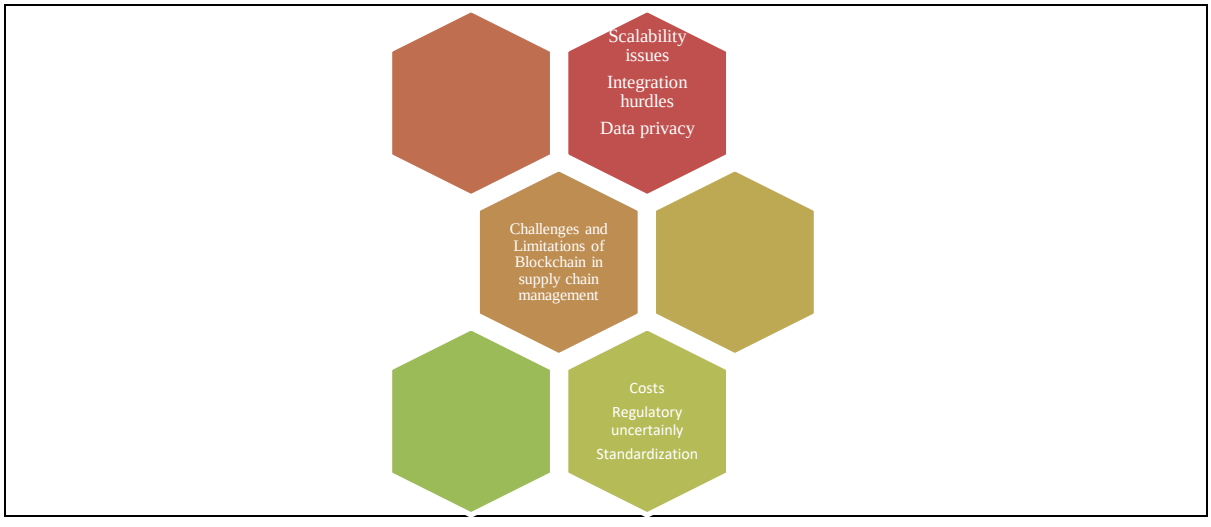

Fig. 4. Challenges and Limitations of Blockchain in supply chain management.

7. Latest Trends of Blockchain for the Logistics Sector USA

7.1 IoT with integration in Blockchain: Real-Time Monitoring

It can collect real-time information about the status of goods in transport location, temperature, humidity, etc., using Internet of Things (IoT) devices comprising sensors and RFID tags. Secure timestamps allow this data to then be stored on a blockchain, which provides a tamper-proof record of product conditions at each point of the supply chain (Bhuiyan et al., 2025a).

7.2 AI and Machine Learning in Blockchain-Based Logistics: Predictive Analytics

AI and machine learning are able, using data gathered from both blockchain networks and IoT devices, to identify breaks in the supply chain and assist in optimal inventory management (Bhuiyan et al., 2025a). AI can optimize logistics routes, adjust inventory levels, and even dynamically schedule production by on-the-ground supply and demand conditions that become known as the blockchain data, with machine learning capabilities that are analyzed; all factors further increase operational efficiency (Biswas et al., 2024).

7.3 Blockchain as a Service (BaaS): Supply Chain as a Service (SCaaS)

Blockchain as a Service (BaaS) provides a simple method for logistics companies to integrate blockchain technology (Chowdhury et al., 2023). BaaS simplifies the integration of blockchain into supply chain processes by offering ready-to-use development environments, helping to increase extensibility and adoption of blockchain-based solutions (Das et al., 2023).

7.4 Sustainability & Ethical Supply Chains: Carbon Footprint Tracking

Blockchain can help trace and verify carbon emissions of a product throughout the supply chain, providing a transparent way for consumers to evaluate the environmental impact of their purchases (Debnath et al., 2024). This functionality allows businesses to create more sustainable and ethical supply chains, something that environmentally conscious consumers are placing a higher priority on (Ferdousmou et al., 2025).

8. US Logistics Industry and its Regulatory Frameworks Around Blockchain

However, as blockchain adoption gains momentum in the logistics sector, regulatory frameworks will need to evolve to address key issues, such as data protection, the valid agreement of smart contracts and environmental concerns (Hasan, Biswas, et al., 2025). Here are a couple of key regulatory considerations: Data Protection and Privacy Regulations, smart contracts and variable legal traditions, digital signatures and authentication, and interoperability standards (Hasan, Farabi, et al., 2025). AML and KYC Regulations: Anti-money laundering (AML) and know your customer (KYC) regulations are implemented to curb illicit activities and ensure compliance in cross-border logistics operations (Hossain et al., 2024). Through the integration of blockchain with IoT, AI and other emerging technologies, the logistics industry in the US can enable better operational efficiency, transparency, agility towards changing market demand, as well as sustainability and social responsibility. Fig. 5 shows the supply chain management Data flow process framework (Hossain et al., 2024).

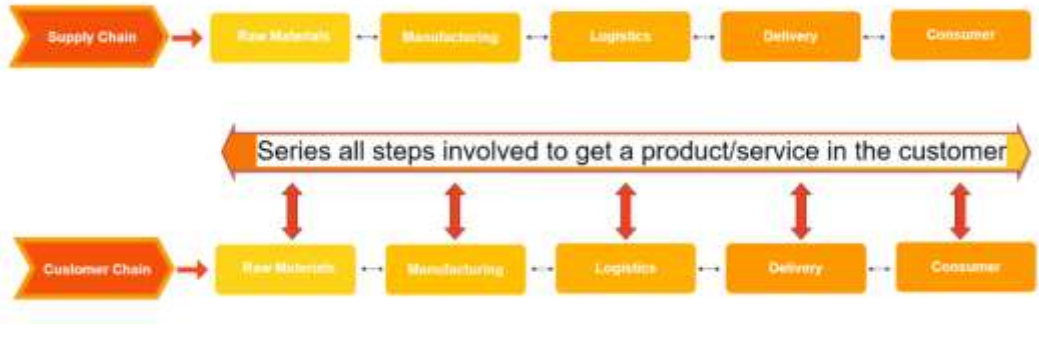

Fig. 5. Supply chain management Data flow process framework.

9. Ethical Considerations in the US Logistics Sector for Blockchain

9.1 Transparency and Traceability

The ethical boon (and bane) of blockchain transparency in the US logistics industry. It offers an unalterable and auditable record of transactions; however, it is crucial to find a balance between this transparency and the necessity to keep sensitive business data and trade secrets secure (Hossain et al., 2025).

9.2 Fair Labor Practices

Using blockchain technology, companies can monitor labor practices along the entire logistics supply chain and confirm that workers are treated fairly. Logistics firms can leverage blockchain to ensure compliance with standards such as fair wages, safe work environments and protection of labor rights, contributing to a more responsible and ethical supply chain(Imran et al., 2024).

9.3 Environmental Impact

With sustainability emerging as a primary concern within the logistics sector, blockchain technology can help track and validate eco-friendly practices. Blockchain can provide a tamper-proof record of sustainability initiatives, including responsible sourcing and carbon footprint reduction efforts (Imran et al., 2024).

9.4 Counterfeit Goods

The growth of counterfeit goods is one of the major ethical issues involved in the logistics industry. This problem is solved by leveraging the ability of Blockchain to confirm the authenticity and origin of products through an unchangeable record of a product's history (M. A. Islam et al., 2025).

9.5 Ethical Sourcing

Within the US logistics sector, blockchain can also promote ethical sourcing. Responsible supply chains require assurance that materials in them, like conflict-free minerals or sustainably sourced agricultural goods, are sourced ethically. Fig. 6 shows how blockchain transactions occur within the supply chain (Johora et al., 2024) (T. Akter et al., 2024).

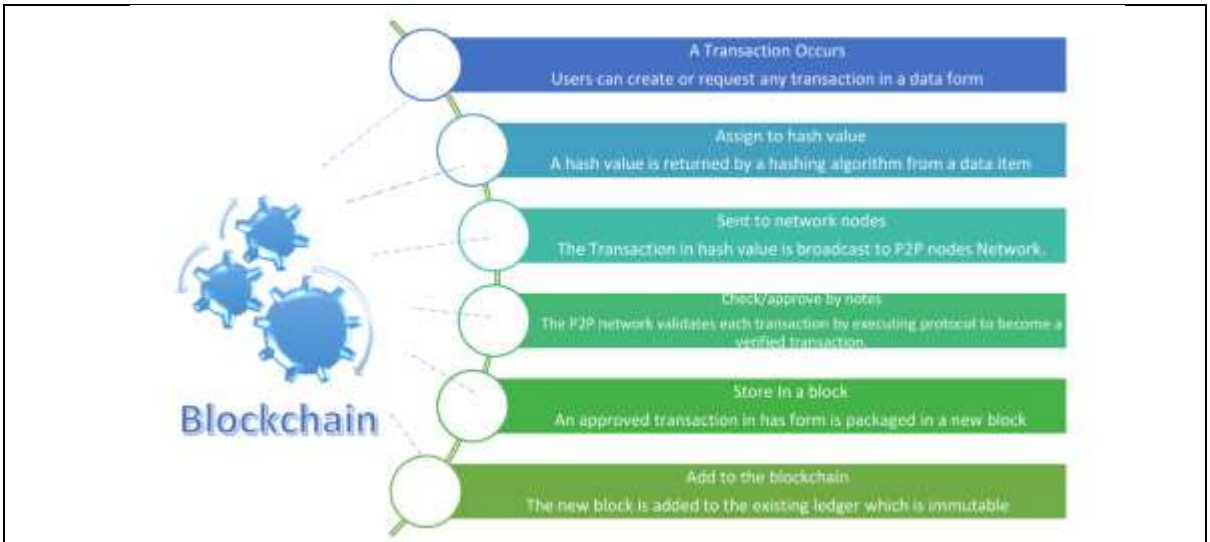

Fig. 6. Blockchain transactions process.

10. Results and Discussion

Case studies illustrate the advantages of bringing technology into the US logistics industry. They are traceability and transparency, which significantly increase efficiency and provide consumers as well as supply chain participants with trust between them. These companies are early adopters of blockchain technology, which can reshape supply chain management across multiple industries and disrupt the logistics industry (Prova, 2024b). In Table 3, we summarize some use cases (case studies) of various businesses and sectors that have implemented blockchain technology for supply chain management, with favorable outcomes (Sadik et al., 2024). Case studies of a few organizations and sectors using Blockchain technology for supply chain management and learning outcomes are presented in Table 3.

Table 3. Case studies.

Case Study	Company/ Industry	Purpose	Aimed	Implementation	Participants	Results
01	Walmart's	Food Traceability and Transparency	Improve Food Safety, Reduce Time, Recall contaminated products	Record and verify the journey of food products from suppliers to store shelves	Collaboration with IBM Food Trust Platform	Trace the origin of a product in seconds
02	Maersk's Trade Lens	Shipping	Improve challenges related to inefficiencies and delays in international trade due to paper-based processes	Digitizes shipping documents and records them on a blockchain	Stakeholders, Shipping lines, ports, customs, and shippers	Real-time data sharing and transparency reduce delays in customs clearance and port operations.

11. Conclusion

Ultimately, this study shows that this technology is playing a huge role in US logistics. The results highlight its transformative ability in improving operational efficiency, transparency, and traceability throughout supply chain operations.

12. Summary of Findings and Insights

- Blockchain establishes an open, tamper-proof, distributed ledger that enables real-time visibility of product movements and transactions. This helps build trust among stakeholders in the logistics sector.
- Blockchain enables granular traceability, affording supply chains access to track products from origin to destination — a formidable asset in terms of managing recalls, assuring product quality, and verifying compliance.
- Smart contracts streamline processes, reduce paperwork, and enhance data exchange efficiency, resulting in error reduction and cost savings; thus, blockchain fosters significant efficiency improvements.
- Additionally, collaborations with IoT and AI will further enhance the capabilities of blockchain technology, thus optimizing supply chain management at every level and empowering developers with updated real-time data that accelerates decision-making and productivity processes.

13. Recommendations for Adoption of Blockchain in the US Logistics Industry

Set clear goals regarding the implementation of blockchain technology in logistics, in terms of potential use cases, for example, increased traceability or fraud mitigation. Forging strong relationships early on with your supply chain partners will ensure

alignment and consistency. Start encouraging the Use of Blockchain by forming alliances or industry consortiums. Select a blockchain platform (public, private, or consortium) based on factors like scalability, consensus methods, and compatibility with current systems. Prioritize data security and privacy, implementing appropriate encryption and access control mechanisms to protect sensitive data. Learn about bridging the gap between multi-blockchain networks with open interoperability standards. Look for a tool that provides a bespoke solution or interlinking. Train your staff and stakeholders on what blockchains are and how to create decentralized ledger technologies.

14. Future Research Development Directions

- Scalability solutions for blockchain will be critical, especially as logistics networks and trade networks grow.
- Continued research on areas such as cryptographic improvements and consensus algorithm development.
- Research into the blending of AI and IoT.
- Standards should be created to ensure consistency and reliability in the use of blockchain-based traceability across various industries.
- Support industry collaboration around common supply chain challenges and best practices for blockchain adoption.
- Explore issues of ethics and social impact of supply chains, with a specific focus on topics such as fair trade, labor practices, and responsible sourcing, all of which blockchain technology is poised to address.
- More r&d in these areas can help mature blockchain technology for use in logistics, paving the way for long-term deployment in addressing existing supply chain issues.

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References

[1] Ahmed, M. K., Bhuiyan, M. M. R., Saimon, A. S. M., Hossain, S., Hossain, S., Manik, M. M. T. G., & Rozario, E. (2025). Harnessing Big Data for Economic Resilience the Role of Data Science in Shaping US Economic Policies and Growth. *Journal of Management*, *2*, 26-34.

[2] Ahmed, M. K., Rahaman, M. M., Khair, F. B., Hossain, S., Hossain, S., Bhuiyan, M. M. R., & Manik, M. M. T. G. (2023). Big Data in Plant Biotechnology: Leveraging Bioinformatics to Discover Novel Anticancer Agents from Flora. *Journal of Medical and Health Studies*, *4*(6), 126-133.

[3] Akter, J., Kamruzzaman, M., Hasan, R., Khatoon, R., Farabi, S. F., & Ullah, M. W. (2024). Artificial Intelligence in American Agriculture: A Comprehensive Review of Spatial Analysis and Precision Farming for Sustainability. 2024 IEEE International Conference on Computing, Applications and Systems (COMPAS),

[4] Akter, J., Nilima, S. I., Hasan, R., Tiwari, A., Ullah, M. W., & Kamruzzaman, M. (2024). Artificial intelligence on the agro-industry in the United States of America. *AIMS Agriculture & Food*, *9*(4).

[5] Akter, T., Samman, A. S. A., Lily, A. H., Rahman, M. S., Prova, N. N. I., & Joy, M. I. K. (2024, 24-28 June 2024). Deep Learning Approaches for Multi Class Leather Texture Defect Classifcation. 2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT),

[6] Al Mahmud, M. A., Dhar, S. R., Debnath, A., Hassan, M., & Sharmin, S. (2025). Securing Financial Information in the Digital Age: An Overview of Cybersecurity Threat Evaluation in Banking Systems. *Journal of Ecohumanism*, *4*(2), 1508–1517-1508–1517.

[7] Al Mahmud, M. A., Hossan, M. Z., Tiwari, A., Khatoon, R., Sharmin, S., Hosain, M. S., & Ferdousmou, J. (2025). Reviewing the Integration of RFID and IoT in Supply Chain Management: Enhancing Efficiency and Visibility. *Journal of Posthumanism*, *5*(3), 409–437-409–437.

[8] Ali Linkon, A., Rahman Noman, I., Rashedul Islam, M., Chakra Bortty, J., Kumar Bishnu, K., Islam, A., Hasan, R., & Abdullah, M. (2024). Evaluation of Feature Transformation and Machine Learning Models on Early Detection of Diabetes Mellitus. *IEEE Access*, *12*, 165425-165440.

[9] Arpita, H. D., Al Ryan, A., Hossain, M. F., Rahman, M. S., Sajjad, M., & Prova, N. N. I. (2025). Exploring Bengali speech for gender classification: machine learning and deep learning approaches. *Bulletin of Electrical Engineering and Informatics*, *14*(1), 328-337.

[10] Bhuiyan, M. M. R., Noman, I. R., Aziz, M. M., Rahaman, M. M., Islam, M. R., Manik, M. M. T. G., & Das, K. (2025a). Transformation of Plant Breeding Using Data Analytics and Information Technology: Innovations, Applications, and Prospective Directions. *Frontiers in Bioscience-Elite*, *17*(1), 27936.

[11] Bhuiyan, M. M. R., Noman, I. R., Aziz, M. M., Rahaman, M. M., Islam, M. R., Manik, M. M. T. G., & Das, K. (2025b). Transformation of Plant Breeding Using Data Analytics and Information Technology: Innovations, Applications, and Prospective Directions. *FBE*, *17*(1). https://doi.org/10.31083/fbe27936

[12] Biswas, B., Mohammad, N., Prabha, M., Jewel, R. M., Rahman, R., & Ghimire, A. (2024). Advances in Smart Health Care: Applications, Paradigms, Challenges, and Real-World Case Studies. 2024 IEEE International Conference on Computing, Applications and Systems (COMPAS),

[13] Chowdhury, S. S., Faisal, M. H., Hossain, E., Rahman, Z., Hossin, M. E., & Abdul, M. (2023). Transforming Business Strategies: Management Information Systems, IoT, and Blockchain Technology to Advance the United Nations' Sustainable Development Goals. *American Journal of Computing and Engineering*, *6*(1), 94-110.

[14] Das, N., Hassan, J., Rahman, H., Siddiqa, K. B., Orthi, S. M., Barikdar, C. R., & Miah, M. A. (2023). Leveraging Management information Systems for Agile Project Management in Information Technology: A comparative Analysis of Organizational Success Factors. *Journal of Business and Management Studies*, *5*(3), 161-168.
[15] Debnath, A., Hossan, M. Z., Sharmin, S., Hosain, M. S., Johora, F. T., & Hossain, M. (2024). Analyzing and Forecasting of Real-Time Marketing Campaign Performance and ROI in the US Market. 2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA),
[16] Ferdousmou, J., Samiun, M., Mohammad, N., Hossan, M. Z., Das, S., Hassan, M., Mozumder, A. Q., & Suha, S. H. (2025). IT Management Strategies for Scaling Artificial Intelligence-Powered Educational Systems in American Schools and Universities. *Journal of Posthumanism*, *5*(2), 470–486-470–486.
[17] Goffer, M. A., Hasan, S. N., Das, N., Kaur, J., Hassan, J., Barikdar, C. R., & Das, S. . (2025). Cybersecurity and Supply Chain Integrity: Evaluating the Economic Consequences of Vulnerabilities in U.S. Infrastructure. *Journal of Management World,*, *2*, 233-243. https://doi.org/https://doi.org/10.53935/jomw.v2024i4.907
[18] Goffer, M. A., Uddin, M. S., kaur, J., Hasan, S. N., Barikdar, C. R., Hassan, J., Das, N., Chakraborty, P., & Hasan, R. (2025). AI-Enhanced Cyber Threat Detection and Response Advancing National Security in Critical Infrastructure. *Journal of Posthumanism*, *5*(3), 1667–1689. https://doi.org/10.63332/joph.v5i3.965
[19] Hasan, R., Biswas, B., Samiun, M., Saleh, M. A., Prabha, M., Akter, J., Joya, F. H., & Abdullah, M. (2025). Enhancing malware detection with feature selection and scaling techniques using machine learning models. *Scientific Reports*, *15*(1), 9122. https://doi.org/10.1038/s41598-025-93447-x
[20] Hasan, R., Farabi, S. F., Johora, F. T., Ullah, M. W., Al Mahmud, M. A., & Hossain, M. A. (2025). Evaluating and Analyzing the Innovative Branding and Marketing Strategies of International Brand: A Study of Kellogg's Pringles.
[21] Hossain, M., Manik, M. M. T. G., Tiwari, A., Ferdousmou, J., Vanu, N., & Debnath, A. (2024). Data Analytics for Improving Employee Retention in the US Technology Sector. 2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA),
[22] Hossain, M. A., Das, S., Suha, S. H., Noor, S. K., Imran, M. A. U., & Aziz, M. B. (2025). Exploring the Future of America's Digital Workspace Solutions. *Journal of Ecohumanism*, *4*(3), 301–311-301–311.
[23] Imran, M. A. U., Samiun, M., Dhar, S. R., Noor, S. K., & Sozib, H. M. (2024). A Predictive Analysis of Tourism Recovery Using Digital Marketing Metrics. 2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA),
[24] Islam, M., Mahmud, F., Khair, F., Hossin, M., Orthi, S., Moniruzzaman, M., & Manik, M. M. T. G. (2025). Advancing Healthcare Management and Patient Outcomes through Business Analytics: A Strategic Approach. *Journal of Management World*, *2025*, 35-45. https://doi.org/10.53935/jomw.v2024i4.866
[25] Islam, M. A., Yeasmin, S., Hosen, A., Vanu, N., Riipa, M. B., Tasnim, A. F., & Nilima, S. I. (2025). Harnessing Predictive Analytics: The Role of Machine Learning in Early Disease Detection and Healthcare Optimization. *Journal of Ecohumanism*, *4*(3), 312-321.
[26] Johora, F. T., Hasan, R., Farabi, S. F., Alam, M. Z., Sarkar, M. I., & Al Mahmud, M. A. (2024). AI Advances: Enhancing Banking Security with Fraud Detection. 2024 First International Conference on Technological Innovations and Advance Computing (TIACOMP),
[27] Kamal, M., Hossin, E., Hossain, S., Khair, F., Hossain, S., Manik, M. M. T. G., & Bhuiyan, M. (2025). Forecasting Sales Trends Using Time Series Analysis: A Comparative Study Of Traditional And Machine Learning Models. *Membrane Technology*, *2025*, 668-682.
[28] Kamruzzaman, M., Khatoon, R., Al Mahmud, M. A., Tiwari, A., Samiun, M., Hosain, M. S., Mohammad, N., & Johora, F. T. (2025). Enhancing Regulatory Compliance in the Modern Banking Sector: Leveraging Advanced IT Solutions, Robotization, and AI. *Journal of Ecohumanism*, *4*(2), 2596-2609.
[29] Kaur, J., Hasan, S. N., Orthi, S. M., Miah, M. A., Goffer, M. A., Barikdar, C. R., & Hassan, J. (2023). Advanced Cyber Threats and Cybersecurity Innovation-Strategic Approaches and Emerging Solutions. *Journal of Computer Science and Technology Studies*, *5*(3), 112-121.
[30] Khair, F. B., Ahmed, M. K., Hossain, S., Hossain, S., Manik, M. M. T. G., Rahman, R., & Bhuiyan, M. M. R. (2025). Sustainable Economic Growth Through Data Analytics: The Impact of Business Analytics on US Energy Markets and Green Initiatives. *development*, *2*(8), 15-17.
[31] Khair, F. B., Bhuiyan, M. M. R., Manik, M. M. T. G., Hossain, S., Islam, M. S., Moniruzzaman, M., & Saimon, A. S. M. (2024). Machine Learning Approaches to Identify and Optimize Plant-Based Bioactive Compounds for Targeted Cancer Treatments. *British Journal of Pharmacy and Pharmaceutical Sciences*, *1*(1), 60-67.
[32] Mahmud, F., Barikdar, C. R., Hassan, J., Goffer, M. A., Das, N., Orthi, S. M., kaur, J., Hasan, S. N., & Hasan, R. (2025). AI-Driven Cybersecurity in IT Project Management: Enhancing Threat Detection and Risk Mitigation. *Journal of Posthumanism*, *5*(4), 23–44. https://doi.org/10.63332/joph.v5i4.974
[33] Mahmud, F., Orthi, S. M., Saimon, A. S. M., Moniruzzaman, M., Alamgir, M., Miah, M. K. A., Khair, F. B., Islam, M. S., & Manik, M. M. T. G. (2025). Big Data and Cloud Computing in IT Project Management: A Framework for Enhancing Performance and Decision-Making.
[34] Manik, M. M. T. G., Rahman, M. M., Bhuiyan, M. M., Islam, M. S., Hossain, S., & Hossain, S. (2025). The Future of Drug Discovery Utilizing Generative AI and Big Data Analytics for Accelerating Pharmaceutical Innovations.
[35] Md Alamgir Miah, C. R. B., Habiba Rahman ,Foysal Mahmud ,Jahid Hassan,Shuchona Malek Orthi ,Niropam Das. (2025). Comparative Analysis of Project Management Software: Functionality, Usability, and Integration for Modern Workflows
[36] Article Sidebar. *membrane technology*, *Volume 2025,*(Issue 1). https://doi.org/https://doi.org/10.52710/mt.309
[37] Md Ekrim, H., Jahid, H., Md Asikur Rahman, C., Shafaete, H., Evha, R., Fahmida Binte, K., & Mohammad Abdul, G. (2024). Harnessing Business Analytics in Management Information Systems to Foster Sustainable Economic Growth Through Smart Manufacturing and Industry 4.0. *Educational Administration: Theory and Practice*, *30*(10), 730-739. https://doi.org/10.53555/kuey.v30i10.9643
[38] Md Habibullah Faisal 1, S. S. C., *, Md. Sohel Rana 1, Zahidur Rahman 1, Emran Hossain 3 and Md Ekrim Hossin 4. (2022). Integrating artificial intelligence, blockchain, and management information systems for business transformation: A bibliometric-content analysis. *World Journal of Advanced Research and Reviews*, *16*(3), 1181-1188. https://doi.org/https://doi.org/10.30574/wjarr.2022.16.3.1171
[39] Noor, S. K., Imran, M. A. U., Aziz, M. B., Biswas, B., Saha, S., & Hasan, R. (2024). Using Data-Driven Marketing to Improve Customer Retention for US Businesses. 2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA),

[40] Prabha, M., Hossain, M. A., Samiun, M., Saleh, M. A., Dhar, S. R., & Al Mahmud, M. A. (2024). AI-Driven Cyber Threat Detection: Revolutionizing Security Frameworks in Management Information Systems. 2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA),

[41] Prova, N. N. I. (2024a, 28-30 Aug. 2024). Advanced Machine Learning Techniques for Predictive Analysis of Health Insurance. 2024 Second International Conference on Intelligent Cyber Physical Systems and Internet of Things (ICoICI),

[42] Prova, N. N. I. (2024b, 15-17 Oct. 2024). Enhancing Fish Disease Classification in Bangladeshi Aquaculture through Transfer Learning, and LIME Interpretability Techniques. 2024 4th International Conference on Sustainable Expert Systems (ICSES),

[43] Prova, N. N. I. (2024c, 28-30 Aug. 2024). Garbage Intelligence: Utilizing Vision Transformer for Smart Waste Sorting. 2024 Second International Conference on Intelligent Cyber Physical Systems and Internet of Things (ICoICI),

[44] Sadik, M. R., Sony, R. I., Prova, N. N. I., Mahanandi, Y., Maruf, A. A., Fahim, S. H., & Islam, M. S. (2024, 17-18 May 2024). Computer Vision Based Bangla Sign Language Recognition Using Transfer Learning. 2024 Second International Conference on Data Science and Information System (ICDSIS),

[45] Siddiqa, K. B., Rahman, H., Barikdar, C. R., Orthi, S. M., Miah, M. A., Rahman, R., & Mahmud, F. (2025). AI-Driven Project Management Systems: Enhancing IT Project Efficiency through MIS Integration.

[46] Tasnim, A. F., Rahman, R., Prabha, M., Hossain, M. A., Nilima, S. I., Al Mahmud, M. A., & Erdei, T. I. (2025). Explainable Machine Learning Algorithms to Predict Cardiovascular Strokes. *Engineering, Technology & Applied Science Research*, *15*(1), 20131-20137.

[47] Tiwari, A., Saha, S., Johora, F. T., Imran, M. A. U., Al Mahmud, M. A., & Aziz, M. B. (2024). Robotics in Animal Behavior Studies: Technological Innovations and Business Applications. 2024 IEEE International Conference on Computing, Applications and Systems (COMPAS),