

Blockchain Technology in Logistics: Opportunities and Challenges

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Abstract

In recent years, Blockchain is one of the key innovative technologies in logistics and supply chain management. Blockchain technology can effectively contribute to recording every single asset throughout its flow on the logistics. Contributes to tracking orders, receipts, and payments while tracking digital assets such as warranties and licenses in a unified and transparent way. For the logistics industry, Blockchain is making it more efficient and transparent. The paper provides, the importance of Blockchain in Logistics and opportunities and challenges.

Keywords: Blockchain, Logistics, supply chain management, Tracking, Distributed ledger.

Introduction

Blockchain is one of the emerging transformative technologies of the 21st century (Author & Curwin, 2020) Blockchain is a technology that originated out of a branch of mathematics called cryptography. While the technical details may be complex, the business use is fairly straightforward (EXL Service, https)

Blockchain, which first entered our lexicon with the arrival of cryptocurrencies like Bitcoin in 2008, is now a technology that promises to transform entire industries (<https://www.globaltranz.com>) many big companies like Google, Amazon and others will be using blockchain technology. There's no question it will be found in the future, and will be a game changer in transport and logistics (Thistlethwaite, G,2019) The main advantage of blockchain is its transparency and ability to optimize ecosystems of digital information(Turvoine,2019)

Review of literature

A., Saberi, S., (2018) Globalisation of supply chains makes their management and control more difficult. Blockchain technology, as a distributed digital ledger technology which ensures transparency, traceability, and security, is showing promise for easing some global supply chain management problems. Issaoui et al,(2019)Nowadays, integrating new technologies into all management processes leads to strong evolution especially in Smart Logistics which forms one of the fundamental pillars of the

fourth industrial revolution 'industry 4.0'. As an integrated technology, Blockchain, which is an emerging concept, allows decentralized and immutable storage of verified data.Durach et al., (2020) Blockchains, a disruptive technology with potentially many applications in modern day supply chain (SC) transactions, have not been adequately reflected by theory. Researchers and business managers must understand where and when blockchains' application may be expected and investigated. Lanko, A., et al.,(2018) The main advantages, shortcomings, perspectives, as well as difficulties arising in the implementation of blockchain technology in the construction industry are described. Special attention is paid to the applicability of these technologies.

Blockchain in Logistics

The logistics industry is the backbone of all businesses across the globe. It is a trillion-dollar industry that is growing exponentially with each passing year. The blockchain is going to alter the landscape of the logistics industry (Honrubia, M,2018)

[Blockchain Logistics](https://www.neurochaintech.io) is the application of a decentralized, distributed ledger to facilitate the movement of goods, information, and finances. It also includes the use of smart contracts to automate supply chain functions (<https://www.neurochaintech.io>)

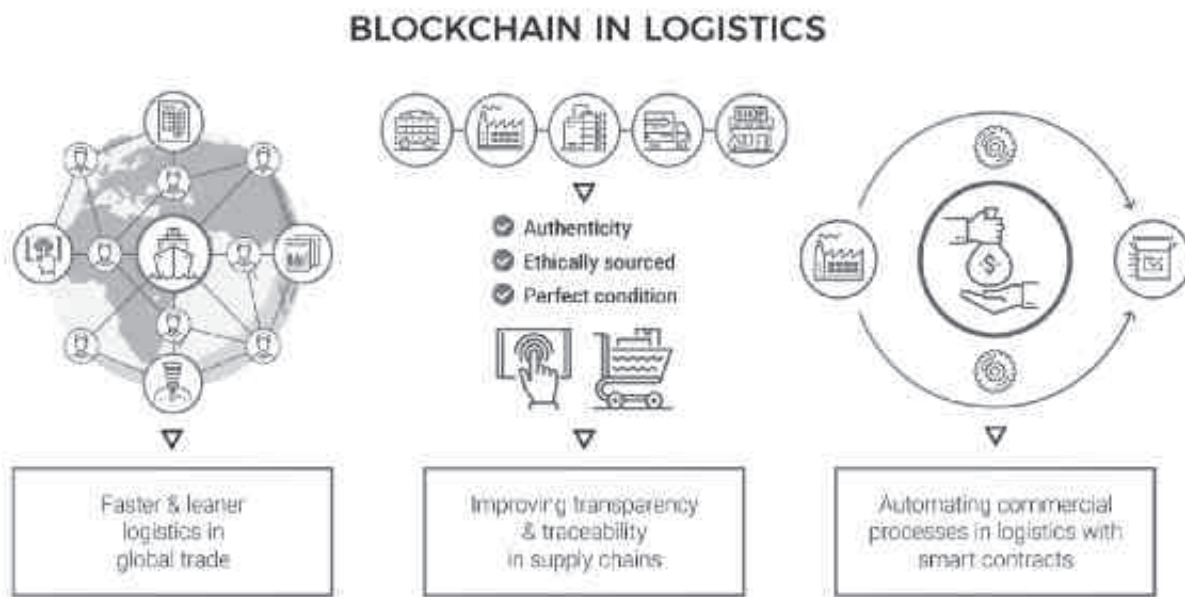
With an estimated 90% of world trade carried out by the international shipping industry every year, achieving new efficiencies in trade logistics could have huge implications on the global economy. According to the World Economic Forum, reducing supply chain barriers could increase global gross domestic product (GDP) by nearly 5% and global trade by 15%.(Aldoma, C,2020) Blockchain is making logistics more efficient and transparent. Blockchain's ability to act as a ledger makes it the perfect technology to facilitate shipment tracking, global contracts and payment processing throughout the logistics industry (Daley,S)

Many companies are now using blockchain technology to disrupt the landscape of logistics and supply chain management. Amazon, Walmart, Unilever, Nestlé, Dole, Alibaba are some of the front-runners of blockchain in

logistics and supply chain (Georgiou, M,2020) In a recent survey by Xeneta, 72% of respondents agreed that this technology will be applied to logistics to regulate and simplify administrative work. Yet, there also seems to be a lot of uncertainty regarding the technology (Bifa) The unique advantage of blockchain is its capability to resist modifications and ensure end-to-end transaction transparency. The ledger is an “append-only” structure, so once added, a record can't be changed or deleted. It allows users to trace the product through the whole supply chain, starting from its origin (<https://www.altexsoft.com>)

Worldwide Blockchain in Logistics Market Split By Major Companies (<https://theloop21.com>)

Maersk, Microsoft, Alibaba, Amazon, Wal Mart , Lynx (Alibaba) and ShipChai



Source: <https://www.e-zigurat.com/innovation-school/blog/blockchain-success-cases/>

Opportunities of Blockchain in Logistics

Faster Transaction Settlements

Blockchain provides harmony as there is no disagreement in the chain regarding transactions; all entities on the chain have the same version of the ledger. This makes the transaction process more efficient and helps achieve a quick delivery of goods and services through mutual trust among participants (<https://www.cloudcredential.org>)

Improves Payments and Pricing Processes

Payment processing and settlement is secure in a blockchain, and transaction information is easily accessible. Shippers will have more data to determine rates. (<https://www.globaltranz.com>)

Breaks down Silos

Increased transparency is the largest benefit of blockchain. A distributed ledger helps break down walls and redundancy between different parts of the supply chain.

Quicker Processing Time: No more filing or conflicting

integration standards. Instead of having to mail or scan documents to various parties, the exchange of information is instant and procedures which normally could take days or weeks to perform can be done in minutes ()

Fraud Reduction

Transactions made on blockchain are secure. It's impossible to change something in the transaction. It leads to decreasing fraudulent operations (Anderson.P. et al.,)

Tracking Efficiency

Tracking your shipments is a headache for many today. Knowing the status of a container from [exporting the shipment](#), clearance, and delivering is a complex process to navigate. Blockchain would provide real-time efficient tracking information to manufacturers, suppliers, and logistics partners (<https://www.atlantacustomsbrokers.com>)

Safety

Blockchain-based systems are able to scale easily without any security issues. The only way to make changes to prior blocks is by rolling back all transactions, a process that is extremely expensive even for the wealthiest third parties. As such, it is safe to assume that blockchain solutions are impenetrable, and offer the highest level of security available (<https://www.universalcargo.com>)

Truck maintenance and verification

Considering the huge waves the electronic logging mandate made through the logistics industry, having more control and better oversight on vehicles is a prudent investment. Blockchain can be used to track everything from odometer readings to hours driven per driver, to maintenance records, ensuring that your company stays in compliance (Ehrlich, T)

Challenges of Blockchain in Logistics

Real-time issue resolution

Natural disasters and unplanned demand and supply often lead to faulty or delayed delivery, which affects the entire production (<https://blockchain.oodles.io>)

Emerging Technology

As this technology is comparatively new, there have been few issues arising related to the transaction speeds, verification processes, and data limits. Correcting these issues on time will make the Blockchain to be broadly applicable (<https://www.zarantech.com>)

Change management

Once the blockchain-based system is in place, businesses

have to promote the adoption of it to their employees. A change management plan should address what the blockchain is, the ways that it improves their job duties, and how to work with the new systems that include it. An ongoing training program can address new features or innovations in blockchain technology, but that certainly requires time and resources (Binance Academy, 2020)

The lack of IT infrastructure

Many logistics providers haven't embraced digital transformation yet, nor have they established an IT infrastructure powerful enough to deploy blockchain. It would, therefore, take research, re-organization, development, and investments to set up the conditions for implementing such a demanding innovation (<https://amconsoft.com>)

Evolving blockchain technology

The last challenge is to work with blockchain itself. Blockchain is a new technology and is evolving at a rapid pace. Implementing blockchain right now will mean more implementation challenges in the future (P, J.,2020)

Conclusion

The shipping and logistics industry is searching for new technologies in order to improve the existing processes, cut costs and increase the transparency of the supply chain. Blockchain technology offers a solution to most current issues (Turvoine,2020) the rise of blockchain promises to revolutionize many sectors, including cross-border trade logistics and global supply chains: blockchain can help track international shipments more effectively, reduce administrative tasks by automating the documentation process, and protect transactions across the entire logistics chain (<https://blogs.worldbank.org>) The future logistics industry is one of the most promising for blockchain technology.

References

- Aldoma, C. (2020, July 21). Blockchain Success cases: Supply Chain and Logistics. Retrieved from <https://www.e-zigurat.com/innovation-school/blog/blockchain-success-cases/>
- Anderson, P., Meklons, J. T., Gregory, D., Aguilar, C., Bothwell, L., Norman, C., & Kamel, S. (n.d.). How Blockchain Improves Logistics: Benefits, Drawbacks, and Use Cases. Retrieved from <https://www.bbnimes.com/technology/how-blockchain-improves-logistics-benefits-drawbacks-and-use-cases>
- Author:, & Curwin), T. (2020, June 11). Blockchain

- Logistics. Retrieved from <https://transportmsandlogisticstms.com/blockchain-and-logistics/>
- The Benefits of Using Blockchain Logistics to Improve Supply Chain. (2018, August 29). Retrieved from <https://www.neurochaintech.io/benefits-using-blockchain-logistics-improve-supply-chain-transparency-and-product-traceabil/>
- Blockchain is already transforming trade and logistics-and that's just the beginning! (n.d.). Retrieved from <https://blogs.worldbank.org/transport/blockchain-already-transforming-trade-and-logistics-and-thats-just-beginning>.
- Bifa. (n.d.). Blockchain Technology in Logistics. Retrieved from <https://www.bifa.org/news/articles/2017/feb/blockchain-technology-in-logistics>
- Binance Academy. (2020, January 19). Blockchain Use Cases: Supply Chain. Retrieved from <https://academy.binance.com/blockchain/blockchain-use-cases-supply-chain>
- Blockchain Technology - New Revolution for Logistic Industry. (2020, August 05). Retrieved from <https://www.atlantacustomsbrokers.com/blockchain-logistics/>
- Blockchain Technology for Logistics and Supply Chain. (2020, April 22). Retrieved from <https://amconsoft.com/blockchain-technology-for-logistics-and-supply-chain/>
- Daley, S. (n.d.). Making moves: How blockchain is quickly becoming a must-have in logistics. Retrieved from <https://builtin.com/blockchain/blockchain-supply-chain-logistics-uses>
- Durach, C. F., Blesik, T., Düring, M. V., & Bick, M. (2020, March 09). Blockchain Applications in Supply Chain Transactions. Retrieved from <https://onlinelibrary.wiley.com/doi/full/10.1111/jbl.12238>
- EXL Service. (n.d.). Blockchain in transport and logistics. Retrieved from <https://www.exlservice.com/blockchain-in-transport-and-logistics>
- Editor. (2020, February 28). Blockchain in Supply Chain and Transportation: Benefits, Use Cases, Limitations, and Opportunities. Retrieved from <https://www.altexsoft.com/blog/blockchain-supply-chain/>
- Ehrlich, T. (n.d.). The Challenges Facing Blockchain Adoption in Logistics. Retrieved from <https://blog.kencogroup.com/the-challenges-facing-blockchain-adoption-in-logistics>
- Georgiou, M. (2020, March 18). 6 Ways Blockchain in Logistics is A Game-Changer (5 Case Studies). Retrieved from <https://www.imaginnovation.net/blog/blockchain-in-logistics-supply-chain/>
- Honrubia, M. (2018, December 03). 7 Blockchain Applications in Logistics. Retrieved from <https://www.ennomotive.com/blockchain-applications-in-logistics/>
- How Blockchain Technology Can Transform Logistics - Part 1. (2019, September 26). Retrieved from <https://www.globaltranz.com/blog/blockchain-technology-transform-logistics/>
- How Blockchain Will Revolutionize Logistics. (2019, November 05). Retrieved from <https://www.cloudcredential.org/blog/how-blockchain-will-revolutionize-logistics/>
- Issaoui, Y., Khiat, A., Bahnasse, A., & Ouajji, H. (2019, November 21). Smart logistics: Study of the application of blockchain technology. Retrieved from <https://www.sciencedirect.com/science/article/pii/S1877050919316825>
- Lanko, A., Vatin, N., & Kaklauskas, A. (2018, June 13). Application of RFID combined with blockchain technology in logistics of construction materials. Retrieved from https://www.matec-conferences.org/articles/mateconf/abs/2018/29/mateconf_2018_03032/mateconf_2018_03032.html
- P, J. (2020, February 20). Blockchain In Logistics: The Role of Blockchain 2020. Retrieved from <https://101blockchains.com/blockchain-in-logistics/#:~:text=Blockchain technology can help solve,is IBM's blockchain-based system.>
- Solving Supply Chain Management Challenges with Blockchain. (2020, July 02). Retrieved from <https://blockchain.oodles.io/blog/solving-supply-chain-management-challenges-blockchain/>
- Thistlethwaite, G. (2019, September 23). How blockchain is changing the logistics industry. Retrieved from <https://www.gbnews.ch/blockchain-logistics-industry/>

- Top Benefits of Blockchain in the Shipping Industry. (n.d.). Retrieved from <https://www.proshipinc.com/about/news/top-benefits-blockchain-shipping-industry>
- Turvoinc. (2019, January 02). Blockchain Technology in Logistics: What Are the Implementation Challenges? Retrieved from <https://cerasis.com/blockchain/>
- Universal Cargo. (2020, July 08). How Logistics Can Benefit from Cryptocurrency. Retrieved from <https://www.universalcargo.com/how-logistics-can-benefit-from-cryptocurrency/>
- Authors, A., Saberi, S., & Additional information Funding This work was supported by the APICS Research. (n.d.). Blockchain technology and its relationships to sustainable supply chain management. Retrieved from <https://www.tandfonline.com/doi/full/10.1080/00207543.2018.1533261>
- (n.d.). Retrieved from <https://www.zarantech.com/blog/blockchain-technology-benefits-and-challenges/>
- 10 Benefits of Blockchain in Logistics - Part 2. (2019, September 30). Retrieved from <https://www.globaltranz.com/blog/10-benefits-of-blockchain-in-logistics/>
- 6 months ago Presley Michelle, Michelle, P., 7 hours ago Thomas Ratzlaff, Ratzlaff, T., & 8 hours ago Thomas Ratzlaff. (2020, February 06). Global Blockchain in Logistics Market 2020 Demand, Growth, Technology Trends, Key Findings, and Forecasts by 2026. Retrieved from <https://theloop21.com/global-blockchain-in-logistics-market-2020-demand-growth-technology-trends-key-findings-and-forecasts-by-2026-2/>