

Blockchain in Logistics Management

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Abstract-Globalization has opened new trade routes, technology has changed the way we shop and spend, and so naturally, the demand for shipping has reached an all-time high. It's no wonder that most shipping customers are shocked and dismayed to find their brokers still relying on artifacts like paper records, written manifests and spoken words to get cargo from point to point. It's time for a breakthrough in how we handle freight. Blockchain technology is often characterized as "disruptive" because it can revolutionize the way we interact as a society. Distributed ledgers are disruptive for ancient business models in the same way email disrupted the mailbox. We will explore the use of blockchain technology in Logistic management in this paper.

Keywords- Logistics, supply chain, blockchain, smart contract

1. Overview

The seamless movement of goods from point of origin to that of consumption aids an economic movement to prosperity. The progress in logistics sector holds an immense value for economy as well.

Here are some stats:-

- The market's global value was \$8.1 trillion in 2015 and is expected to grow to \$15.5 trillion by 2023, making it one of the largest industries on planet.
- 55 billion tons of freight was transported in 2015, with expected growth to 92 billion tons by 2024.
- In India, freight and logistics market is at US\$160 billion currently and it is expected to be around US\$215 billion in next two year.

The Logistic management has various drawback such as unified communication platform, outdated ways of tracking etc. According to **KPMG** 40% of global manufacturers lack information and material visibility across their supply bases. In some cases, companies are still using paper ledgers to track their products. These outdated system result in tremendous amounts of wasted time, resources and money.

But as freight volume increases, so do customer expectations. Both industrial and individual customers expect faster shipments with more flexibility, more transparency and lower prices. Shippers can find it challenging to handle all the complexities of booking, tracking and regulatory compliance, unless they hire teams of full-time, experienced staff. This is where the concept of blockchain technology in logistics management comes in the role.

Blockchain is a digital, distributed ledger that keeps a record of all transactions that takes place across a peer-to-peer network. It is an interlinked and continuously expanding list of records stored securely across a number of interconnected systems. This marks block chain technology resilient since the network has no single point of vulnerability. Additionally, each 'block' is uniquely connected to the previous block via a digital signature which means that making a change to record without disturbing the previous records in the chain is not possible, thus rendering the information tamper-proof. The key innovation in blockchain technology is that it allows its participant to transfer assets across the internet without the need for a centralized third party.

2. How Logistics Management Works Today

The logistics management, the management of flow of goods and service, involves the movement and storage of raw material of work in process, inventory and of finished goods from origin to point of consumption.

The process of shipping freight can occur across many channels, including air, sea, rail or truck. Four major entities make up the lifecycle of any shipment, regardless of the channel being used.

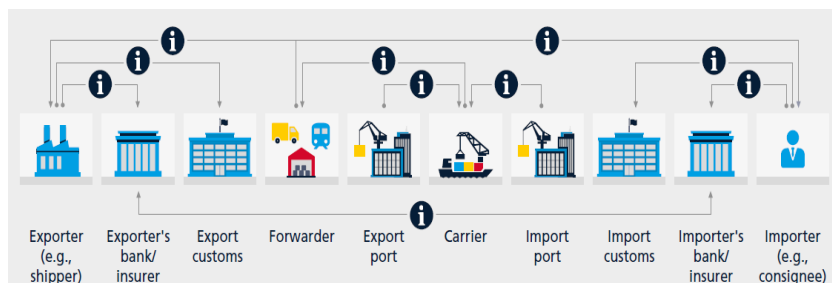
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Brokers coordinate carriers to organize multimodal orders.

Carriers provide freight transportation services.

Drivers are the operators of a single vehicle in a fleet.



3. Problems with Current Logistics Management

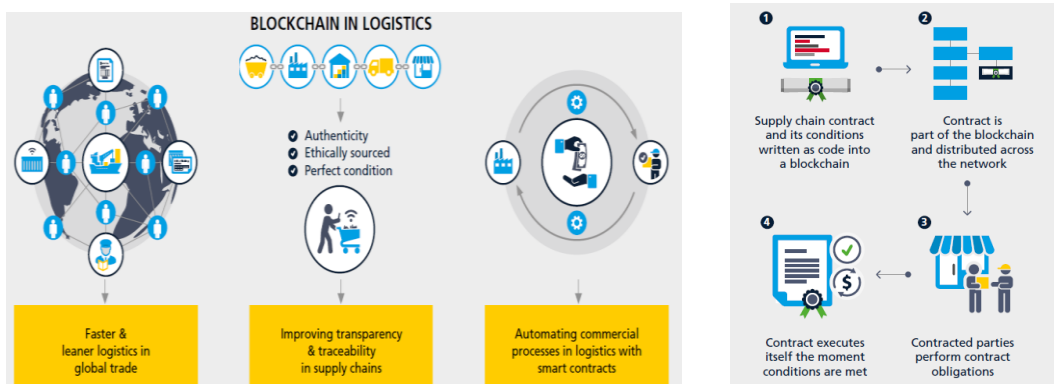
- **Bad tracking-** For the end user the regulatory and reliability of shipping status update is primary concern in the perceived quality of a shipping experience. If a package late or low, but has regular update, customers are less likely to complain or file chargebacks against merchants. But the shipping industry has not kept up. Tracking problems lead to confusion among carriers, failed handoff, failed deliveries and even lost shipments. Economically, this is a disaster, lost efficiency, wasted fuel and missing products combine to cost the shipping industry billions of dollar per year- costs that broker rarely cover and ultimately pass it to the shippers.
- **Lack of transparency-** The current supply chain management lacks transparency. The shippers are not known how their freight are being carried due to broker involvement. According to the supply chain resilience report 2015, 31% business said that they did not analyze the supply chain to identify the original source of any disruption they experienced because of the supply chain lacking transparency. This failure means that many are sleepwalking into their potential destruction.
- **No accountability-** The US Federal Bureau of Investigation estimates annual cargo theft losses exceeding \$30 billion USD in 2016 and rising, with an average theft value of \$190,000. Cargo theft raises prices across the industry approximately 20%, negative impacting all customers of the shipping industry –nearly every person on earth. The combination of tracking and transparency failures together lead to a lack of accountability. As brokers withhold information on who is moving which cargo and fragmentation amongst carrier causes uncertainty where the cargo is at any given time, shippers often have no way of knowing who is responsible for the cargo. Handoffs are one of the largest sources of error in freight, with neither side wanting to take responsibility for a container that didn't make it from the ship to a truck.
- **Middleman Markup-** Brokers and forwarders are largely to blame for all of the above issues, acting as gatekeepers to the industry and incentivizing poor transparency and tracking practices and yet they typically charge a significant premium sometimes 30-50% for their claim of making freight easier to manage and ship. In reality, their high maintenance increase the cost of freight and decreasing what carriers get paid.

4. How block chain will solve the above problem

- **Tracking and Transparency-** The blockchain will create individual encrypted geographic waypoints across each small contract. With this system, the meaning of each waypoint will be encrypted, accessible for interpretation by only the parties involved. This will give shippers more visibility across their logistics chain and allow carriers to communicate with ease, reducing delays and miscommunications. Information about loads, geo-waypoints and basic compliance information will be recorded and publically validated. Upon delivery and conformation, the contract will be completed and recorded on the main blockchain, releasing any payment. By using blockchain, smart contract could completely eliminate the need for all these administrative steps cutting costs and virtually removing all possibilities for error. If we consider the fact that administrative costs can make up 20% of the overall costs of transportation, the amount of money saved by using smart contract could be staggering.

****Smart Contract** are essentially self-executing task that are coded through the blockchain and executed when a certain condition is met. To use a basic example if a company wants to release payment to shippers when an item reaches its destination that company can program a smart contract to automatically pay the shipper when the item has reached specific location.

- **Decentralized Brokerage**-In the current system, freight brokers exist to facilitate the transactions of loads from shippers to carriers; they are typically asset-light and focused on sales. Brokers find loads, mark them up and sell them to a carrier, which increases the cost of shipping and reduces profile for carriers and their crew. Blockchain will supplant the need for brokers by allowing carriers the ability to find shipments and intelligently route their team for multimodal transportation based on factors such as distance, traffic, weather conditions fuel use and more. This load system will generate a smart contract upon pick-up and will hold payments in escrow until conditions for release are met while using the blockchain and side-chain for tracking and cargo security monitoring
- **Asset Security**- Deploying blockchain technology into freight industry to encode geographic data will increase cargo visibility and thereby dramatically decrease theft. By using barcodes or hardware RFID integration, assets can be automatically verified each time electronic logs are reported, increasing security and providing peace of mind for all parties. Per missioning, immutability and encryption are inherent benefits of blockchain technology, allowing select individuals to access, examine and add critical transport data but no one will have the ability to change or delete existing data. By bringing accountability to every step of the process, the blame game between carriers, brokers and shippers is mitigated.
- **Trustless Incentives**- By encoding and encrypting waypoint information and data about which loads belong in a shipment, digital escrow can be used to fairly assess whether goods actually arrived in a particular shipment. Conflicting accounts of the whereabouts of goods are eliminated and individual players can be rewarded for their participation in a system that operates without trusting any particular party's story about what happened.



5. How Blockchain will Influence the Logistics Sector of India

- If there is any one impediment that's coming in the way of India in becoming a super economic power that is logistics. India's logistics sector is highly defragmented and costs around 14% to GDP currently and India ranks 35 in LPI(Logistics Performance Index).
- Blockchain has significant potential to increase efficiency along entire logistics and settlement process including trade finance and help to resolve disputes in the logistics industry. As digitized document and real time shipment data become embedded in blockchain based system this information can be used to enable smart contract. These contract can automate commercial process the moment that agreed are met.
- With validation of electronic contract in India the smart contract of blockchain can also be considered valid and enforceable.
- With collaboration and co-operation between various public and private entities of all kinds- government agencies, industrial organizations, regulators, partners and even competitors, blockchain technology can be implemented in logistics sector. It will make easier for the regulator agencies such as CUSTOMS, DGFT, FSSAI and CDCSO etc. to provide clearance to the goods as every information about freight will on a smart contract. It will drastically decrease the cargo release time and will further bring down the logistics cost.
- The blockchain in logistics can help India in achieving dream of bringing down GDP logistics cost to 10% and improving India's ranking in world bank LPI(Logistics Performance Index).

6. Conclusion and Outlook

- Blockchain technology is emerging from its deployments in crypto currency and is now likely to have significant impact across almost all industries. Like a pebble dropped into a lake, the ripples from this technology are beginning to expand outwards in all directions including the logistics industry, where blockchain promises to make business processes more efficient and facilitate innovative new services and business models.
- Already many projects are underway to apply blockchain technology to global logistics, adding value by boosting supply chain transparency and automating administrative operations. In future we can anticipate blockchain technology will intersect with other innovations to amplify impact. Imagine how physical flow of goods can be more effectively orchestrated and synced with information and financial flow when blockchain is combined with the IoT, artificial intelligence, robotics and more.
- Moving from today's era of providing concepts and piloting applications to actually deploying productive solutions at scale will require further technology development, organizational transformation and crucially collaboration between all stakeholders. Success depends on all parties working together to transform legacy processes and to jointly adopt new ways of creating logistics value. In the highly fragmented logistics industry, consortia that bring together stakeholders will play key role in achieving blockchain's potential in the industry.
- Despite all the hype surrounding blockchain today, we believe that the logistics industry needs to leverage new technologies and embrace ways of rethinking old processes in the digital era. While there are still many challenges to overcome, we invite you to explore with us the opportunities that blockchain presents. By joining forces, we can create the right foundation for successful industry adoption of blockchain and we can ultimately unlock new value in logistics.

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