



Blockchain to Transfigure the Supply Chain Industry

Blockchain technology has just emerged from the hype-realm and descended down to join others in the conceptual workforce to actually get things moving. On the other hand, the rapidly evolving environment of the international supply chain experiences several new norms. The traditional network of manufacturers and suppliers has grown into a vast ecosystem made of various products that move through multiple actors and demand cooperation among stakeholders. Topping it all, there is increased demand for improved product visibility and source-to-destination tracking.

Blockchain Overview

Blockchain was structured in 1991 by two researchers who wanted to implement a system where document timestamps could not be tampered with. However, it wasn't until Bitcoin's rise to popularity, that the technology driving the cryptocurrency became known in the tech-fields.

Blockchain principally is a distributed, immutable ledger that facilitates the recording of transactions and tracking assets in a business network. Asset can mean any tangible or intangible object of value. It is possible to track and trade assets on a blockchain network in a low-risk, cost-effective way to all stakeholders. Blockchain is ideal for delivering that information because it provides instant, distributed, and completely transparent information stored on an immutable ledger that can be accessed only by members who are granted. Since a common view of the detailed transaction is shared among permissible members, confidentiality and trust are automatically vested in the technology building scope for expansion and innovation.

Understanding Supply Chain

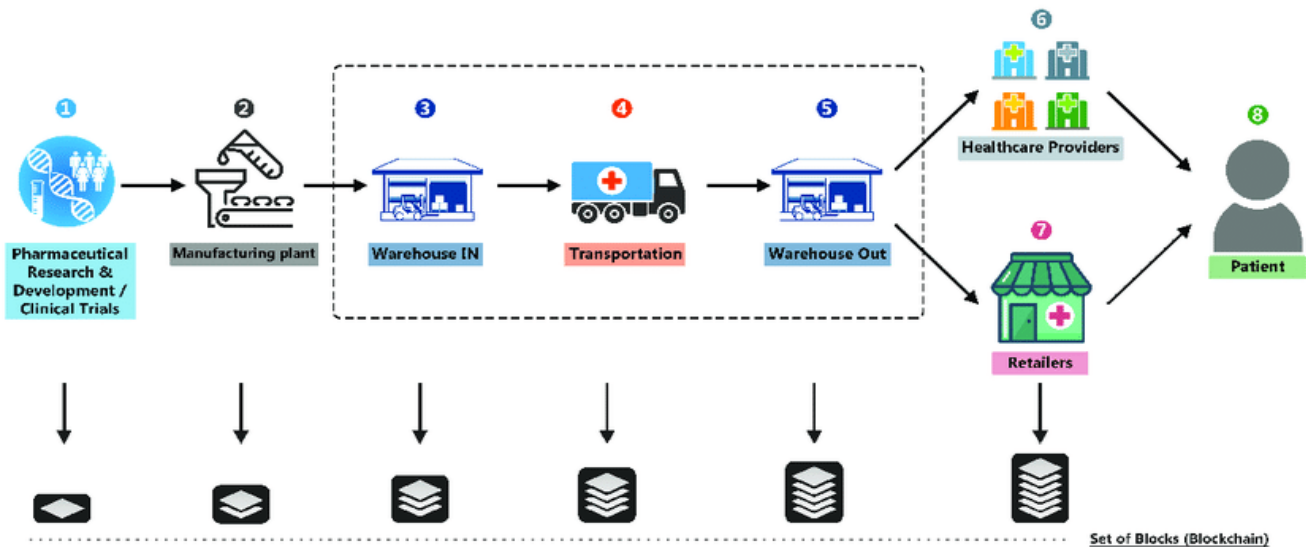
Supply chain is the entire process of making and selling commercial goods. The chain begins with procurement of raw materials and ends with distribution and sale or delivery. Efficiently managing the supply chain is very important to successfully run a business. Managing the supply chain is complex as there are many elements that make up the supply chain; from manufacturing sites and warehouses to transportation, inventory management and order fulfilments.

Every step of the process has numerous risks and issues tagged with it, that could be serious enough to disrupt the whole system. Minimising delay, regularising the delivery time, the wait-time of the inventory before the order dispatch process are all points that can have huge impacts on the operation. Without an optimised Supply Chain Management (SCM) process in place, the chain can collapse.

There is no end to speculations on optimising the supply chain as the demands for goods rise with the expectation for prompt delivery.

Blockchain to the Aid

Adoption of blockchain technology can significantly mitigate the problems faced by the supply chain today. There are many ways in which the blockchain can redress the challenges of supply chain.



Source: Research Gate

- **Advanced Traceability:**

Adaptation of blockchain technology enables improved traceability within the supply chain; by producing a fully auditable trail of all items flowing through the network. Coupled with IoT-based devices, such as RFID technology, a blockchain-enabled supply chain can automatically collect the item-level data of massive quantities of products in real-time. Additionally, this information is associated with timestamps and collection locations to form an audit trail that is complete, accurate, and easy-to-access, from the product's origin to the customer. Furthermore, thanks to the immutability of blockchain data and the digital signatures required to confirm information ownership, data stored in this chain offers a secure and full history of any item in the entire supply chain.

- **Improved Transparency:**

Blockchain technology facilitates reliable identity management in the supply chain by enabling all participants to have an updated knowledge regarding the functions, time and location of one another. This information is stored and shared in distributed ledgers that can be conveniently accessed by involved and authenticated stakeholders. By integrating the digital and physical flows across the supply chain, coordination between multiple actors can be achieved.

- **Boosted Efficiency:**

In one great plus of digitalization, the logically centralized data ledger is updated with local copies to all stakeholders within the network. All transactions are committed and immediately validated by all involved parties and data are automatically synchronized to each party's local copy. Blockchain technology makes it safer and faster to maintain the quality of transactions and associated data by reducing human error and eliminating the need for third-party intermediaries and for local ledger reconciliation. Finally, the autonomous and self-executing blockchain-based smart contract replaces tedious processes and improves flexibility in supply chain management.

- **Greater Security:**

Blockchain is structured in a way that it cannot be hacked into like any centralized database. If there is an attack on a specific block then all preceding blocks in the chain's history have to be tampered with. Thus rendering it immune to hacking attacks. This inherent feature of the blockchain makes the data secure.

- **Enhanced Trust:**

The transactions of a blockchain-based supply chain are stored upon creation based on peer-to-peer interaction that can be trusted by the associated digital signatures. On top of that, a reliable identity management mechanism records and verifies the collection of time, location, and other data at every action on a product in the supply chain. All data are synchronized to all stakeholders in real-time, which enhance trust among stakeholders within the supply chain network.



- **Easy Compliance:**

A blockchain-enabled supply chain network records all transactions with precise details, such as timestamps, environmental conditions, and location. These accurate, tamper-proof records can serve as the source of a business's data integrity and be easily accessed for regulations and compliance.

A blockchain-driven supply chain network records all transactions with precise details, including the timestamp, environmental conditions and location. These accurate and tamper-resistant records contribute towards the business' data integrity and can be easily accessed for regulations and compliance.

It can be confidently concluded that blockchain has a long and promising future in the supply chain. It has verifiable capacity to adhere to the promises made in its underlying architecture. It is fully capable of building and sustaining transparent, collaborative network organization and securely share and transmit data across a variety of supply chain sectors and processes. This technology allows businesses to build a more flexible and responsible supply chain, and to robustly address new external and internal challenges.