

# Shipcoin- Blockchain Technology in Shipping Industry

Ranjith Menon D<sup>a</sup>, Sundhesh M Nagesh<sup>b</sup>, Tanmay C Kalyankar<sup>c</sup>

<sup>a</sup>The Great Eastern Institute of Maritime Studies, Lonavala,  
[ranjithmenonnn@gmail.com](mailto:ranjithmenonnn@gmail.com)

<sup>b</sup>The Great Eastern Institute of Maritime Studies, Lonavala,  
[sundheshm24@gmail.com](mailto:sundheshm24@gmail.com)

<sup>c</sup>The Great Eastern Institute of Maritime Studies, Lonavala,  
[tanmaykalyankar@gmail.com](mailto:tanmaykalyankar@gmail.com)

**Abstract:** Despite the recent technological revolution, shipping still remains a traditional industry and the processes the parties follow in many cases are almost archaic. Whilst Blockchain Technology in shipping industry can simplify your transactions, data entry, by reducing physical paperwork and reduce communication time delays, added costs, and human error that plague today. Thus by connecting all parties to your company's Blockchain via the Internet of Things (IoT) to make your day-to-day task transparent, scalable and secure.

**Keywords:** Blockchain Technology, Internet of Things, Parties.

## 1. Introduction:

From generations we are so used to writing forms, invoices, letters, emails and also communicate via telephone, that any other control method seems fanciful, far-fetched even, but, not anymore. Imagine getting instant and personalized information like logistic data updates, voyage course updates, bunkering updates, emergency alerts, provision data, consumables data, seafarer's data and at the same time data processing into the company's block chain server. Meanwhile all of the foresaid being shared and recorded into your company's server which can be viewed only by those particular parties with a unique access key. They can connect to the internet to find out pretty much any piece of information and also connect to your ship and list out your logistic data, your history of voyages, crew's data, future contracts and pretty much all the piece of information both on board and while ashore. This advancement on-board ships can ease up every crew member's daily work as well as help the offshore managements to keep a track record of each and every individual vessel in its fleet.

*What is Blockchain?*

Blockchain is a distributed database that holds records of digital data or events in a way that makes them tamper-resistant. While many users may access, inspect, or add to the data, they can't change or delete it. The original information stays put, leaving a permanent and public information trail, or chain, of transactions (Investopedia).

Think of it like this: If the entire blockchain were the history of all the fleet’s logistical and functional/operational/service/maintenance data, an individual vessels data would be a single “block” in the chain. Unlike most shipping companies, however, there is no single organization that controls the entire vessels logistic, operation or maintenance. It can only be updated through consensus of a majority of participants in the system (Re/code).

In short, blockchain is a record-keeping mechanism that makes it easier and safer for businesses to work together over the internet.

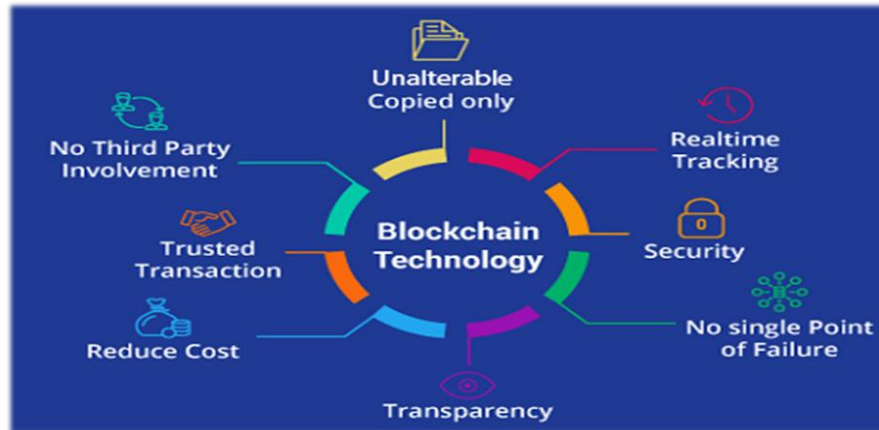


Fig 1. Why Blockchain Technology?

❖ *What is Internet of Things(IoT)?*

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction

**2. Main work**

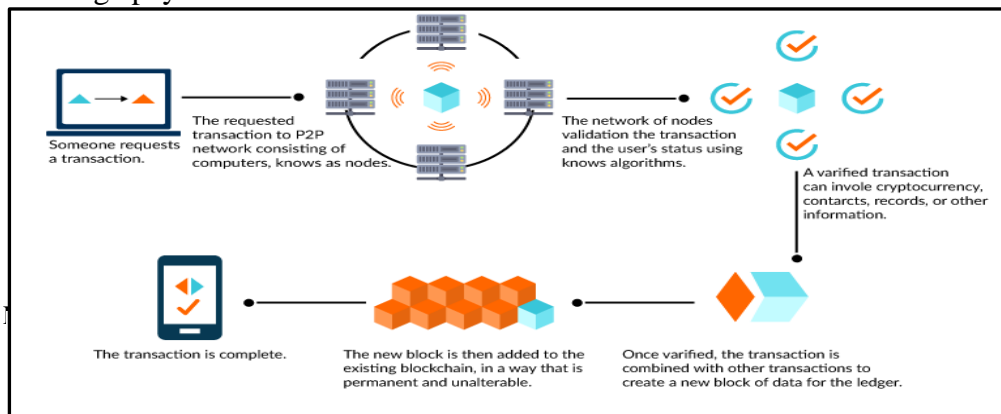
*2.1 How will Blockchain Technology Affect the Supply Chain?*

Currently, most of the shipping transactions involve a big number of papers, such as sales contracts, charter party agreements, bills of lading, port documents, letters of credit and others related with the vessel and the cargo. All these documents may need to pass through a long chain of parties since their importance remains high both for various payments to be effected as well as the carriage and delivery of the cargo to take place. Look, for example, into the bills of lading and the long way they follow: Starting from the shippers at load port, they pass through several banks until they reach the receiver. This procedure can be so lengthy and time-consuming that it is very common the vessels to arrive at the discharge port before the bills of lading.

In an effort to simplify the current procedures. The shipping industry has been inspired by the way that the bitcoin payment system works, namely – “Blockchain”. The bitcoin, which was introduced in October 2008 by Satoshi Nakamoto, was the first digital currency/ payment system that brought the revolution to the financial markets. Blockchain tech is based on open-source peer-to-peer software which is totally decentralized and the management of all transactions or the issuing of new currencies is taking place collectively by the network.

For the management of all these transactions, the Bitcoin or any similar software uses a chain of blocks which is cryptographically secured and which is used as a public ledger that records all the bitcoin transactions; this is the “blockchain”. Each of these blocks include a timestamp and a link to the previous block of the chain and the transaction is processed only after several confirmations of the network, so as to ensure that every transaction follows the rules of the network. After the information is stored in the block, it cannot change or be deleted unless the subsequent blocks are also changed and the majority of the network accepts the change/deletion. Therefore, user’s interference in the blockchain looks impossible and the system becomes completely waterproofed.

Blockchain technology was initially used to enable trusted financial transactions between the parties without the need for any intermediary, such as a bank. The use of blockchain, as a secured, decentralized and encrypted public ledger, could be used in various applications in shipping and bring a revolution on the way the trade is performed, almost similar to the evolution that Open Sea brought in the industry on the way that ship chartering takes place. Blockchain could turn the whole processes into a paperless paradise by which all the related parties in each transaction (i.e. sellers/buyers of cargo, ship owner, charterer, banks, agents, customs, port authorities etc.) with the use of public and private keys could come in contact with each other, perform physical transactions, exchange and store information in encrypted format and perform their contractual obligations, give and accept instructions and securely exchange payments.



### MARKET SIZE IN OTHER SECTORS (in USD)

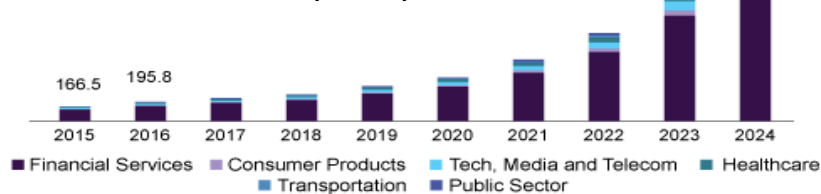


Fig 3. Blockchain Technology in other sectors

If blockchain technology allows us to more securely and transparently track all types of organizational data and operation, imagine the possibilities it presents across the supply chain. Every time an action is taken on board or a decision is made offshore, the action could be documented, creating a permanent history of all the actions or changes made, from **onboard to** offshore management.

This could dramatically reduce communication time delays, added costs, and human error that plague today.

Some supply chains are already using the technology, and experts suggest blockchain could become a universal “supply chain operating system” before long.

Consider how this technology could improve the following tasks:

- *Recording* the quantity and transfer of assets—like pallets, trailers, containers, etc.—as they move between supply chain nodes (Talking Logistics).
- *Tracking* purchase orders, change orders, receipts, shipment notifications, or other trade-related documents.
- *Assigning or verifying certifications* or certain properties of physical products; for example determining if a food product is organic or fair trade (Provenance).
- *Linking* physical goods to serial numbers, bar codes, digital tags like RFID, etc.
- *Sharing information* about utilizing shop spares, assembly, delivery, and maintenance of products with suppliers and vendors.



Fig 4. Ship and parties connected

#### *Smart Contracts by Blockchain Technology:*

Except of its use as a public ledger, one of the biggest revolutions that the blockchain could bring in the shipping industry is the “smart contracts”.

These are contracts in the form of a computer program which is run and self-executed in blockchain and which shall automatically implement the terms and conditions of any agreement between the parties. These charter-party and bill of lading terms and conditions will be standard part of the software and will not be able to change by the parties. This way, we are moving to a digital market where a contract will be published by the Owner or the Charterer and the other party will negotiate the price/freight directly via the blockchain network.

The smart contracts will be executed by a computer network that uses consensus protocols to determine the sequence of actions which result from the contract’s code and this way to automate calculations, approvals and other transacting activities. Before the use of blockchain, this type of smart contract was impossible to happen because parties to an agreement would maintain separate databases. With a shared database that runs a blockchain protocol, the

smart contracts auto-execute, and all parties validate the outcome instantaneously, without wasting time on further exchanges and without the need for a third-party intermediary.

#### *Chartering by Blockchain Technology:*

A digital chartering marketplace can provide strategic operating and financially efficient benefits for charterers and vessel owners by enabling them through the blockchain platform to instantaneously identify the best possible counterparty whilst utilizing the least possible company resources at a significantly lower cost than the traditional chartering houses.



Fig 5. Smart Chartering by Blockchain technology

#### *Dry Docking by Blockchain Technology:*

Dry Dock is all about, choosing a shipyard that best suits your requirements is a decision that requires evaluation of multiple parameters.

- Trading Area.
- Cost.
- Time.
- Safety record.
- Technical Ability.
- Local infrastructure.
- Financial situation.
- Weather/season in the area.
- Operational restriction- tide.

All this above fore said actions and decisions can be incorporated in blocks and thus, the ship management can plan the dry dock according to their feasibility. This will eventually reduce the over stay charges or delay charges also schedule or reschedule any dry dock, hassle free.

#### *Major Advantages:*

Adapting a blockchain technology, such as the Smart Contracts, could have the following advantages for the shipping industry.

- *Quick processing time and real-time updates:* Instead of mailing the documents to various parties, the exchange of information can become instantly and procedures which currently take weeks to be completed even within a few minutes. The software code of blockchain will also automate tasks that are typically accomplished manually.
- *Higher accuracy:* Since all the execution of contracts and other processes are automated, the errors are much less possible.

- *Full Transparency:* The information is stored in a place where everyone can have access provided that he has the required access key. This gives full transparency to market participants and also the counter-party risk is easier evaluated when anyone can have access to the transactions previously performed by each party.
- *Increased security:* All information is encrypted, something which adds security by its own. Also, the fact that the users can not interfere with the system and change the information stored in the blockchain protects the market from fraudulent activities and various documentary manipulations.
- *Cost Saving:* A big part of the trade financing costs is related to documentation, procedural delays, discrepancies or errors. These costs can be omitted and total cost currently spent to various intermediaries will be avoided and replaced by a much cheaper cost of the blockchain.
- *Easier access to the market:* Everyone can have access to the blockchain technology and therefore the entry barriers will be less and the market will become more competitive. Furthermore, the parties will be able to develop direct communication without the need of intermediaries and the overall chain will become lighter.

#### *Main Challenges:*

Notwithstanding the advantages of such a technology for the shipping industry, there are a few issues which should be addressed before a full blockchain system is established in the dry bulk and tanker shipping.

- *Special contractual terms:* The contractual terms of the ship chartering and the sale & purchase of commodities are unique and very specific. These terms should be adapted by the blockchain network which should be able to recognize, for example, what the lien is and how it works, the lay time and demurrage and their exceptions, the Notice of Readiness and when the vessel is actually considered arrived at port etc.
- *Higher flexibility:* It is very usual in shipping, the parties to come across situations where they can only solve through a commercial approach. This will not be easy to take place when the transactions are taking place through a sealed system which does not allow any interference from the parties. Furthermore, it is very usual the parties involved in a transaction to have their own contractual terms which are usually subject to the negotiation of the parties. Will it be possible in a universal system? So, the blockchain technology must be configured to include special terms and conditions at inception, otherwise the parties' liability exposure will be even higher than the liability saved by the system's use.
- *Global adoption:* The blockchain is not adapted or it is not yet allowed by all jurisdictions around the world. However, since various governments and agencies are involved around the globe, in order for such technology to be used in trading and shipping services, all these parties should be brought into a common platform and a universal adoption should be achieved.

*Recent Developments:*

The shipping industry has not yet adopted the blockchain technology and whether its traditional practices will be replaced within the next years from such a technology it remains to be seen, however the first steps have already been made:

- Earlier this year, Mercuria, a shipping and trading conglomerate, announced that they are working with their two financial institutions, ING and Societe Generale, so as to adopt a blockchain technology for its trading and shipping business. According to Mercuria, the current process followed in shipping is archaic and it is expected that the trading and shipping industries will be digitalized more and more within the next couple of years.
- Another large shipping company which explores the possibility of investing into the blockchain is Maersk who have commenced a cooperation with IBM in order to build a blockchain system utilized in the container market, where Maersk maintains a leading position. In this case, the blockchain will be used to manage and track the millions of shipping containers, by digitizing the supply chain process to enhance transparency and security of sharing information among the company's stakeholders. Maersk says the software is expected to be online by the end of 2017 and could save the industry billions of dollars each year.

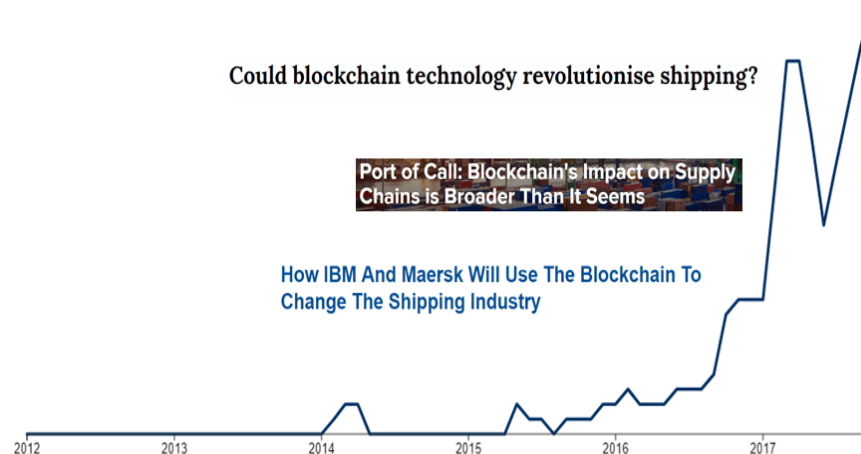


Fig 6. Stats showing IBM and MAERSK using Blockchain Technology in SCM

- *OpenSea* is a leading company in the digitalization of shipping services and they follow all the recent developments in this field so as to continue offering unique services to their clients and make the shipping industry more transparent, technologically advanced and more efficient.
- *Singular Point* is currently developing MARiS, the award-winning chartering and shipping solution, which will be blockchain enabled and launched in Geneva on September 20th, 2018. MARiS will make sure that vessel owners and trading companies benefit of the advantages coming along with the blockchain technology such as high data quality, process integrity, configurable smart contracts, lower transaction costs, empowered network, ecosystem simplification and many more.

### **3. Conclusion:**

Applying Blockchain technology in shipping industry to improve global trade and digitise the supply chain management is still a vision for some, most of the shipping companies have already started venturing it. There might be various obstructing aspects in implementing this technology and globalizing it, but initially every technology faces a setback and gradually over a period of time gets recognized and adopted. To conclude Blockchain technology is transparent thus decentralized power, it is open to all parties hence it is a Public ledger, it is one of the safest mode in transactions and data sharing thus immutable to hacks. Though initial investment is high the instant future returns can be reaped.

### **Acknowledgement:**

Thanks to our Principal, Capt. A.P.Sethi, Vice Principal Capt. Philip John, course in charge Mr. Mukund Joglekar, also Mr. Sardool Singh and Capt. Rakesh Kumar, IT instructor and all engineering Faculty, in investing their valuable time in the compilation of this paper. Thanks to Mrs. Meena Ravi Shankar, soft skills trainer, for the persistent assistance and backup given while preparing our paper.

### **References:**

1. <https://opensea.pro/blog/blockchain-for-shipping-industry>
2. <https://www.youtube.com/watch?v=jKYhLpHJv8U>
3. <https://www.marineinsight.com/shipping-news/blockchain-technology-in-the-shipping-industry/>
4. <https://www.xenonstack.com/blog/devops/blockchain-technology-decentralized-applications/>
5. <https://blockgeeks.com/guides/what-is-blockchain-technology/>