

BLOCKCHAIN POWERED IMPORTS PROCESS

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Abstract: The purpose of this document is to study how blockchain framework can offer an effective cost savings and efficiency gains in one of the complex processes in supply chain management - Imports procurement. The typical Imports process involves the participation of multiple groups (Commercial, financial, government and legal entities) with cross-border material flow. It also involves handling of extensive documentation. Because of this complexity, business is faced with frequent issues of delays in receiving material, heavy demurrage charges, loss/misplacement of documents, miscommunication and often mistrust among the partners. For this scenario, Blockchain technology capabilities are analyzed with an eye on how business can leverage the immense potentiality of this technology to enhance efficiency and value.

Index Terms – Blockchain Technology, Distributed Ledger, Imports

I. INTRODUCTION

The concept of Blockchain is hailed as one of the most revolutionary innovations of recent times. The hallmark of this concept is the benefits it provides like allowing mutually mistrusting entities to exchange financial value, providing a secured data storage, process transparency and immutability of records.

A Blockchain is basically a digital distributed ledger and this distributed ledger is a database of transactions that is shared and synchronized across multiple computers and locations – without centralized control.

Each party in a Blockchain owns an identical copy of the record, which is automatically updated as soon as any additions are made.

The transactions in this ledger are recorded in a series of blocks and multiple copies of ledger exists to multiple computers (nodes). This is highly secured as each new block is linked to previous blocks and tampering of data is virtually not possible. The digital ledger of Blockchain contains the database records of transactions carried out by the different participating parties. Each transaction is time stamped and verified by the authorized participants ensuring trust. A Blockchain is made up of chain of blocks. Each block contains information like transaction performed, amounts and parties involved. So all previous blocks from current one to the initial block can be accessed which provides the history of all assets and transactions executed. This facilitates authenticity by checking with various users that their copy of the blockchain matches with all of the others.

The blocks cannot be modified or deleted. The tampering of information is also virtually eliminated as all the blocks are linked to one another.

Another benefit a Blockchain provides is "Smart Contracts". A smart contract is a programmable code which can trigger actions when a predefined condition are met or not met. This will greatly automate the process to bring efficiency in supply chain.

With the advent of this concept many use cases have been shown in the areas of financial services, Insurance, supply chain management, transportation etc., to prove the potentiality of this emerging technology.

In any industry, supply chain management is a crucial and complex process with inherent high uncertainties and involving planning, communication and massive coordination with different groups. Unless right information, transparency and trust among the different groups are ensured, customer satisfaction cannot be guaranteed.

The supply chain management is also an area where it heavily relies on physical documents, tracking and tracing issues and ever-increasing costs. Since different parties are involved, there is always a possibility of an element of mistrust.

Almost all the above complexities can be found in imports procurement process. There are multiple players involved in the chain like importer, exporter, financial institutes, customs, on land freight forwarders, brokers, ports and ocean freight carriers.

In international trade scenarios, the costs associated with trade documentation processing and administration are estimated to be up to one-fifth the actual physical transportation costs.

For example, in 2014, Maersk found that just a simple shipment of refrigerated goods from East Africa to Europe can go through nearly 30 people and organizations, including more than 200 different interactions and communications among them.

Blockchain has the potential and capability to digitize the process to collaborate across companies and authorities, reduce the paperwork, streamline cross border movements, and reduce fraud and errors.

II. RESEARCH METHODOLOGY

The analysis is carried out in 4 steps: 1. The theoretical framework of Blockchain 2. Current Imports procurement process 3. Challenges in the Current process 4. Blockchain powered Imports procurement 5. Benefits. The details are as follows;

2.1 Theoretical Framework of Blockchain Technology

A Blockchain is basically a digital distributed ledger and this distributed ledger is a database of transactions that is shared and synchronized across multiple computers and locations – without centralized control.

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Blockchain Technology provides a reliable and difficult to hack records of transactions. The main features are:

- Consensus: All parties should agree to network and verified transactions
- Immutability: Anything written on ledger cannot be modified or deleted.
- Provenance: Records that can be tracked to original source.
- Privacy: Permissions and identity ensure appropriate visibility of transactions

There are currently four types of Blockchain networks and the details of application suitability are given below:

Type	Usage
Consortium blockchains	These are permissioned Blockchains where a selected group controls consensus process with the right to read the blockchain and submit transactions. This type is best suited for Business
Semi-private blockchains	These blockchains are run by a single company and access is given to any user who satisfies pre-established criteria. Although not truly decentralized, this type of permissioned blockchain is appealing for business-to-business use cases and government applications
Private blockchains	These are 100% centralized and controlled by a single organization. Useful as a sandbox environment and not for production
Public blockchains	Anyone can read a public blockchain, send transactions to it, or participate in the consensus process. They are “permission less.” Every transaction is public, and users can remain anonymous. Bitcoin and Ethereum are prominent examples of public blockchains.

2.2 Imports Procurement Process

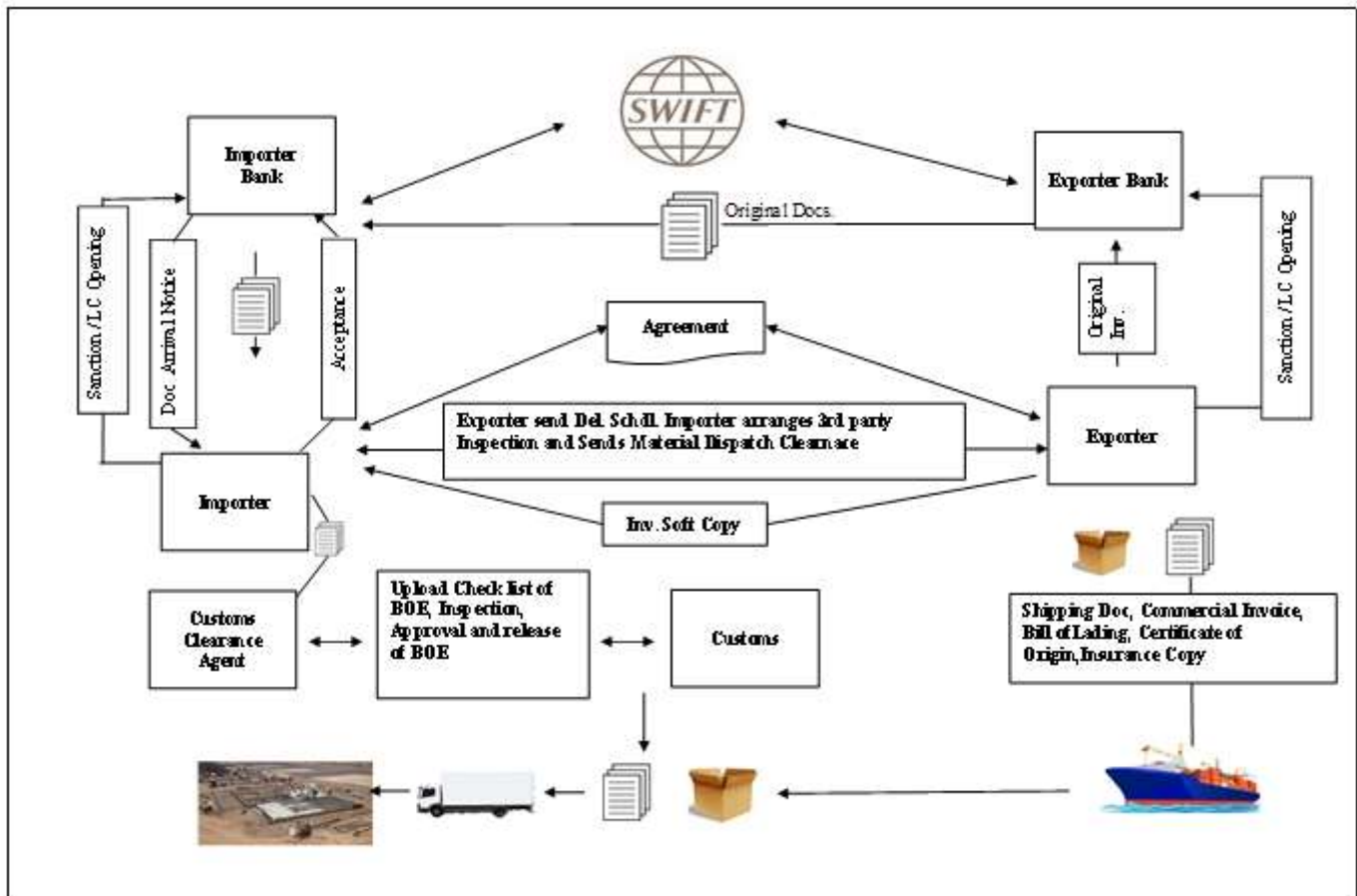
A business example from a Renewable Energy sector is presented here to analyze the process and ascertain the challenges in the process so that a comparative study can be made when the same process is implemented on blockchain.

In this scenario items like PV Module, Inverter and required spares are imported from China to India and the process flow is as below:

Process Steps:

1. Purchase Order (Agreement) will be released by Importer after negotiating all the commercial terms and conditions.
2. Importer approaches Bank for LC approval with Importer Exporter code, Agreement, Exporter details and Exporter Bank details
3. The interaction of Importer Bank and Exporter Bank takes place via SWIFT and LC opening takes place.
4. Exporter sends delivery schedule and as per that a third-party inspection or inspection from quality team of Importer at Exporter site will be done.
5. Once the lot is cleared, Exporter will send a Check list of Bill of Entry. The Importer will check and gives clearance to dispatch the material by sending Material dispatch certificate.
6. Material will be shipped to Exporter and all original documents (Shipping Doc, Commercial Invoice, Bill of lading, Certificate of Origin etc.,) will be sent to Exporter Bank and soft copies to Importer.
7. Exporter Bank will verify and courier the documents to Importer Bank and informs the message through SWIFT.
8. Once the documents are arrived, Importer Bank will send a Document Arrival Notice to Importer.
9. Importer verifies and sends an acceptance letter to Importer Bank and Importer receives original documents and these documents after endorsement by Importer Bank will be forwarded to Customs clearance agent.
10. Custom Clearance Agent of the Importer will Upload check list of Bill of Entry in Customs IDPMS (Import data processing & monitoring) system
11. Once the cargo arrives in port, carrier of goods files Import General Manifest (IGM) with customs department. This number will be automatically linked with the already uploaded bill of entry in customs web portal.
12. The inspection is carried out under the supervision of necessary customs officials and enters examination report in the system. Once approving the inspection report by concerned officer, bill is ‘passed out of customs’ for delivery after payment of applicable Duties.
13. Prints of processed bill of entry are generated and customs officer signs physically on the said bill of entry.
14. The custodian of cargo delivers cargo to the authorized Custom clearance Agent of the Importer who will move the cargo to project Site.
15. Material will be received at stores of Project site after gate entry. Material will be inspected and counted, and Goods receipt will be done.
16. Empty Container will be sent back.

17. BOE- Reference numbers pertaining to value of LC opened by Importer is summarized and given to Importer.
18. Importer Bank knocks off the BOEs with Customs IDPMS online database as a part of Import proof from RBI side.



2.2 Challenges in the Imports Procurement process

The challenges encountered in the above process are:

1. **Physical Documentation:** A lot of physical documents like purchase order, importer information, importer bank information, inspection documents, vendor bank information, shipping documents, invoices, BOL, insurance, bill of entry etc., are generated and handled at various stages. This will increase document handling costs and delays in the case of missing documents which are very common.
2. **Container Tracking:** Due to project deadlines and heavy demurrage charges, the status of container from the point of Ex-works to the point of reaching the project site needs to be monitored on continuous basis. This needs a lot of coordination and communication with the different parties in the supply chain.
3. **Delay in receiving original Documents:** The procedure of processing of documents is complex requiring verification and stamping at different stages. It also involves international and local couriers as original documents need to move physically to different entities. There are procedural and verification delays also. The time window for original documents from exporter bank to importer bank 1 to 2 weeks and another 2 to 3 days from importer bank to importer. It is also observed that these delays also caused demurrage charges.
4. **Transparency:** Low visibility of the process from end-to-end leading to lot of coordination and communication. Information is shared through mails, documents and phones. There is no instantaneous information available to any stakeholder.
5. **Fragmented Data;** The data is captured at different stages by different groups on different systems. Any information need requires consolidating and validating data from different sources leading to delays and mistrust.
6. **Too much coordination:** Lot of follow up required for documents, information and knowing status of the consignment. Since different groups of different categories are present in the process, there is no common tool to monitor the progress and status. Each needs to coordinate with other as there is no transparency. There is no automatic alert mechanism, if something goes wrong.

7. Difficulties in tracking & tracing material: Any reconciliation activity will become tedious and time consuming because of non-availability of data at one place. Any counting discrepancies, damages, quality issues or material returns will become cumbersome.

2.3 Procurement of Import Materials on Blockchain

2.3.1 Selection of Blockchain Type

As per the discussion in 2.4, a private permissioned blockchain can be selected. The different entities on the blockchain can be operated on different nodes which can be either managed by importer by allocating required authorizations.

But in future, it is likely that shipping companies and government regulators are expected to manage their own nodes.

2.3.2 Elimination of Intermediaries

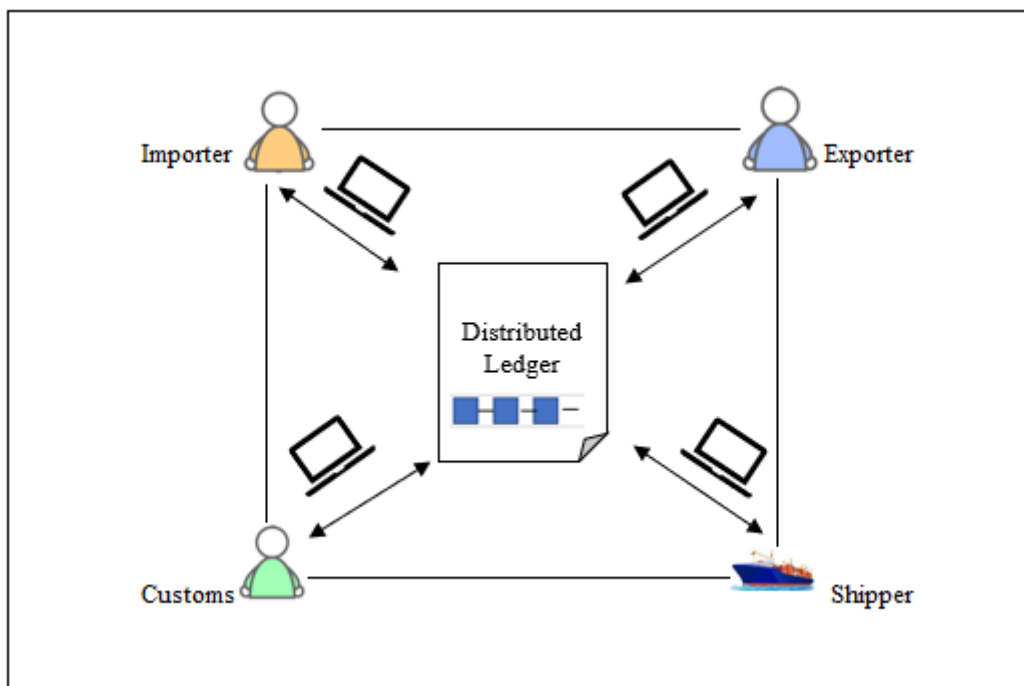
The disruptive element of Blockchain is crypto currency. If cryptocurrency is used, the need for intermediaries like Banks can be eliminated. But, there are many legal and government regulatory laws which are coming in way for the adoption of crypto currency. However, many of the obstacles, limitations and aversions may change progressively for better with more and more successful user cases and implementations.

2.3.3 Blockchain-based Imports process

In the proposed scenario, the necessity of the presence of Banks are eliminated as Blockchain provides the Trust factor in the form of transparency and immutability. As per the agreement, which can be referred in Blockchain Exporter will dispatch and handovers the material to shipper. All the relevant digitalized information will be available in Blockchain. The Customs can also check the necessary information and give clearance which will be captured by Blockchain.

In addition, all the data related to inspection, serial numbers, batch numbers etc., will also be available. Smart contracts, which are one of the components of Blockchain can also be utilized to use as a monitoring and alerting mechanism whenever the pre-defined conditions are not met.

When all the entities collaborate on blockchain, the scenario will look like as below:



III. RESULTS AND DISCUSSION

3.1 Benefits

The high-level benefits are summarized below:

- Elimination of physical documents: Handling of physical documents is a major issue in transportation. Misplacement of documents lead to delays and sometimes hefty demurrage charges. There is no need to courier the documents from one point to another as multiple stakeholders are involved.
- Instantaneous Information: Real time information is available to all the parties. The status of the Material movement and approvals can be viewed instantaneously.
- Transparency: Entire process will be transparent. No record can be modified or deleted.
- Elimination of Intermediaries: Intermediaries act as trust agents. Because of the in-built trust by way of transparency and immutability of Blockchain technology, the necessity of having Intermediaries is eliminated.
- Increasing the scope of Accounting: Blockchain Technology has potential to enhance the accounting and auditing professions by reducing the costs of maintaining and reconciling of ledgers, providing certainty of ownership of assets

and its history. It can also automate the transaction-level accounting done by the accountants, thereby increasing the scope of accounting

The detailed benefit for each process is provided below:

Scenario	As Is Process	Blockchain Advantage
Purchase Order creation	<ul style="list-style-type: none"> PO creation takes place in ERP and mailed to Exporter. PO follow up needs high level of manual intervention. 	<ul style="list-style-type: none"> Central digital copy available for reference. Smart Contract functionality can take care of monitoring partial deliveries through a workflow system.
LC opening and communication between Import and Export Banks	<ul style="list-style-type: none"> Required Documents like Agreement, Export Bank details, Exporter details etc., needs to be submitted in physical form. SWIFT (Society for Worldwide Interbank Financial Telecommunications) system is used as messaging network between Banks. 	Cryptocurrency can eliminate the requirement of Banks as the providers of Trust.
Shipping of consignment	<ul style="list-style-type: none"> Original documents will be handed over to Export Bank by the exporter. Exporter Bank will verify the documents and a lot of delays observed because of pending queue documents of other Exporters. Verified Documents will be sent by Courier to Importer Bank enhancing further the lead time. Importer Bank generates Document Arrival Notice Importer will send Acceptance letter. Import Bank releases Original Document Due to unnecessary lengthy process, sometimes the lead time of receiving documents can be more than the lead time of consignment reaching the port which leads to heavy demurrage costs. 	<ul style="list-style-type: none"> All digital copies available and required release procedures can be handled online to eliminate delays.
Cargo	<ul style="list-style-type: none"> Cumbersome handling of Documents Extensive coordination for tracking of Container 	<p>Digital documents availability which prevents the cost of documents handling and loss of documents.</p> <p>Entire cargo movement right from Exporter port to reaching project site can be tracked on Blockchain.</p>

		This will ensure pre-planning of container clearance to avoid high demurrage costs.
Customs clearance	<ul style="list-style-type: none"> • Uploading of check list Bill of Entry into customs portal • Submission of original documents • Physical generation and stamping of BOE 	Availability of Digital copies will greatly reduce delays.
Receiving Container at Site	Receipt done in ERP system and information shared via Mail	Information accessible to all parties instantaneously
Return Empty Container	Container movement information needs to be shared with manual intervention.	Empty container movement can be tracked by all the concerned parties on a Blockchain.

3.2 Challenges

- The blockchain technology is still in nascent stage. Though many use cases across the industry have come up, they are still on testing phase.
- There is still resistance from some quarters as governance and legal frameworks have yet to be evolved.
- Clarity, confidence and new way of thinking and adaptability required in case of Security and controls.
- As technology is new, technical expertise is also rare.

IV.CONCLUSION

Blockchain is an ideal solution to ensure accuracy and security for import materials procurement as it is the foundation for building transactional applications that establishes trust and transparency among multiple groups involved in the process, while also streamlining business processes across geographical boundaries.

The digitization of the process through Blockchain to collaborate across companies and authorities, reduce the paperwork, streamline cross boarder movements, and reduce fraud and errors. Blockchain has the potential to do this and can also help enable the management to track shipping containers.

The resistance for participating in blockchain by the entities is less likely as many of the entities involved in the import process are also embarking on blockchain innovation journey by investing on large scale and carrying test runs. For example, the Danish shipping giant Maersk completed its first live blockchain trial in Feb 2017, in partnership with IBM using Hyperledger's open-source Fabric blockchain, the shipment in mid-February, took two weeks to move from Rotterdam to the port of Newark in New Jersey, passing through US customs and other agencies along the way.

Even SWIFT (The Society for worldwide interbank financial telecommunication), one of the largest messaging network for financial institutes has a road map to go into blockchain in third phase of development of its product SWIFT gpi (global payment innovation). Currently SWIFT gpi is on first phase. So in the near future most of the entities can manage their own nodes on blockchain

Together with other complementary technologies like IOT, RFID etc., blockchain can further enhance value proposition and can provide solutions for the issues plaguing for a long time.

V. ACKNOWLEDGMENT

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