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CAPITALIZING ON BLOCKCHAIN'S POTENTIAL AND BENEFITS IN THE SUPPLY CHAIN

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ABSTRACT

This paper investigates impact and benefits blockchain technology can brings to supply chain system. If India is looking forward to take the advantage of this growing opportunity in logistic & supply chain, the urgent need is to recalibrate itself towards getting more organized in work flow; it should tackle the security issues more efficiently and effectively; it should build more trust amongst the involved entities. There is an urgent need of a robust system which can cater to the various problems existing in the logistic & supply chain system at a single place to verify and authenticate transactions and settle various conflicts in a transparent manner which cannot be denied and can be easily verified at any time. Blockchain technology holds such promising features that can be leveraged to make supply chain system more transparent, accountable and more secure.

Keywords: Blockchain, Supply Chain, Cryptography, Smart Contracts

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INTRODUCTION

Logistic performance whether it is domestic or international plays a vital role in countries economic growth. Logistic sector is considered as one the important pillars of countries or companies economic growth.

India's logistic industry is one of the most unorganized, unsecure & less trustworthy among the entities involved for end to end delivery of items. India's logistic industry is currently estimated at around 300 billion dollar. According to recent data India's logistic market is forecasted to grow at a CAGR of 10.5% between 2019-2025. It is being identified for investment inflows and is one of the major growth drivers of the logistic industry.

If India is looking forward to take the advantage of this growing opportunity in logistic & supply chain, the urgent need is to recalibrate itself towards getting more organized in work flow; it should tackle the security issues more efficiently and effectively; it should build more trust amongst the involved entities. There is an urgent need of a robust system which can cater to the various problems existing in the logistic & supply chain system in a single place to verify and authenticate transactions and settle various conflicts in a transparent manner which cannot be denied and can be easily verified.

Whenever a technology comes into existence it's likely to disrupt the way conventional work is done, one of such technology that has evolved to disrupt the most of the industries is "Blockchain". As in recent time we have seen that digital technology redefined the way industries work and blockchain has become one of such most shouted technologies which have the potential to disrupt industries in all verticals.

It comes as no surprise that some logistics experts consider Blockchain to offer "tremendous potential" (O'Marah 2017), which is going to be a "much-required platform for economic recalibrationl" (Casey & Wong 2017), and to "reorient the supply chain and disrupt the way we produce, market, purchase and consume our goods" (Dickson 2016). Considering this all together, we can say Blockchain might be nothing less than the "holy grail" (Popper & Lohr 2017).

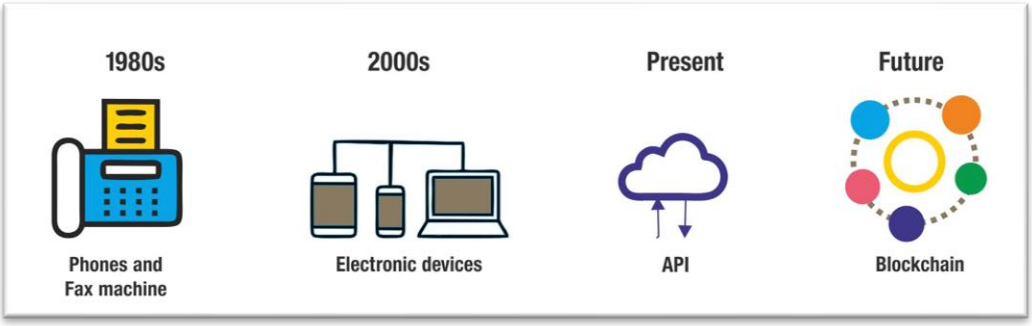

Figure 1: Past present and future communication approaches

Pain Points of Today's Supply Chain:

If we look into today's supply chain it has grown into very sophisticated, and it put a great impact on the competitiveness of companies to be considered. There are inherent risks in supply chain associated to interlinked nature of the ecosystem.

There are various internal and external factors that bring risk into the supply chains. With increasing complexity of global supply chains system the efficiency of supply chain is of a great concern.

Margin Loss Due to Sudden Demand Changes:

With rapidly changing market demand and working environment requires business to quickly respond to sudden demand of the business. Globalization has brought fiercer competition to capture the margin share.

Cumulative Effect Due to Connected Value Chain:

Due to complex and sophisticated supply chains companies are facing tremendous risks at several layers of stake holders which include producers, suppliers, distributors and customers.

Ineffective Risk Management in Supply Chain:

To manage effective supply chain risk management programs are built to accurately monitor as well predict risk associated to with supply chain management system.

Absence of End-T-End Visibility:

Companies find it very difficult to actually have a clear view of their supply chains, either internally or externally. This leads to various kind of losses from fraud, violation of contracts and many more.

Outdated Technologies:

Global opportunities brings more complex working system to interface with each other at various level of supply chain and thus this demand a advanced supply chain management tools and system.

Working Principle of Blockchain Technology

Blockchain is a distributed, decentralizes, permission or permission less digital ledger of transaction which cannot be tampered and can be used to transform various business operations due to the use of cryptographic methods (Pilkington 2016). The idea was first introduced by Satoshi Nakamoto (S. Nakamoto 2008) in the year 2008. The first use case of blockchain technology is well known digital currency "Bitcoin" and then after researcher across the world rushed to find various application of blockchain across the industries Blockchain has got three prominent and important properties:

Decentralized, Verified, Immutable

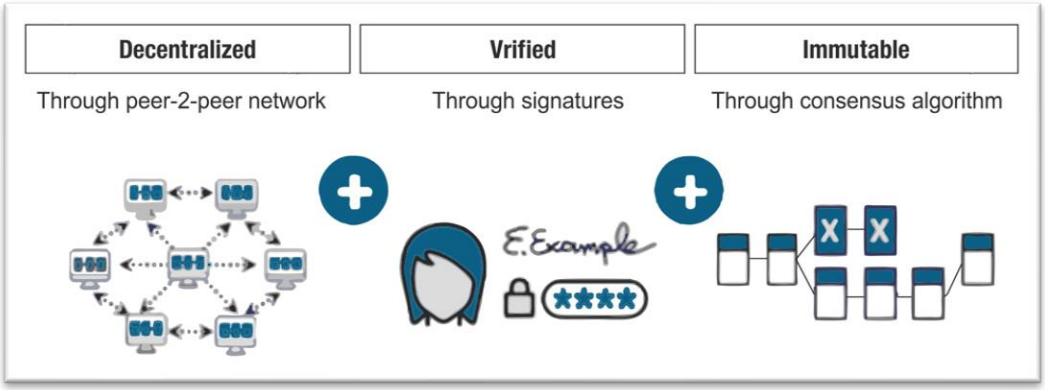

Figure 2: Three important properties of blockchain

Decentralized: It is completely a decentralized network as it is run by the members in the network which is not owned by any central authority. To add any transaction in this network, the committed transaction must be shared with the Blockchain peer-to-peer network (M. Iansiti & K. R. Lakhani). All the members in the network keep a local copy of the transaction in the local ledger.

Verified: All the transaction made in this network get verified by its member as all the members sign the transaction with their public-private-key cryptography. The member in the network stays anonymous because the keys are not connected to the real world identities.

Immutable: blockchain technology is a shared ledger that allows immutable storage of verified data (M. Pilkington 2016) through consensus algorithm means once the transaction is committed in the network and is added in the block it is almost impossible to change the committed transaction in the network.

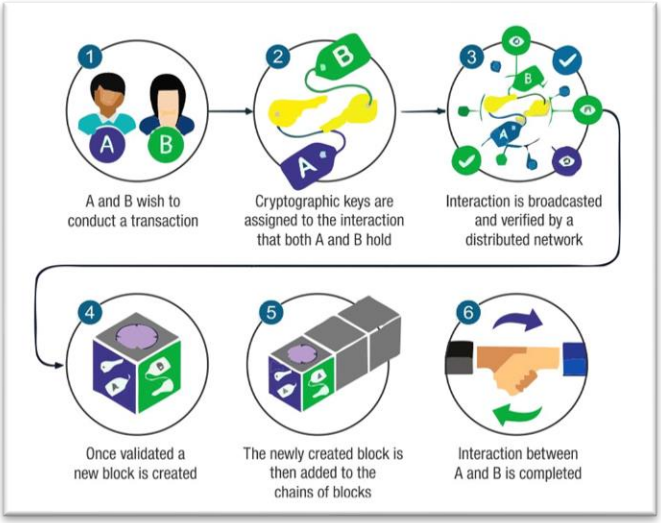

Figure 3: How a blockchain transaction works

Impact and Benefits of Blockchain in Logistics and Supply Chain Management

Blockchain technology can be applied to help global logistic & supply chain industry. The most eminent property- the shared behavior of the blockchain will allow logistic and supply chain industries to not only track their products or freight either in rail, road, air or water within their control but also across vendors participating in the transaction, thus will provide a complete 360-degree view to business stakeholders. The permission aspect of the technology on the other hand will limit the required view to authorized participants. Along with these benefits, the smart contracts capability makes blockchain more attractive to be adopted by businesses. As a new technology blockchain has clearly been embraced by the supply chain community but still there are as of yet no open standards to help ensure successful implementation.

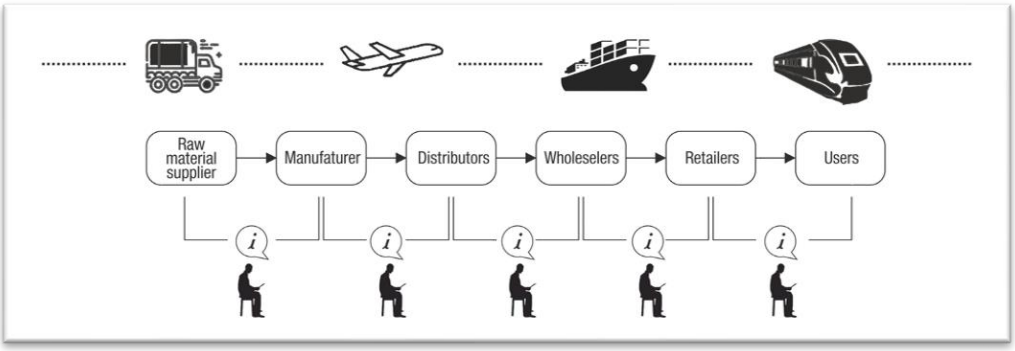

Figure 4: Traditional supply chain process

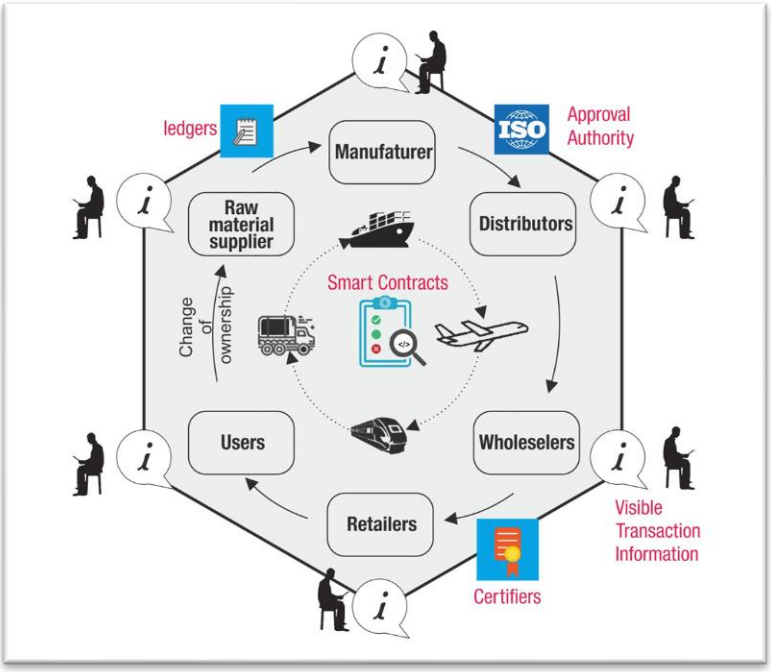

Figure 5: Blockchain enabled supply chain

There will be tremendous impact points that this technology holds in logistic and supply chain:

Trust Without Intermediate Trustee

Wherever there is a high value transaction in present day business model, like selling purchasing of house, settling any business deals and in almost all the business model there is an intermediate. The purpose of the intermediate is to help negotiate between the two party and the intermediate is one of the common trustee of both the party which in turn is get paid by both the parties for the trust. No one loves

intermediate in their business but they are very helpful. Until the arrival of blockchain technology there as only one way to which all members get agree upon truthfulness of data, such as who has what balance and who transferred what amount of many to whom is to appoint impartial intermediary to process and validate all transactions, a banking system is an example of such intermediate system. Blockchain make it possible to for any business partners to share and agree upon each other without the involvement of any intermediate. Blockchain synchronizes all the transaction and data in a network and each member verifies the transaction, thus an enormous amount of redundancy and crosschecking is dramatically reduces and this creates a trust as all the transaction can be seen and can be verified without any intermediate.

The Fundamental Logic of Blockchain Inside Supply Chain

If same sort of security and redundancy of a banking nodes applied to supply chain we will have a foundation of new approach to supply chain management system which is more trust worthy and transparent. The new way of working of supply chain at its core logic of blockchain means that an inventory cannot exist twice at the same place. A product can be easily traced from production to transit, to dealers to shop and finally to consumer and the transaction status will update for everyone, everywhere within a minutes.

Promising Advantages

The transparency offers proof about how goods go from one place to another and how they comply with regulations. Blockchain technology has brought physical, financial and digital information under one roof to reveal sources of any value leakage. Through blockchain organization will get real-time digital ledger of all the transaction and movements of goods across all the participants in their supply chain network. This will lead to saving time, money and effort on several fronts of supply chain management and this will impact how a business will be done in a redefined business model based on blockchain.

More and Better Visibility Means Greater Savings

Companies negotiate based on their total volume they procured. Business may ask other intermediate bodies to do purchasing on their behalf, but it is very difficult to track of the volume business drive across subsidiaries, various business partners and everyone else in supply chain.

Blockchain makes it simple by continuously updating digital ledger that incorporate data from all relevant partners, companies can see the total volume regardless of who did the purchase activity, while each one as to share only operational data with the others.

Without blockchain in place companies hire peoples to audit their orders to capture there volume purchases. Larger business can have tons of people spending months to audit each other to add up all the money they were supposed to receive.

Insightful Data & Analytics Means Great Outcomes

There is an oldest saying in computing “garbage in, garbage out” and this apply so strongly to supply chain management. To find out how much product or materials are there in different locations, how much demand will be there in coming period of time-companies has to put up extra inventory and that cost a lots.

With the implementation of blockchain, the supply chain system will get an ability to track and manage resources effectively & efficiently. In return the system will be leveraged with greater accuracy and thus will be able to do better forecasts. The impact will be that there will be lesser chance to maintain big inventory to get the same service level.

Transparent Digital Payments and Contracts

In a tradition method most of the companies has more than 60 days of sales outstanding. After completing the task or service this is how long it takes companies to paid off. The pain point is that all these companies in their contracts have to get paid off within the 30 days of receipt of good or services.

There is a huge gap between reality and the contracts because of the payments. Physical contracts are digitally separated from payments. This gap can be well eliminated by the application of smart contracts and thus more trust will result in better business ethics.

Smart Contracts to Terminate the Costly Procurement and Pay Gaps

Processing invoices in a system moves from table to table and takes tremendous manual authentication, once contracts gets validation then the finance depart again has to go through tedious task of financial approval and finally get approved for the disbursement.

Using smart contracts, as soon as there is proof of delivery from vendors or logistic carrier will immediately automatically trigger digital invoicing and payments through the banking system with almost no gap between customer and supplier. It has a great impact on the working capital requirements and will greatly simplify the finance operations.

An End to The Miscreant

Blockchain will give these supply chain a networks to shared truth without making any entity having all powers, with centralized intermediary. Each party will have a copy of their ledger and tll the transaction and the goods movement will be recorded in the ledger. If any party tries to fraud by manipulating their ledger will be immediately caught and will be thrown out of the system. So we can say a powerful deterrent to bad practices.

CONCLUSION

This paper investigated the impact of blockchain technology at different verticals of supply chain ecosystem. This paper gives a brief overview that if supply chain system is integrated with the features of blockchain technology; all the verticals of the chain can leveraged the benefits of security, better visibility of goods and transactions and can enjoy the financial benefits. Further work can be included to develop blockchain platform where supply chain system can connect with their existing system with least modification.

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