BLOCKCHAIN AND ERP: IMPACT ON SUPPLY CHAIN

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Abstract: This study uses interview method to investigate benefits of block chain on supply chain performance and how block chain is going to impact existing ERPs in the industry. The finding suggest that Blockchain can benefits supply chain in many ways and can work as additive technology along with ERP to improve transparency/visibility across end to end supply chain. The insight gained from this paper not only help academicians, researchers understand how block chain can work along with ERP to improve supply chain efficiency but also guide supply chain professionals to understand impact of blockchain on supply chain and how it can work as ERP of their internal ERPs.

Keywords: Blockchain, Supply Chain, ERP, End to end supply chain transparency

Introduction:

There is no doubting the fact that Enterprise Resource Planning (ERP) is an Elephant in the industry and a one stop solution for all of today's supply chain problems. Deployment of ERP helps supply Chain in planning, decision making, execution and increasing the overall performance of the firm which further results in greater competitive advantage. But currently what we know about our supply chain is limited to our vendors and customers i.e. sources from where we are buying our products and people / agencies to whom we are selling our product i.e. can excel with in a well-defined boundary.

Despite all its benefits, ERP still does not achieve some of the major objectives of supply chain i.e. end to end visibility, collaboration and coordination among all entities which are a part of Supply Chain.

At the same time a recently hatched technology Block chain which is creating buzz in the industry and lot more said on its benefit on supply chain efficiency.

White (2017) highlights that characteristics such as openness and robustness of blockchains contribute to discussions that blockchain solutions would change social and business systems previously built on trust. Supply chains have been argued to lack transparency and

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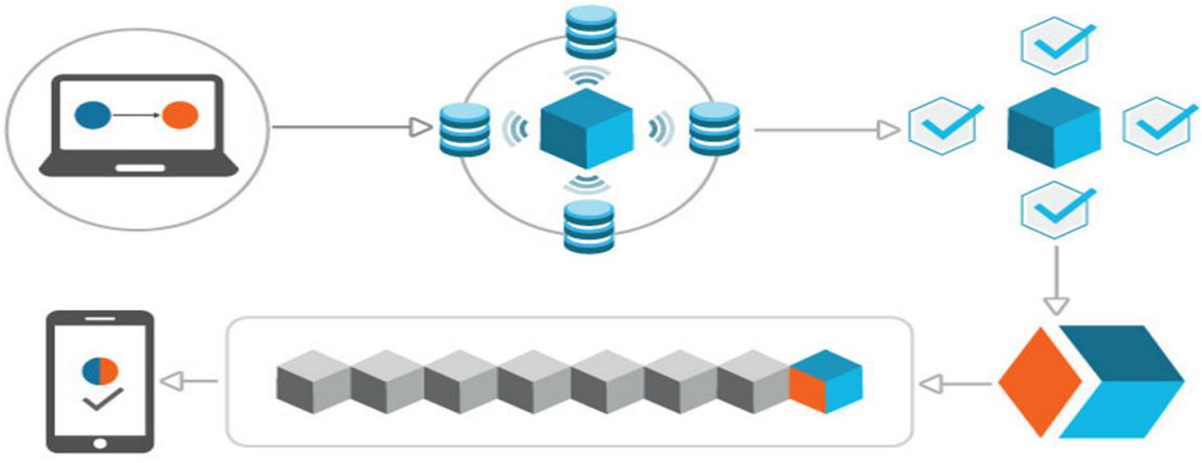
accountability due to the complexity of dealing with a large number of actors involved in the supply chain networks (Casey & Wong, 2017).

What is Blockchain?

Block chain is a decentralized database that stores a ledger of transaction across a peer to peer network. When one wants to add a transaction to the chain, all participants in the network validate this transaction and its user's status by applying an algorithm. This transaction then becomes a verified transaction and gets appended to other verified transactions and creates a new block of data for the ledger. This block then gets sent to all the nodes in the network and gets validated and then added to the existing block chain. Each successive block contains a cryptographic hash, which is unique fingerprint of the previous block.

Cryptography secures the data and new transactions are connected to the previous ones, making it near-impossible to make changes in older records without having changes in subsequent ones. And because multiple "nodes" (computers) run the blockchain network, one would need to have control of more than half of them in order to make changes. Overall, block chain technology has ability to provide greater security and lower costs than traditional databases.

Its database consists of records of two kinds: transactions and blocks. Blocks hold batches of valid transactions with a hash and encoded into a tree. Each block includes the hash of the prior block in the blockchain to link the blocks.



Source: https://antra.net/block-chain-technology/

Research Question:

This concept about ERP and Blockchain gives us the question to ponder on:

- Will blockchain be able to fulfill some of the major objectives of supply chain i.e. end to end visibility, collaboration and coordination among all entities of supply chain? If yes how?
- If Blockchain is really a recently hatched Dragon, which is going to revolutionize entire supply chain industry. Will it replace existing Elephant ERP?

Rationale:

There are many pilot projects being run by companies like:

- Maersk and IBM are working on cross-border, cross-party transactions that use blockchain technology to help improve process efficiency.
- Provenance, a UK start-up, just raised $800,000 to adapt blockchain technology to trace food. It previously piloted tracing tuna in the Southeast Asian supply chain.

These researches and pilot projects are finding block chain a platform which can improve efficiency of supply chain by increasing transparency, cost reduction over long term, faster processing, improved supply chain financials etc.

But blockchain being still in nascent stage, not much data is available in the industry. There is no clarity on its future. These pilots run to date have not proven the technology's unique value to the supply-chain sector. The cost of developing and running a blockchain is not yet clear, with few standards now in place. We need to first clearly understand what the block chain is and how it can add value to supply chain sector before mass adoption. Through this project, will try to understand blockchain and how it can contribute towards efficient supply chain. What will be effect on ERP of Blockchain? Because of absence of data availability, this project is based mostly on interview with blockchain experts and seminars on Digital Supply Chain.

Methodology: For this project exploratory descriptive research design will be used. Research design for the study is qualitative based on the primary data collected through interview of blockchain and supply chain professionals and seminars on supply chain.

Information on topic was gathered from primary sources by the means of semi-structured interviews with blockchain professionals. Interviews were being conducted face to face as all the respondents were from Mumbai. Total there were four in-depth interviews were being conducted, two from blockchain professionals, one from the field of digital operations and one from supply chain professional. Since semi-structured interviews are relatively open so each interview conducted was of an average of 2 hours. Because of blockchain being new

technology, I tried to gain deep knowledge about blockchain and their opinion of black chain's impact on supply chain and ERP.

In addition to the interviews, have attended two seminars one on SMART Logistics and second on Digital Supply Chain to get to know more about industry sentiments and acceptability towards blockchain in the field of supply chain.

The data gathered through the interviews further supplement by information acquired from secondary information sources, such as company web-pages.

Analysis:

The purpose of this chapter is to analyze findings that are generated by the information gathered during interviews and seminars being attended. The analysis has the aim to answer the research questions by explaining first the impacts of the blockchain technology on Supply chain efficiency. Will blockchain be able to fulfill some of the major objectives of supply chain i.e. end to end visibility, collaboration and coordination among all entities of supply chain?

And then answering the second question of the research i.e. would it replace existing Elephant ERP?

Blockchain and Supply Chain:

During the interview, blockchain professionals highlighted the many features of blockchain which distinguishes it with other existing technologies: decentralized system, distributed ledger, fewer third parties required, operate trustless, chronological, time stamped, immutable, digital, consensus required etc.

As per the interviews of supply chain professionals: In current era of globalization we cannot look at one's own supply chain in isolation. To achieve goal of supply chain i.e. to improve customer service level at the least possible cost requires all entities involved in supply chain to work collaboratively to improve overall supply chain performance not only their own internal supply chain. Collaboration helps companies in achieving various advantages like cost reduction, faster processing, gain agility and its success depends on commitment and engagement of different entities like vendors, vendor's vendor, manufacturer, distributor, retailer, third party service providers, customers in the supply chain.

Whereas according to IBM CSCO Survey 2013: Visibility is the keystone of Smarter Supply Chain, driving analytics & collaboration, and enabling resolution of major challenges facing today's supply chains

Further the collected answers and opinions of blockchain professionals and key issues faced by supply chain entities were being analyzed and mapped during analysis phase. Insights after mapping blockchain features with supply chain issues are summarized in the following table.

Features of Blockchain	Benefits to Supply Chain
Largest distributed peer to peer network	Can record all the transactions involved in end to end supply chain of any product or service in form of a chain. Direct information sharing without any intermediaries, which will further increase the speed of processes. Boost collaboration and coordination among all entities of Supply Chain.
Operates trustless i.e. needs consensus from all parties	Brings reliability /trust over the transactions. As transaction on blockchain can be executed only if all the parties involved in supply chain unanimously approve it. Entire system operates trustless as each party involved has the same data and has consensus over the data by all the entities involved in the chain.
Can also work as write only public ledger	Data cannot be altered i.e. increasing security
Transparency among all the entities involved in the network. Information is saved on multiple servers and is transparent to all involved participants.	Will bring end to end visibility /transparency across supply chain and stimulate collaboration. Transparency of information will further improve decision synchronization.

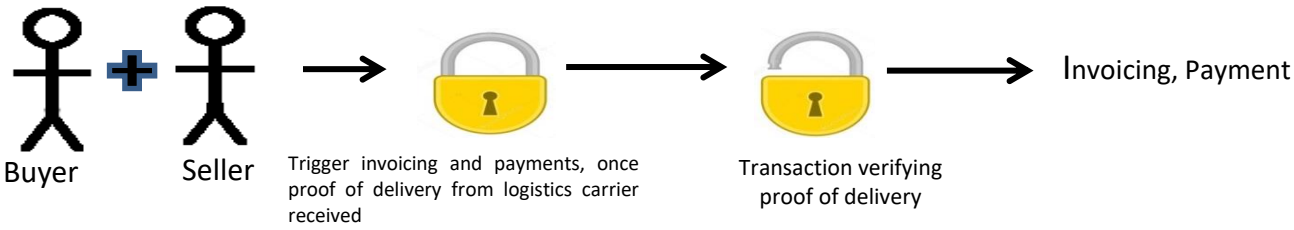
Table 1: provides all the distinguished features of Blockchain and how it can benefit supply chain

As per the analysis, blockchain can be seen as promising platform which will completely revolutionize the way we look at or deal with supply chain. It has potential to become universal supply chain operating system resulting: improved end to end supply chain visibility, increasing security, faster decision making, detecting bottleneck in the supply chain processes, boosting collaboration and coordination among all entities in supply chain.

Other than these benefits, one more feature of blockchain which can automate entire supply chain business financial operation processes is smart contract. Smart contract is a computer code containing a set of rules to which all parties involved are agreed. The agreement

automatically gets enforced once pre-defined rules are met. Wherever required in supply chain, multiple smart contracts can be set to automate digital invoicing and payment through banking system.

For example by setting a smart contract between two parties with term as payable upon goods receipt, a block containing transaction of proof of delivery from transporter or logistics carrier will immediately trigger a invoicing and payment system without any manual intervention resulting in cheap and faster system.



Blockchain and ERP:

ERP, an Elephant in the supply chain industry still have few limitations, which can be solved with the help of blockchain. Does that mean blockchain will replace ERP? In answer for this question, Blockchain professionals explain:

Certainly not!!! Blockchain is additive technology which can strengthen the entire supply chain by working together with ERP. ERP helps firms in managing their internal supply chain and having reached maximum one step to its left and one step to its right. But they do not have reach to the entire end to end supply chain. One of the promising benefits of blockchain is that it can unite a large supply chain network by integrating various ERP softwares of different entities existing in the chain. Blockchain can push the existing benefits of ERP system to another level. The advent of middleware technologies connect the ERP systems with different blockchain networks enabling interaction among different entities of supply chain and resulting into end to end visibility. This means company can maintain their own existing internal ERP systems and can interact with other ERP systems with the help of one enforced blockchain network. Blockchain can work as integrator of various supply chain entities i.e. fulfilling the objective of collaboration among various stake holders of supply chain (interview)

During one of the seminar, I found that many companies hesitate when it comes to collaboration of their internal systems with the system of the other firms involved in the supply chain. According to them most of the times collaboration among various firms

becomes complex due to different business structure and also requires huge investments. However as per blockchain professionals, blockchain can integrates companies without complete restructuring of organizational processes and without making huge investment in a completely new system. This type of integration is possible because of middleware technology.

One more concern of the supply chain professionals can be seen when it comes to collaboration with the help of blockchain i.e. data privacy. As per blockchain professionals, Blockchain will bring transparency across chain but not at the cost of company's own data privacy. Each blockchain network can have its own rule of data privacy and sharing. Company can still have control on their internal data by using internal ERP systems, i.e. they will not have to share their business intelligence.

In simple words we can say Blockchain can work as ERP of ERP's. This can integrate ERP of individual companies. Blockchain is additive technology. It is not going to supplant the need for the internal ERPs.

Conclusion:

This section summarizes the overall findings of the study and the answers to the research questions. The study concludes with limitations and recommendations for further research.

First of all the aim of the study was to find out how blockchain can contribute towards supply chain and can it solve issue of supply chain visibility?

As per the study conducted, blockchain can be seen as promising platform which will completely revolutionize the way we deal with supply chain. Many features which distinguishes blockchain with other existing technologies like decentralized system, digital distributed ledger, fewer third parties required, operate trustless, chronological, time stamped transactions, immutable, consensus required etc. can positively influences supply chain by : improved end to end supply chain visibility, increasing data security, faster decision making, detecting bottleneck in the supply chain processes, boosting collaboration and coordination among all entities in supply chain. One more feature of blockchain i.e. smart contracts can automate entire supply chain business financial operation processes.

Blockchain being an additive technology can work collaboratively with existing ERPs systems of firms to bring in transparency across end to end supply chain and making supply chain processes faster in the era of multi-echelon supply chains. Because of existing

middleware technologies, it can easily be integrated with existing ERPs without changing firm's internal supply chain processes or organizational structure.

Blockchain will bring transparency across entities involved in chain but not at the cost of company's own data privacy. Company can have control on their internal data by using internal ERP systems and share only the data required to the other parties involved in the chain by setting rules for privacy.The future will be more about integration of blockchain and ERP than replacement.

By answering these research questions, the study shows the potentials of this new technology in the field of supply chain and its relationship with ERP.

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