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# Supply Chain using Block Chain

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**ABSTRACT:** Applying blockchain technology for information sharing in supply chain is driven by many factors, but developing trust is one of the most proposed. However, trust is a multidimensional, intangible concept without an agreed-upon definition. Whereas some argue that trust is the main driver of block chain technology, others have found a negative relationship. This study focuses on how applying blockchain in supply chain management can influence trust and proposes a corresponding research agenda. Trust and blockchain technology discussions are scattered throughout the literature. Thus, a systematic literature review was performed based on a conceptual trust framework. This study discovered a gap in linking trust theories to blockchain technology applications especially in supply chain management, and provided insights into trust's reciprocal nature.

**KEYWORDS:** Blockchain, Supply Chain, Decentralized, Distributed Ledger, Security

## I. INTRODUCTION

We observe that there are many existing works in the recent literature exploring the potential of big-data and blockchain technology and how it can disrupt the supply chains (Benzidia, 2013; Wang, 2019; Ageron et al. 2020; Dubey et al. 2020). However, blockchain adoption by businesses is still on its early stage. The most important literature is discussing the conceptual framework and how it can be implemented in supply chains. A few of research papers are proposing a strategic approach based on stakeholder's interactions and decision making along the supply chain. In the recent literature on supply chain operations, researchers and practitioners argue that blockchain can provide a real time visibility in the shipping industry among the stakeholders such as customs, ports authorities, freight forwarders. The blockchain offers a framework with secured sharing data, predictive and risk analysis capabilities. Bocek and al., (2017), conclude that smart contracts can reduce the number of intermediaries and provide more automation in the supply chain process. Smart contracts can also reduce the operational costs. Pan (2020) argue that Blockchain technology has the potential to enhance the information sharing among the supply chain players. Moreover, until now, there has not been any technological innovation that had more potential to advance the supply chain industry than blockchain technology. Over the last few years, companies of all sizes have identified and tested dozens of blockchain use cases and applications to help address operational problems, improve processes, and reduce business costs. These potential applications range from end-to-end process visibility and real time product traceability to data security and transaction reconciliation. While these potential benefits are quite promising, there are hurdles that still remain which prevent blockchain technology to see a widespread adoption.

### 1. Traditional Supply Chain Networks

One way to compare traditional supply chains and digital supply chains is to think of the former as a largely static entity. Traditional supply chains are reactive. They operate on rules based on historical transactions. Traditional supply chains usually rely on standalone systems which function in siloes with little or no data-sharing. These supply chains involve processes where a product evolves from the procurement of raw materials to production and delivery to the end customer. Thus, the key elements of traditional supply chains are:

- Procurement of raw materials
- Raw materials to manufacturing
- Manufacturing
- Distribution and shipping
- Sale
- Consumption

Traditional supply chains and SCM focus only on production and provision, not on customer needs. They also are not optimized and lack the “intelligence” to spot problems along the value chain quickly. Even after a problem is identified, predicting its likely effects and finding a fix can require considerable time and effort. That delays production, introduces errors, and increases the time-to-market all of which can harm customer satisfaction and corporate profits.

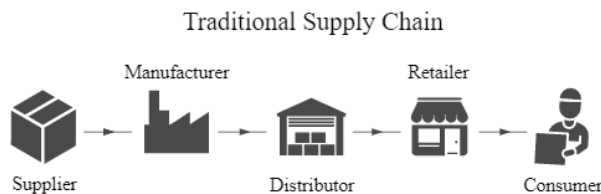


Fig. 1:- Traditional Block Chain

## 1.2 Distributed Ledger and Blockchain

Blockchain is one type of a distributed ledger. Distributed ledgers use independent computers (referred to as nodes) to record, share and synchronize transactions in their respective electronic ledgers (instead of keeping data centralized as in a traditional ledger). Blockchain organizes data into blocks, which are chained together in an append only mode. Blockchain/ DLT are the building block of “internet of value,” and enable recording of interactions and transfer “value” peer-to-peer, without a need for a centrally coordinating entity. “Value” refers to any record of ownership of asset -- for example, money, securities, land titles -- and also ownership of specific information like identity, health information and other personal data.

### Distributed ledger technology (DLT)

DLT could fundamentally change the financial sector, making it more efficient, resilient and reliable. This could address persistent challenges in the financial sector and change roles of financial sector stakeholders. DLT has the potential to transform various other sectors as well, like manufacturing, government financial management systems and clean energy. Since this technology is still nascent, the World Bank Group doesn't have general recommendations about its use for international development. We are in dialogue with standard-setting bodies, governments, central banks and other stakeholders to monitor, research and pilot applications based on blockchain and DLT. However, waiting for “perfect” DLT solutions could mean missing an opportunity to help shape it. To understand how DLT can address challenges in the financial sector requires both research and real-life applications and pilots. It also requires resolving consumer protection issues, financial integrity concerns, speed of transactions, environmental footprint, legal, regulatory and technological issues that arise with the advent of new technology.

## II. ENHANCING SUPPLY CHAIN MANAGEMENT USING BLOCKCHAIN

Blockchain is one of the most discussed topics at the moment. For many people the first and most well-known financial application of blockchain, developed in year 2008, is the crypto currency Bitcoin (Swanson, 2014). Blockchain technology is defined as “the core system that underpins bitcoin, computers of separately owned entities follow a cryptographic protocol to constantly validate updates to a commonly shared ledger”. Every transaction in the network is recorded in a digital ledger and multiple transactions are together forming a block (Swan, 2015). A 'block' is then added to the general ledger, once a predetermined quantity of transactions is documented. Each block is together forming the 'blockchain' which is the reason of the technology's given name (White, 2017). A block may consist of monetary transactions (Bitcoin) or smart contracts (Ethereum) (Swan, 2015). Ethereum blockchains and smart contracts will be explained in more detail later on in this chapter. Figure 2 illustrates the chronological order of the activities involved in a blockchain transaction.

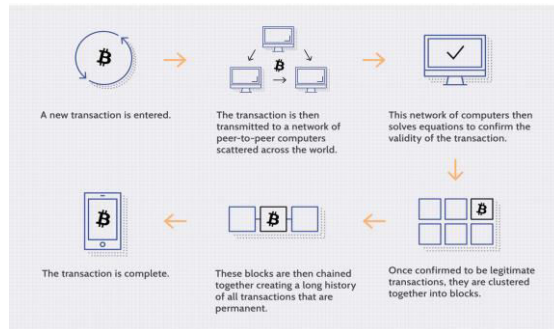


Fig -2: Blockchain works

There are many reasons to switch to blockchain:

Enhanced security :

Your data is sensitive and crucial, and blockchain can significantly change how your critical information is viewed. By creating a record that can't be altered and is encrypted end-to-end, blockchain helps prevent fraud and unauthorized activity. Privacy issues can also be addressed on blockchain by anonymizing personal data and using permissions to prevent access. Information is stored across a network of computers rather than a single server, making it difficult for hackers to view data.

Greater transparency :

Without blockchain, each organization has to keep a separate database. Because blockchain uses a distributed ledger, transactions and data are recorded identically in multiple locations. All network participants with permissioned access see the same information at the same time, providing full transparency. All transactions are immutably recorded, and are time- and date-stamped. This enables members to view the entire history of a transaction and virtually eliminates any opportunity for fraud.

Instant traceability :

Blockchain creates an audit trail that documents the provenance of an asset at every step on its journey. In industries where consumers are concerned about environmental or human rights issues surrounding a product — or an industry troubled by counterfeiting and fraud — this helps provide the proof. With blockchain, it is possible to share data about provenance directly with customers. Traceability data can also expose weaknesses in any supply chain where goods might sit on a loading dock awaiting transit.

Increased efficiency and speed :

Traditional paper-heavy processes are time-consuming, prone to human error, and often requires third-party mediation. By streamlining these processes with blockchain, transactions can be completed faster and more efficiently. Documentation can be stored on the blockchain along with transaction details, eliminating the need to exchange paper. There's no need to reconcile multiple ledgers, so clearing and settlement can be much faster.

A blockchain supply chain is an innovative solution for a wide variety of problems. In a typical supply chain, different processes are involved, including procurement of raw material, manufacturing, financing, and so on.

### Blockchain services:

Blockchain technology is emerging as a business focus for organizations in several industries, including consumer products, manufacturing, financial services, health care, life sciences, and public sector. Deloitte helps companies and organizations achieve many goals with respect to blockchain implementation—innovation and ideation, strategy development, prototyping, and product development. services of blockchain:

Innovation and ideation :

Continuously identify relevant use cases to harvest the benefits of blockchain technologies

Collaborate with clients to evaluate existing processes, pain points, and goals to brainstorm domains for blockchain adoption



Enable clients to grasp the broad innovation landscape of blockchain opportunities through our thought leadership and growing ecosystem tracking

Strategy development :

Lead clients in defining blockchain goals and objectives as part of their unique journey with a strategic plan to define “where to play and how to win”

Craft comprehensive business cases to enable executive buy-in to drive business, technology, integration, talent, and consortium operating models

Develop strategies to pilot and implement blockchain based solutions for prioritized/selected use cases

Prototyping :

Leverage our library of over 30 proof of concept solutions to serve as accelerators across supply chain, loyalty, know your customer (KYC), trade finance, identity, payments, and more

Define an iterative and flexible approach to match the rapid changes in the ecosystem

Product development

Mobilize our highly trained and technical global blockchain practitioners to not only re-engineer business processes but also build applications

Deliver as one team in partnership to leverage advanced and effective blockchain technology vendor platforms to cater to client requirements

Offer our broad set of services, across compliance, technology, talent, operations, and tax, to effectively integrate your blockchain solution

### III. CONCLUSIONS

This paper, through a systematic and structured review of literature, provides insights into the conceptualization and research methodological bases of the SCM field. A decentralized network made possible using blockchain will have numerous advantages for a supply chain network. The blockchain will make all aspects of the supply chain interconnected, make the data more secure, traceable and structured. This will positively impact all stakeholders involved including customers, manufacturers and delivery services.

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