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# Introduction

Today's supply chains involve many parameters, including people, physical resources, knowledge, processes, and financial contracts and transactions that facilitate the transportation of a product from the supplier to the customer. This makes it difficult in a large supply chain system to maintain an overall view of all transactions between all players. The information is typically stored in multiple locations and is accessible to specific system units. Customers usually have only partial access to the overall information. (Abeyratne und Monfared 2016)

The Blockchain Technology which gained a lot of popularity within the last few years due to the Bitcoin cryptocurrency, is about to enter and change the supply chains and their Management Systems as we know it.  
The decentralized and open-source Database allows to parties to transact directly, using duplicate, linked ledgers called blockchains, rather then relying on centralized intermediaries (e.g. banks). This makes transactions more transparent without requiring explicit trust in a third party other than the block chain network itself. Blockchain technology thus has the opportunity to increase transparency in all areas of various supply chains. Thus, scandalous incidents such as for companies such as spoiled food, unethical behavior in dealing with resources or the allegation of child labor can be avoided. (Francisco und Swanson 2018)

The Research Question of this work, “Impact of Blockchain technology on the Supply Chain Industry”, shall be answered with the help of a systematic literature review.

# Blockchain Characteristics

Especially in the area of supply chain tracking there are suitable applications for block chains. Due to the necessary documentation of many different actors, goods along a supply chain are exposed to the risk of theft or counterfeiting at many points. By creating a digital "token", block chain technology protects against these dangers. The final recipient of the item can then authenticate the token, which can trace the history of the item back to its point of origin. This gives end users greater confidence in the information they receive. Arbitrary external intervention in the supply chain is thus no longer possible.

This makes the block chain an appropriate technology to enable supply chain traceability. Since goods and the associated "brands" in a given block chain are generally not traded between competitors within a given block chain, this operational facet helps to maintain anonymity. As such, the confidentiality of the participants can be maintained. (Francisco und Swanson 2018)

A look at the features shows why the block chain is a unique and convincing solution for the supply chain market.

**Data Structure.** Transactions are formatted into blocks that are linked together using a cryptographic hashing algorithm that takes as input data from prior entries such that the output is a secure chain of data in which one block cannot be altered without invalidating the hash.

**Distributed**. Every node in the network contains a full copy of the dataset.

**Decentralized.** An algorithm is used by the nodes to validate new entries, with entries that are validated by a majority of nodes included in the blockchain. Not only are transactions verified by consensus, but updates to the blockchain software are also accepted by consensus.

**Transparency with Privacy.** Users have a digital signature, and each transaction includes the digital signature of the parties involved, but the signature is not easily associated with an individual or organization.

**Timestamps.** Timestamping assures the order of transactions is accurate. Combining these traits creates a secure, publicly-sharable database that reliably records the time, content, and parties of each transaction without centralized control for data or software updates. Compare that to privately-held, centrally managed databases that are susceptible to alteration of individual data components. To simplify, traditional technology says “I have my data. You have your data. We have to validate and reconcileactivity between our databases using a bank or a trusted third party to facilitate. As soon as the reconciliation concludes, either of us can change our data such that I no longer trust who you are or your data.” Blockchain technology has the potential to say “I know who you are. I know who owns this asset. We have a shared record of trusted, validated transactions; no reconciliation required.” As a result of these traits, blockchain offers several key benefits compared to traditional approaches.

**Data Integrity.** The cryptographic, secure nature of the data structure removes questions about asset identity, asset ownership, and transaction history. Hashed blocks make it unfeasible to reverse or tamper with transactions.

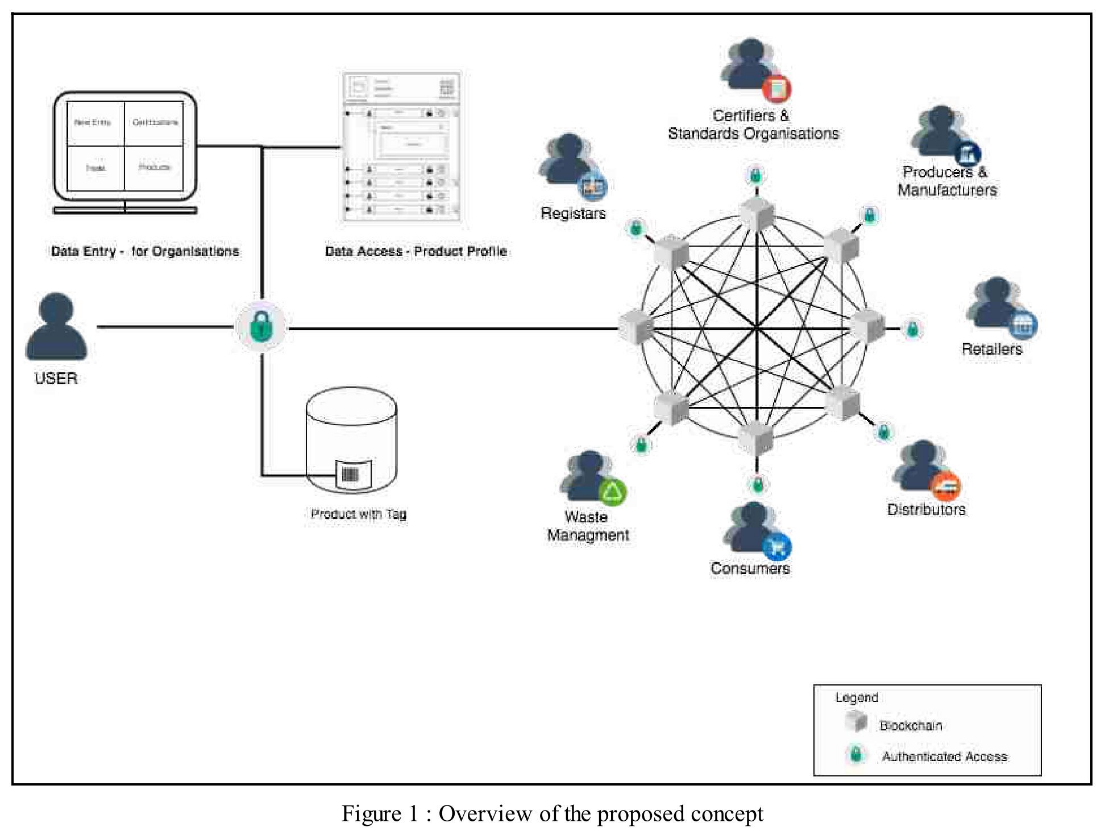
**Operational Resilience.** Distributed data model means data is always accurate and accessible.

**Built-in Audit Trail.** Time and parties to transactions are built int o the data structure itself, automatically establishing audit trails while protecting privacy since parties are identified only by public/private keys.

**Ownership**. Provides an immutable record of ownership and effectively prevents double-spending of assets. The potential to create a secure, shared, immutable record of transactions and asset ownership is predicted to drive the mass adoption of blockchain technologies as the next logical step in application evolution. Blockchain instantiates trust as part of the application. (Scott et al. 2018)

## 2.1 Influence on supply chains

The supply chain deserves special attention among all the many activities that can be changed by the block chain. A trend that deserves special attention is the impact that Internet of Things (IoT) applications have on supply chain management. By using IoT, RFID (Radio Frequency Identification) tags, sensors, barcodes, GPS tags and chips, the locations of products, packages and shipping containers can be tracked at every step. This enables improved real-time tracking of goods from their origin. (Kshetri 2018, S. 80)



(Abeyratne und Monfared 2016)

# Discussion

Among the many possible applications of block chain technology, its use in supply chain activities is one of the most promising. For instance, Blockchain facilitates a valid and effective way of measuring the results and performance of key supply chain processes.

The main benefit of supply chain management technology for companies is the ability to manage supply chain information more efficiently without having to worry about properly securing it and the possible additional increased resources required. The government could obtain more trustworthy information for better, faster, more targeted and less time-consuming inspections. For customers, the technology increases transparency, data security and thus confidence in products and the players involved.

Promising fields of application can be found in international sea freight or in the food industry where there are long and also critical supply chains in terms of quality and time.

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