[1. Introduction 2](#_Toc256000000)

[2. Supply Chain Industry 4](#_Toc256000001)

[2.1. Basics 4](#_Toc256000002)

[2.2. Disadvantages and Risks 5](#_Toc256000003)

[3. Block Chain Technology 7](#_Toc256000004)

[3.1. Discovery 7](#_Toc256000005)

[3.2. Application 9](#_Toc256000006)

[3.3. Limitations 11](#_Toc256000007)

[4. Impact 12](#_Toc256000008)

[5. References 21](#_Toc256000012)

# Introduction

In this paper a brief analysis of supply chain, blockchain technology and the impact of blockchain technology on the supply chain industry can be found.

Since blockchain shortens the line from manufacturer to customer while adding highly demanded transparency and thus increasing trust, it becomes more and more important to develop the use of blockchain technology in different industries. (Kshetri, 2018; Abeyratne and Monfared, 2016; Francisco and Swanson, 2018)

# Supply Chain Industry

## Basics

Supply chains for example in manufacturing systems, or of a product or material consists of different entities, starting from suppliers, knowledge, processes, manufacturers, contracts, and transactions to the distributor and finally the end consumer or customer. (Abeyratne and Monfared, 2016)

Information being stored all over the world in different locations makes keeping an overall picture difficult, while also the transparency and the visibility of the whole supply chain are the challenges being faced. Because of the missing transparency and concealed actions, the effectiveness and secure monitoring gain more importance. (Abeyratne and Monfared, 2016; Francisco and Swanson, 2018)

## Disadvantages and Risks

As there are countless products being manufactured everyday all over the world, tracing each and every step from the origin through the process of production to finally reaching the customers is complex and almost impossible for a single part of the whole network. This complexity and the global network makes a supply chain vulnerable to man-made or natural disturbances on one side of this network, that can severely damage the reputation and/ or the finances of any company along the further supply chain, let alone disturb if not even stop the delivery of the product or service on the other side. (Abeyratne and Monfared, 2016)

Furthermore, since sustainability, Fairtrade, or Organic certifications on the products gained importance among customers and consumers, verification of the certificate or logo remains a costly and time consuming process. The trust, which the customers need to have in the suppliers regarding the truth behind such certificates can easily be abused, not only in regions with high corruption levels but also in reputable, globally acting companies such as VW, who were involved in the emissions scandal in 2015, and NISSAN in 2016. (Abeyratne and Monfared, 2016)

Such events and the opacity of most supply chains have raised a demand for transparency in manufacturing supply chains, not only for the aim of risk prevention but also in means of consumer and labour protection. The demand currently develops into an overall demand to regain consumer trust in products by improving access to information. (Abeyratne and Monfared, 2016; Kshetri, 2018)

# Block Chain Technology

## Discovery

A blockchain can be seen as a chain of blocks of which each block is an encrypted piece of information about a certain process. Each block contains a record of the valid activity within the network since the last block was added. Without authorization , the data within the chain can’t be changed, but it can be added to and reviewed by anyone. It is operating on an open-source, decentralized network, so there is no longer a need for third party intermediation or control facilities, thus reducing the costs and risks while providing the generally demanded transparency. Trust in the process enhances due to the fact, that all parties in the respective network need to agree on change requests and improvement. (Abeyratne and Monfared, 2016; Francisco and Swanson, 2018)

The process of ‘mining’ ensures the security and validity of each information that is added to the respective chain. Each new block is added as soon as a miner, an independent entity in a network, solves a cryptographic algorithm, which the majority or all of the nodes in the network must accept as valid data. Whether it is the majority or all of the nodes that have to accept the new block depends on the definition of the block. The miner receives some sort of digital credit, in the form of financial gain or approval for completion as a reward for each successfully added block. A miner who adds invalid data to the network will always be detected by the rest of the network, but the rejected block will be logged in the system, so that the miner can be recognized as a possible threat. (Abeyratne and Monfared, 2016)

The technology has been invented with the implementation of Bitcoin in 2008 and it is more and more discovered and advanced to be used in other sectors apart from finances and digital currencies. (Abeyratne and Monfared, 2016)

## Application

Blockchain technology is already applied in the financial sector, and with digital currencies where Bitcoin is a well known example. It can also be applied in many more sectors, basically anywhere where a precise and up to date information of the product or service is demanded. Yet there is a big potential, that is not fully used discovered. (Abeyratne and Monfared, 2016)

Certification process, Fairtrade as an example, can be much more transparent than it is right now, where customers need to rely on the information displayed on the product sheet. Blockchain is also applied in the pharmacy sector already, the swiss company Modum for example uses this to verify the correct storage and transportation for medicine and pharmaceutical drugs. (Abeyratne and Monfared, 2016; Kshetri, 2018; Bocek *et al.*, 2017)

There are many more to list, but this would expand the frame of this paper to a larger dimension than intended.

## Limitations

Though there are many possibilities of Blockchain technology, there are some limitations to take into consideration.

The interaction with less developed countries to start with, can be quite difficult with blockchain technology, since they need to have the resources to implement that as well as be willing to develop their technological standards in the first place. Also negotiations, the political situation (with that being a valid argument for the whole world) and the cultural background might put the application of blockchain technology to a certain difficult level. (Kshetri, 2018)

Manipulation also is an important danger, that must not necessarily be detected by blockchain technology. Levine, 2017, mentions the example of a container, in which one could drill a hole to exchange the content with something else that needs to be smuggled. (Kshetri, 2018)

**4 Impact**

The impact of blockchain technology on the supply chain industry is big regarding the saving of costs, increase of transparency and trust, and in order to reduce the risks that comes with more instances involved. (Bocek *et al.*, 2017)

The growing demand of sustainability within Europe and also globally requires a precise and dense network, that can’t be as easily manipulated as the regular supply chain. Customers and consumers nowadays want to know where the product they’re consuming is coming from, weather the manufacturing facility sticks to regulations and still holds a valid certificate. (Kshetri, 2018; Francisco and Swanson, 2018)

Also repeating the example of the swiss company Modum, that set itself the goal of ensuring the correct transportation of medication worldwide, while arriving on time at the consumer, who is in need. (Abeyratne and Monfared, 2016)

Thus one can be sure, that the development of blockchain technology especially in the supply chain industry will continue in a fast pace, easing the processes and following up on each and every step the product or material goes through before it is delivered. (Francisco and Swanson, 2018)

# References

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