Blockchain Technology's Impact on Supply Chain Relationships

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Abstract

Blockchain technology has in recent years been acknowledged as a separate technology with potentials outside managing cryptocurrencies. Research shows that blockchain is prospected to disrupt the traditional supply chain processes and management, particularly the role of the intermediary, as blockchain technology offers an information system where information is shared directly from peer to peer. Which lead to considerations of how relations within supply chains would be influenced if processes were changed to be managed by blockchain technology.

This thesis investigates how relations would be affected and change if blockchain technology were implemented. These relations constituted inter-organizational, intra-organizational and external environment relations. Discovering how the relations is impacted by looking into governance mechanisms, the role of power and trust, and ultimately how BCT impacts relations possibilities for generating relational rent. Building on a theoretical framework for discovering this perspective were a combination of the relational view, network theory, principal agent theory and a framework for understanding power and trust. A structured literature review were conducted and the data was compiled into a thematic analysis and coded within the three different types of relations. Additionally use-cases were considered as secondary data, to put the theoretical approach into a business perspective.

The analysis shows a strong correlation between conflicts of interests and lack of management support on the outcome of supply chain relations. Furthermore governance interactions and mechanisms projected a huge impact on the success of the relations and were identify to be closely related to trust and how intra-organizational structures were adapted. However when managed properly the analysis showed that BCT could have great impact on relations in terms of increased collaboration and performance, reduction of bull whip effects and the generation of relational rents.

It was concluded that for a successful relation to emerge with a BCT, considerations need to be given into the intentions for the collaborations as well as the organizational management and technological expertise. Furthermore it was concluded that blockchain technology, does not remove the need for trust within relations and comes with a complex technology that requires great attention from managers to generate value from it.

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1.0 Introduction

Recent years has brought great attention to the technology of blockchain (henceforward referred to as BCT or BC for block chain). BCT created the foundation for the record keeping technology of which Bitcoin is based, as introduced anonymously under the pseudonym Satoshi Nakamoto. Bitcoin, a digital distributed currency, was originally developed with the intention of being traded in a peer to peer (P2P) system with no centralized authority. BCT created the foundation for Bitcoin, using cryptography to create and control the transfer of a digital currency Gammelgaard et al. (2019).

Since BCT's relative emergence the technology has primarily been tied together with matters of bitcoin and other cryptocurrencies but recent years has brought attention to the potential of its applicability to other lines of businesses and other matters not related to the management of cryptocurrencies. BCT withhold much more potential and is slowly gaining its own acknowledgement as an independent technology. As the technology can be used as a data sharing method, allowing more transparent and secure information sharing between the chosen entities.

It is still in the early stage of adoption, but several pilot projects worldwide continuously confirm its potential to disrupt, within several industries. Which could arguably dismiss the critiques of being hyped, that the technology has received in recent years Konstantinidis et al. (2018). This is further confirmed by (Savin, Andrej, 2018), who argues that when a great company like Maersk, who is considered to operate within a relatively tech-inert industry, decides to engage and invest in BCT projects, then it arguably testifies the technology's potentials. In addition to that, the European union established a department in 2018, called the European Blockchain Service Infrastructure (EBSI), as an initiative under the so called Tallinn declaration (which serves the purpose of further exploring the potentials of the digital

single market[1]), to collectively develop BCT potentials aimed at both eGovernance as well as business objectives. With 4 m.€ budget invested from 2019-2020, this initiative further confirms the relevance of BCT EBSI (2020).

Studies indicate that BCT is being either used or developed within various areas, such as e-governance, healthcare, energy, banking, cryptocurrencies and supply chains Konstantinidis et al. (2018). Especially Supply Chain management is deemed to be one of the industries where BCT withhold the biggest potential to disrupt according to Gammelgaard et al. (2019), who argues that two main beneficial objectives of operating with BCT in supply chains comes down to "operational efficiencies" and "improving trust and security". Generally supply chains are characterized by operating with many different partners, who relies heavily on data sharing and a very system intensive procedures (Beck et al., 2019). Therefore, systems are needed to share, receive and transfer information and data, between these partners.

BCT incorporated in supply chain management would function as way of verifying transactions, sustaining audit trails, allow more efficient sharing of sensible information and enable more transparency in the selection of vendors Gammelgaard et al. (2019). Hence BCT could enable the creation of cross system and cross partnership standards. However, several studies points out that BCT cannot stand alone in supporting transparency in the supply chain and must be combined with an enabling technology such as Internet of Things or Radio Frequency Identification (RFID) (Beck et al. 2019 ; Konstantinidis et al. 2018 ; Treibelmaier 2018) .

Despite the positive attention that BCT has received and the growing interest and investment, the technology does however, also withhold restraining aspects and still lacks insight into

[1] The digital single market, refers to a policy owned by the EU and covers the unions initiatives towards sustaining the market, for both citizens and businesses, in terms of development of matters related to E-commerce, digital marketing, telecommunications and technological development. https://ec.europa.eu/digital-single-market/en

different areas when implemented in the management of supply chains. Studies show that many fear being left behind if they fail to embrace the potentials of BCT Gammelgaard et al. (2019), however, supply chain operating companies face several barriers to successfully internal integration of BCT, due to the generally low levels of digitization in their chains. Adding to that point, "60-70% of organizational management projects tend to fail" further indicating that there are several barriers to consider for BCT to successfully emerge with supply chain management Gammelgaard et al. (2019).

Along with BCT's potentials in supply chains of "enhancing contract management and governance" as well as "increased surveillance and the enforcement of power" Hald & Kinra (2019) , BCT arguably also arrives with impact on matters of trust and relations.

Nevertheless, (Gammelgaard et al. 2019 ; Hald & Kinra 2019 Treibelmaier 2018) argues that BCT possess a great opportunity for sustaining an efficient supply chain in terms of creating transparency and visibility. Furthering this aspect Treibelmaier p. 555 (2018), argues that managers must acknowledge that "a strategic reorganization and delegation of responsibilities is needed to cope with blockchain-induced changes". Which leads to questioning how technological development and implementation such as BCT, in terms of supply chain management, could be more effective, less reluctant to failure and more critically emphasized, if the relations within the supply chain and their affect, are clearly defined and concretized much earlier in the process, in order to support such strategic reorganization.

2.0 Problem Statement

The purpose of this section is to provide an overview of the area of research this thesis aims at providing insight and attributions to. In this section the problem of the thesis will firstly be contextualized in terms of issues already know within the research area, provided by existing studies and how these have attributed to the problem statement of this research. Secondly the relevance of the problem will be counterbalanced along with a discussion on how the thesis should help advance the understanding the topic. Third and lastly this section will align the aim and objectives of the thesis.

2.1 Contextualizing the problem

As previous introduction indicate, there exists a number of complex perspectives within BCT's emergence with supply chain management. Due to BCT relative intangible nature, managers struggle with coping and understanding its potentials Gammelgaard et al. (2019). Nevertheless there exists a need in the industry for keeping a competitive position by continuously streamlining the supply chain management in an ever evolving business environment. Seemingly the business environment collectively agrees that when considering supply chain management, there do exist a need for increased visibility. Visibility is vital for providing good conditions for generating strong relations within supply chains. However visibility within B2B transactions, is often missing this capability and yet means to achieve this objective need to be discovered. Gammelgaard et al. (2019) .

A literature review conducted by Hald & Kinra (2019) indicate that BCT does in fact sustain increasing supply chain visibility. Further Hald & Kinra (2019) found that BCT is considered a technology that enables firms to enhance collaboration and that "BCT in supply chains enhances the potential to gain relational rents[2] from supply chain partnerships". Adding to that collective agreements on supply chain governance should lead to increased levels of trust and thereby lower transaction costs (Hald & Kinra 2019 ; Konstantinidis et al. 2018 ; Treibelmaier 2018).

However despites its bright forecast of revolutionizing several aspects of doing business, the technology still creates doubt and lacks managerial insights and illustration. The matters mentioned above on the creation of visibility, increased trust and collaboration also have its implementation considerations. In terms of its managerial considerations studies shows that issues with collaboratively developing a shared BCT ecosystem and a agreeing on the setup

[2] Relational Rents: Dyer & Singh (1998) defines relational rents as "a supernormal profit jointly generated in an exchange relationship that cannot be generated by either firms in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partnership".

comes as one of the main barriers to adopt BCT. Managers has doubt connected to BCT's applicability, interoperability ease of implementation as well as concerns of its reliability and level of security. Which is why, when building a common BCT driven ecosystem, managers must agree on the general architecture, fair cost-benefit splits as well as the general rules on governance and participation (Gammelgaard et al 2019 ; Konstantinidis et al. 2018).

While there has been put great emphasis on the practical and conceptual understanding of how BCT can provide to the supply chain, in both pros and cons, little attention has been given to how, it will impact the relations at different levels within the supply chain. And thus the trust generated between the participating parties. This gives rise to the question of, if understanding power-distance and the position the different participants have within the supply chain as more or less powerful and influential, impacts BCT implementation.

2.2 Problem Relevance

Previous statements clearly provide an indication of a need for increased transparency in the supply chain as well as demand for managers to better understand BCT's implementation considerations on different levels. An insight on BCT's impact on relations (both up-stream and down-stream) and matters of trust and power, could help elevate the understanding of how technological changes could impact governance and thus how these should be considered in creating effective and considerate governance tools. This could further help managers understand how the enabling and constraining effects of implementing BCT and how to take these consideration into account when working with BCT. Furthermore this problem is especially interesting in correlation to negotiations, as trust and the power structure is an important factor to understand when navigating in such situations and ultimately to create appropriation and sustain common value creation (Kwon & Suh 2005 ; Sridharan & Simatupang 2013).

Aside from that insight into the problem could potentially benefit future research in understanding how supply chain collaboration and partner consensus could be structured more efficiently with considerations of above mentioned factors.

2.3 Research aims and objectives

2.3.1 Aim

This thesis projects at investigating three interconnected perspectives in answering the research question. That being:

Perspective 1) Governance mechanisms

Perspective 2) The role of trust and power

Perspective 3) Generation of relational rents

P1) In the context of creating transparency and visibility throughout the supply chain, the governance mechanism plays a central role in the managerial work. The thesis aims at projecting how terms of collaboration vs. mandatory/power-based approaches, and formal vs. informal ones influences the relationships and thus the adoption of BCT in the supply chain ecosystem.

P2) Along with a digital transformation, the role of trust and power in byer-supplier relationships is important to consider as it may entail diverging impacts. Will a digital transformation such as BCT in supply chain, creating increased visibility and traceability, thus remove or reduce the importance of trust; and will any information be transparent? Furthermore aiming at discovering if it would be acknowledged as trustworthy by all involved partners. The project also aims at discovering if will it give rise to considering trust or more precise “digital trust” as unnecessary within supply chain henceforward.

Leading on the aim of this thesis is hence to gather insights on how BCT, impacts managerial aspects of the supply chain, when used as a tool to achieve trust, transparency and authenticity and thus how it affects the relations and the different roles and ultimately corporation the within the chain.

2.3.2 Objective

The project aims at conducting a theoretically based research, to sustain a firm research agenda while simultaneously creating a bridge between academical approaches and the industry, by researching on matters, managers might equally question to better understand BCT impact on relations within supply chain management. Therefore this thesis will be built on a structured literature review to be connected with the chosen relevant theorical perspectives in answering the following research question.

2.4 Research Question

How does implementing blockchain affect relationships in supply chains?

Sub Questions:

- What role does governance mechanisms play when implementing BCT into supply chains?
- How does BCT in supply chains affect the role of trust in buyer-supplier relationships? Under which terms will BCT replace personal trust and will trust, or perhaps "digital-trust" still be necessary?
- How does BCT impact relational rents?

3.0 Delimitation

This section will present the delimitations of this thesis in terms of the research area that was chosen for the given topic.

As the research question indicates, the purpose is to understand how BCT influences the relationships within supply chains and to clarify this, relationship is limited to relationships of inter-organizational and intra-organizational character. Furthermore the scope includes relationships, that the supply chains engage and operate with in its environment, this includes governments such as local and global ones, NGO's, trading unions etc. It does not consider the direct relationships that supply chains would have with B2C though it could be argued to be a part of their external environment. The thesis therefor further limits its scope to looking

into relations of B2B in supply chains. Furthermore it is important to mention that despite engaging with a relatively complex technology, this thesis will not be a technical oriented thesis.

When conducting the literature review, the process was not industry specific and thus the scope of this thesis is neither considered to be industry specific, since the available data would thus be way to scarce. Moreover that search process in the literature review was not limited in terms of publication year span, since blockchain is considered a relatively new phenomena and therefor this would be irrelevant.

4.0 Elaboration of Blockchain Technology and Supply Chain

In this chapter follows an elaboration of BCT and how it works, its architectural characteristics, how it connects with supply chain management and lastly the foreseen challenges BCT faces. Concepts related to theory will not be explained within this chapter.

4.1 Blockchain Elaborated

BCT can essentially be defined as a back-end database (referred to as a digital ledger), which is shared among the users of the particular platform, who then each have a access to a copy of the digital ledger, allowing the ledger to have no central party to refer to.

The information is added in batches referred to as “blocks”, creating an interconnected line of blocks which are all linked together chronologically thus creating the “chain”. The line of blocks exist in perpetuity and data cannot be overwritten. Since information cannot be overwritten, changes can thus only enter the chain by adding a new block, meaning that the BC becomes immutable while allowing every user to have a historical view of all transactions, ultimately making all data in the chain credible Gammelgaard et al. (2019). In contrast to a regular database, where a company will typically have a saved record of the transaction which either correspond to each other or does not. Here BCT could in contrast, function as a the basic tracibilty of truth ultimatively disminishing this issue. BCT enabling data transparency whilste also making modifications of data very diffuclt, especially as the chain gets longer, is arguably creating better conditions of trust, near to a trustless consensus (Gammelgaard et al. 2019 ; Treibelmaier 2018).

The blocks which the chain consist of are made digital information and specifically contains:

1. Basic information such as time and date on the transaction along with the given information (e.g. instead of the cryptocurrency such as when BCT is used to facilitate Bitcoin, it could be any other data).
2. Information about the participants involved in the transaction, such as A who want to transfer or trade something to B. Participants are usually given a digital signature comparable to a username.
3. The block further contains a unique signature, distinguishing them from other blocks in the chain. This unique name is in BCT terms referred to as "hash", enabling users to tell one block from another. Hashes are "cryptographic codes created by special algorithms", enabling this identification that users need to approve blocks in the network Investopedia (2020 "Blockchain Explained".

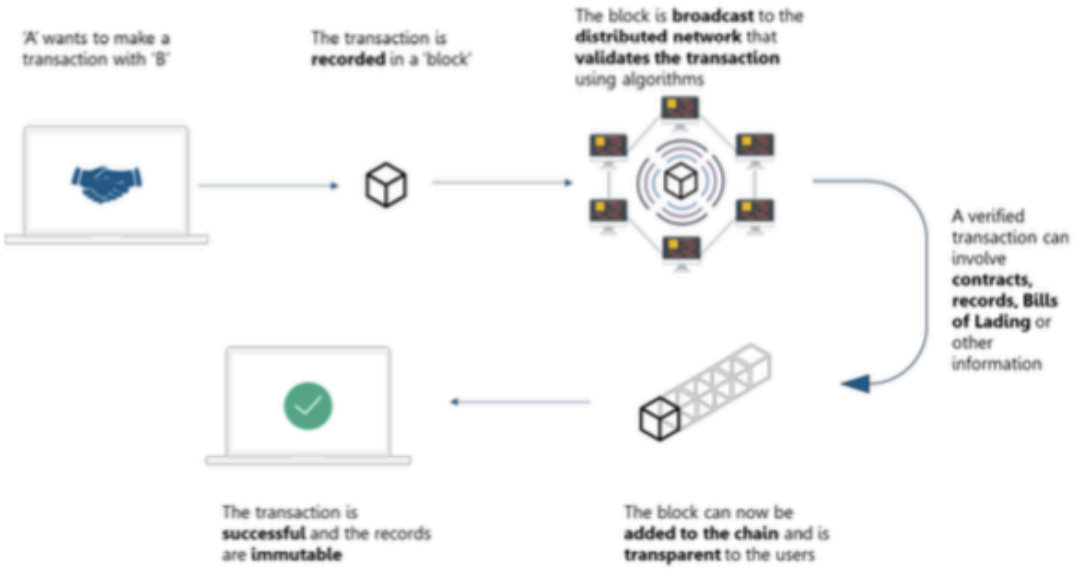
Explaining BCT's unique architectural structure from a more technical perspective, it consists of keying and hashing. Keying means that a block contains two keys, which are different but related so that either one of them can either encrypt or decrypt the given transactions or message. Meaning that if one key is used to encrypt the transaction, only the other can help decrypt it which enables blocks to be tied together in an immutable sequence.
Also, each block contains information in the header, which reflects the content of the previous block that is called the hash value. It reflects the value derived from the previous block, which contains the value from its predecessor and so on, thus creating the chain all way back to the first block Hald & Kinra (2019).
Which makes up the cryptographic system of BCT, promising immutability of the shared data and chains providing manageable overview of the tracked data and transactions Treiblmaier (2018).

Considering another important feature that BCT provides is its consensus mechanism, providing integrity and quality throughout the chain. The consensus mechanism ensures that

each transaction are coded into the respective blocks in accordance with the persisting cryptographic rules thereby plugging in the time sequence that sustains creating a chain Hald & Kinra (2019). The consensus mechanism within BCT is also referred to as the “consensus algorithms”.

Adding another important feature of BCT comes smart contracts, Gammelgaard et al. (2019) defines smart contracts as “conditional agreements (digital contracts) that self-execute when predetermined conditions are met”. Such conditions are mutually agreed upon, between those with access to the network and the conditions are written into the blocks. Meaning that parties can be held reliable for their activities in the transactions and the actions can be accessed equally. The contracts are managed through a computer program that automatically verifies and executes in accordance with the given contracts.
Bringing smart contracts into the context of the supply chain it could help reduce uncertainty and general complexity within the supply chain and further reduces the lack of trust, known to be big problem when making agreements Gammelgaard et al. (2019).

Following is a basic illustration for how BCT works Figure 1.0



Source: Adapted from Blockgeeks (2018)

BCT is developed around the idea that the common centralized entity is abolished, in favour of a decentralized one, where information is approved in a peer to peer (P2P) system meaning that no single controlling entity is needed. Thus Treibelmaier p. 547 (2018) defines BCT as *"digital, decentralized and distributed ledger in which transactions are logged and added in chronological order with the goal of creating permanent and tamper- proof records".*

Thereby decentralized means there is no single entity who needs to verify the transaction, before it arrives at the end user, while distributed refers to computational work which is divided by multiple computers. Distributed Ledger Technology "DLT" covers a broad spectrum describing technologies that "distributes information across multiple sites, countries and institutions", thereby placing BCT within this category Treiblmaier (2018)

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4.2 Private / Public Blockchain

As originally invented, BCT was designed as being a public system, allowing data transparency accessible to everyone. Whereas a private BC entails a closed ecosystem where only given users are authorized access to adding and accessing the information in the shared digital ledger. That being internally as well as externally in the supply chain.

Since a public ledger allows everyone to access the given information it also makes its easier in terms of discovering fraud and irregular activity. However a public BC requires, higher expenses on energy and general operations making it much more complex. Making private BC the preferred one for B2B in order to protect information and matters related to competitive advantages. Additionally a private BC can also be recognized in an permission-based sense, where "restrictions are set on those participants who have been granted access to the network", thus only involving those who are trusted with access to the network Gammelgaard et al. (2019).

To provide a real use case example of this, comes a collaboration between Maersk and IBM who corporate on developing "Tradelens", a BCT based platform with the prospects of digitizing global trade. The shipping industry is characterized by having most economic expenses tied to the administrative paperwork of sending a container and it is estimated that the industry could save many billion of dollars annually, using a BCT based ecosystem to cut down on intermediaries expenses involved in the shipping process. Therefore the goal with "Tradelens" was to create an ecosystem for the shipping industry enabling shipping counterparts to share information and interact seamlessly, without issues of trust (Gammelgaard et al. 2019 ; Savin, Andrej 2018).

4.3 Blockchain Technology and Supply Chain Management

Supply Chain

Supply chains can be a defined as a network in which companies collaborate on the production and distribution of a specific product. The network includes companies and suppliers and evolves around information sharing, people, entities, different activities and resources. A supply chain furthermore represents the journey of a product or service from its starting point to the end costumer Kenton (2020).

Supply Chain Management

Supply chain management can be defined as "the systematic, strategic coordination of traditional business functions and the tactics across these functions within a particular company and across businesses within the supply chain, for the purpose of improving the long

term performance of the individual companies and the supply chain as a whole" (Mentzer et al 2001 in Hald & Kinra 2019).
BCT in supply chain management can benefit the improvement of visibility, contract management and security while also benefiting key features of supply chain performance, such as speed, quality, cost, dependability, sustainability, risk reduction and higher levels of flexibility (Gammelgaard et al 2019 ; Hald & Kinra 2019).

Viewing BCT in correlation with supply chain management it is considered an enabling technology, however as it was intended for a business which is mostly intangible in its nature (financial sector), its necessary for BCT to sustain the supply chain with ancillary technologies. According to Treiblmaier (2018) combining BCT with Internet of Things (IoT), is a prerequisite for BCT to sustain development within supply chain management. IoT devices like RFID would be a way to collect data on various goods, such as different measurements (temperature, volume, state of the goods etc.) whilst also tracking it to share it on the internet. This would provide real time data inputs that could be incorporated in the BCT Gammelgaard et al. (2019). By combining BCT and IoT it could further create access to better overview of resources in stock and possessions of goods in different stages of the chain, thus creating a more formal way of doing product registry. This would further create transparency, by making it possible to track suppliers identity and reputation by using smart contracts and thus improve conditions for getting validated information prior to negotiations, on matters such as best prices and seller's reputation.
Furthering smart contracts compliance with supply chain management, they withhold the potential of automating "repetitive manual processes such as billing and handling of documents", Gammelgaard et al. (2019) provides following example, assume that a contract stipulate following outcome:

- Outcome 1: If a certain level of service is met, the price will be X amount of money
- Outcome 2: If the level of service is not met, the price will be Y amount of money

Additionally the smart contract requires that issues are to be reported back within ten days from the point of delivery and further includes "dynamic pricing to take account for volatile transportation prices". All of these aspects of the contract can be coded into the BC and as

new blocks are being added they will automatically be checked for the given conditions and if they are no met then the records are prevented from entering the chain.

Considering a more general notion BCT applied in a supply chain context, is predicted to lead to increased visibility, optimization as well as more precise forecast of demand while creating more transparency, which could sustain better possibilities for acting faster to unforeseen events. Simultaneously it should have a positive effect on the management of inventories, while also increasing the general level of security, thereby reducing errors and fraud and thus generally reduce costs of administrative posts within supply chains (Gammelgaard et al. 2019 ; Treibelmaier 2018).

4.4 Challenges with Blockchain Technology

Even though several studies indicate that BCT would provide a great potential improving supply chains there is also important constrains to consider. As Gammelgaard et al. (2019) argues that there lies issues of implementing BCT solutions ´in the "gap between the tangible nature of the physical supply chain and the digital nature if the blockchain technologies". Because even though BCT is designed to be immutable the input from the supply chain placed in the BC can theoretically still be manipulated. Because if the given data is retrieved form devices such as RFID, the BC cannot control what happens outside the system, despite its immutable design of the synergy within the blocks Gammelgaard et al. (2019).

Adding to that point, BCT faces issues with technical scalability. Since centralized information sharing systems are acknowledged to be much easier scale up to align with a higher capacity, this is quite the opposite with BCT. It is in contrast much more difficult to scale up and harder to change and thus lacks flexibility. Another concern to the technical perspectives of BCT, is that it requires increased computer power to sustain the time and memory capacity required to confirm the given transactions as the BC develops and grows Hald & Kinra 2019 ; Konstantinidis et al. 2018).

Apart from that BCT receives concerns in regards to issues related to smart contracts. Supply chains are considered to function in a very dynamic market, in contrast to a BCT

implementation which might only consider the current activities and relationships within the supply chain. Which further connects with the technical scalability issues. But especially the matter of smart contracts, since it performs no matter what and as they are impossible to modify when changes are needed, as argued by (Kewell et al. 2017 ; Skarloff 2017 in Hald & Kinra 2019). Hence making BCT very inflexible to apply to a dynamic market. Additionally, the contracts might be difficult to align with the current legal framework that regulates contracts.

5.0 Theoretical Framework

This section purpose is to explain and define the theoretical framework chosen to research, interpret and analyse the findings coming from the literature review later on. It also sets out to discuss current theoretical approaches and evaluate these in context of the scope.

First comes an elaboration of the chosen key words and concepts deriving from the problem statement, to make a clear definition of their scope.

Secondly a contextualization of the current theoretical field on the problem is presented and discussed. Lastly the chosen theoretical framework will be explained considering its overall concepts, ideologies and contributions to this research.

(If irrelevant in the context, the specific theoretical concepts is not explained in depth in this section, as they will be put in context and elaborated on in context with the analysis, however their overall approach is explained.)

5.1 Key concepts identified and elaborated

Deriving from the problem statement, different key concepts is to be identified and clarified. From a starting point it is important to identify how BCT is to be perceived and understood in connection to the specific research area of this thesis.

Considering the main attributes that BCT provides comes down to the characteristics as listed in table 1 a). Such as a peer to peer system in a decentralized consensus where many transactions happen automatically. Putting this into an managerial context it is clear that BCT can project different implications (Tapscott and Tapscott, 2016; Tschorsch and Scheuermann,

2016; Liang et al., 2017; Neisse et al., 2017 in Treibelmaier 2018) tied to the supply chain management as though common agreements has been made between partners in a network, it may still entail insecurity on matters such as reliability, integrity and trust. The managerial implications are listed in table 1 b).

Table 1	
A) BCT characteristics	B) Connected managerial implications
- decentralization of decision making - distributed processing - peer to peer transmission - reliability - data immutability - lower transaction fees - automaticity and speed - transparency	- trust - privacy - provenance of data - security - enforcement - integrity - availability - consensus - authenticity - availability

Leading on, the research question aims a understanding how BCT affects the relationship, when integrated in the supply chain. Thus creating a need to define what constitutes such relationships in this context, especially taking into account that we are considering relationships that function in an interdependent environment. Which provides the keywords of buyer-supplier- / partnership-relations. Another aspect of buyer-relationship is governance mechanisms which constitutes many managerial aspects such as organizational and strategic goals, power structures and financial incentives. According to Dyer & Singh (1998), governance projects an important key role for buyer-supplier relations to succeed, as they affect matters of transaction costs and along with the partners willingness to engage in an value-creating agreement (often due to low transparency levels). Which is essentially what BCT has the potential to disrupt. Therefore aspects of management governance on trust, power and governance mechanisms is further selected as keywords, as they make up important impact of the success of the transparency and the networks willingness to share/create such.

Above mentioned keywords are to be the research within a focus on BCT in supply chains, thus making BCT and supply chain an essential keyword for the literature review.

Summing up the addressed key-words in the literature review comes down to:

→Buyer-supplier relation→ Governance mechanisms
→ Trust
→ Power / power asymmetry
→ BCT / Supply chain

5.2 Contextualization of the current theoretical field

As suggested by Hald & Kinra (2019) BCT could, from a supply chain perspective be understood as an organizational technology "which spans multiple organizations and work processes and which help supply chain managers intervene and manage the supply chain". Drawing on from this perspective, applying an organizational theoretical approach to this problem area can sustain different managerial and intraorganizational perspectives. To approach this, an assessment of how theoretical approaches are being applied to supply chain management, thus limited to the selected focus areas of governance mechanisms, leads to different perspectives. Amongst others it lead to, Treiblmaier (2018) who suggests a framework for theoretically addressing BCT implications for supply chains, both in terms of structuring and managing the supply chain.

BCT implications in supply chains - framework
Treiblmaier, (2018) projects that their created framework provides a complementary perspective on the (inter) organizational attributes. By combining four theoretical angels, being, Transactions Cost Analysis (TCA, Principal Agent Theory (PAT), Resource Based View (RBV) and Network Theory (NT). These theories was also combined by Halldorsson et al. (2007) as a framework to approach supply chain management.

Transactions cost theory focus on minimizing the costs of exchange by projecting the most optimal organizational structures to achieve the highest economic efficiency for the company.

Not neglecting the potential of applying transactions cost theory, but as it stems from classic economic theory and is interesting in the context of addressing the structure and economics of the supply chain it however lack insight on the impact of dyadic networks, resource access and human behaviours. Which is why it is not considered relevant for the scope of this thesis. Nevertheless, to addresses the lack thereof the framework thus argues that the resource based view and network provides a suitable approach. The resource based view projects that relational rents (that is subnormal profit) belongs to the capabilities of the single firm. Whereas network theory provides a framework to assessing the different roles within interorganizational companies and thus the importance thereof. Exactly this lens that the network theory projects will be built on in the thesis, however arguing that the resource based view does not provide the needed perspective to research this topic and instead taking the relational view, as presented by Dyer & Singh (1998) into account. Which in contrast to the resource based view stresses the important to address the advantages and disadvantages of a firms network of relationships. The relational view takes the networks and interorganizational relations which a firms is embedded in, as point of analysis and thus believes that the quality of these are the cause of relational rents. In contrast to the resource based view, who argues that that the unique resources a company possess is their competitive advantage, the relational view would argue that a company could simply not possess the resources without the network. Adding another argument as to why the relational view is better suited in this thesis than the resource based view, is found in the fact that network theory also projects that companies ability to create and appropriate subnormal profit and value, is to be found within its network capabilities and shared resources. Meaning that network theory has a relational view in itself (Halldorsson et al. 2007 ; Sridharan & Simatupang 2013 ; Treibelmaier 2018). Thus this paper considers the relational view of greater relevance, for elevating the understanding relational impact of BCT in supply chains.

Regarding transaction cost theory, it is somewhat comparable to network theory in the sense that both of them consider the connections within the interorganizational network, however transaction cost theory focuses on the transactions opposed to network theory which focuses on the management of relations. Network theory is an interesting approach to this, since it

considers a network not to be static but rather to in a continuous state of movement and change, and further believes that firms who are closely linked in a network thus develop through processes of exchange and adaption. This makes network theory interesting to this research as it provides a framework to perceive the interconnected intraorganizational network. However, NT is of a more descriptive nature, and is thus used in supply chain to map the network activities concerning its actors and resources Halldorsson et al. (2007).

Considering principal agent theory projects the central relations in a supply chain network, that is between the principal and the agent in transactions. It provides a good perspective to understanding how if these relations will be influenced by transparent information flows as followed by a BCT implementation.

Summing up on the framework as suggested by Treiblmaier (2018), it is clear that it provides a comprehensive approach to discovering how BCT can impact supply chain, in terms of structure and overall management. However, it could be argued that it lacks a deeper perspective on the management in terms of dissolving and understanding what influences the relationship in which BCT could sustain better transparency and thus generate higher levels of value creation in the network.

Trust and power

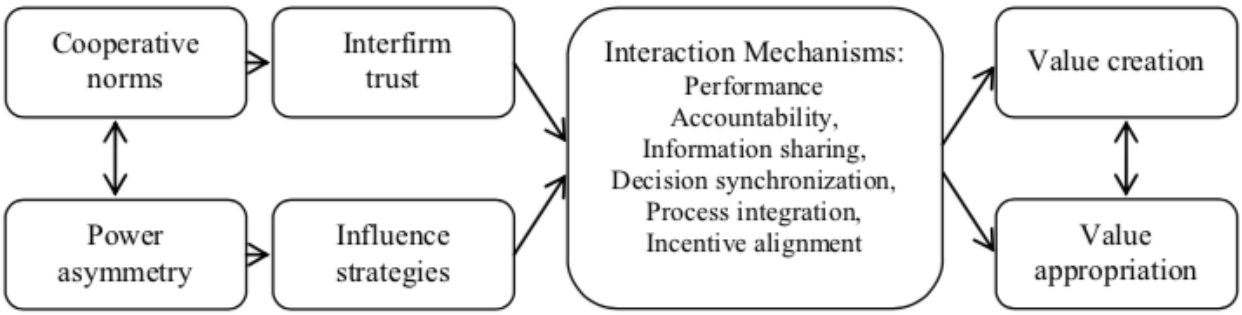
In this perspective and following on from network theory, there prevail several arguments that trust and power is of great importance when understanding the dynamics of interorganizational relationships and that it is an essential a prerequisite (Halldorsson et al. 2007 ; Kwon & Suh 2005 ; Sahay 2003 ; Sridharan & Simatupang 2013). Kwon & Suh (2005), argues that an effective and positive relationship is highly impacted by the "degree of commitment and the degree of trust". While also arguing that to road to getting there is highly impacted by matters of [a]decision making uncertainty and lack of transparency".

Mayer et al. (1995) offers a description of trust as "the willingness to take a risk and rely on

an exchange partner in whom one has confidence". Same authors further composed a model for understanding which factors that compose trustworthiness, being ability, benevolence and integrity and thus how these in connection with risk taking in the relationships, affect the overall levels of trust in an organizational perspective. However this model lack the power component, which is quiet relevant in this study, since power is often connected to how companies assert power and thus how efficient an collaboration turns out (Sahay, 2003). In collaborations power imbalance will always be present to some degree, however balancing power "makes participants feel less vulnerable and allows them be more innovative" (Khoja et al. 2011 in Sridharan & Simatupang 2013). Understanding power in collaborations is important, not only to reach common agendas but also "to gain commitments to address impediments faced by the chain members from attaining value creation" Sridharan & Simatupang (2013). Which are all strong incentives for a company to be working on power exercises in supply chain collaborations and in this research, to understand how trust and power influences relations in the context of BCT. This framework was chosen because it is considered relevant in the supply chain perspective and further because it considers theoretical approaches applied before to research BCT as suggested by (Schmidt & Wagner 2019 ; Treibelmaier 2018).

Providing a framework combining a lens on both trust and power is that of Sridharan & Simatupang (2013):

Figure 1 Schematic overview of key constructs of power and trust in supply chain collaboration



They provide a framework to help understand how "trust and power interact and exert influence over the interaction mechanisms"(Sridharan & Simatupang, 2013) and thus

determine the outcome of collaborations in supply chains, that is indicated by value creation and appropriation. To further clarify, they define interaction mechanisms as " repeatable patterns of coordination of economic and resource exchanges between participating members" including "performance accountability, information sharing, decision synchronization, process integration, and incentive alignment" Sridharan & Simatupang (2013).

Summing up network theory is lacking a more comprehensive in depth approach to governance issues of trust and power which can be addressed by applying the framework by Sridharan & Simatupang (2013). Nevertheless, when combined with this conceptual framework, network theory can provide an interesting perspective for understanding the selected governance matters of trust and power on relations in the supply chain and thus how BCT could impact these.

5.3 Theoretical Framework

Moving on to the chosen theoretical framework for this thesis consists of following:

- The Relational View
- Network Theory
- Power and trust in supply chain collaborations - Conceptual Framework Principal Agent Theory

5.3.1 The Relational View

The relational view by Dyer & Singh (1998) projects the ideology that, the sum of the different relationships a company has, can create something much more valuable and impactful, than what a business could achieve individually. They argue that a solid network creates the foundation and conditions for achieving a competitive advantage with relational rents. This view therefore considers the dyads and networks of firms as the point of analysis to explain relational rents.

As relational rents Dyer & Singh (1998) identifies the following four sources:

1. Relation-specific assets
2. Knowledge-sharing routines
3. Complementary resources/capabilities
4. Effective governance

As opposed to the relational view, we find two major influencers, being the industry view and the resource based view. According to the industry view, the reason for competitive advantages and relational rents is to be found in companies position on the market and their structural composition, whereas the resource based view argues that is to be found in companies heterogeneity and their ability to elevate resource (Dyer & Singh 1998 ; Treibelmaier 2018).

However, this thesis takes on the angle that competitive advantages and conditions are created as a result of interorganizational capabilities, which is why the relations view is sought to be more suitable. Since considering the network and the relations a company operates within, is deemed interesting and relevant when wanting to understand BCT's impact on supply chain management. This theoretical view is interesting in connection to BCT as it provides an approach to understand and explain the posterior gains and potentials of working up relations that are BCT driven. Furthermore this view can also help understand how BCT in creating a "chain" of information on matters such as accuracy, timeliness of production or payments, resources, knowhow etc of potential partners , could potentially benefit or hamper future collaborations. This view does further provide some parameters on the determinants of interorganizational competitive advantages, which is interesting in considering and evaluating how BCT could sustain the supply chain and thus help develop the interorganizational relationship. These determinants are relation- specific assets, knowledge-sharing routines, complementary resource and capabilities and effective governance Dyer & Singh, p.663 (1998).

It is further interesting as it distinguish between two different classes of governance used between alliance partners (elaborated on later on) that are interesting in considering if and how BCT is relevant in a supply chain context. These two classes can help understand how companies approach safeguards and thus how BCT could affect these.

Dyer & Singh (1998) argues that among many challenges for gaining relational rents by combining complementary resources, but in particular the challenge of first of all finding the relevant partners but second of all discovering the potentials of combining respective resource (to clarify, tangible as well as intangible resources). The biggest issue within this idea of finding and evaluating potential complementary partners does however, according to Dyer & Singh (1998) lies in the access to "accurate and timely information on potential partners" which is interesting in the context of BCT and if could provide at tool for to the supply chain relationships emerge easier, due to more transparency thereof.
In this context Dyer & Singh (1998) argues that most often the reason as to why collaborations fails in succeeding is due to "organizational complementarity" or more, the lack thereof. Organizational complementarity referring to their "compatibility in decision process, information and control systems, decision making processes and cultures". Making it relevant because BCT is considered valuable in sustaining especially such matters.

In the perspective that BCT is said to reduce transactions costs is interesting in connection to relations in particular as to understand how companies thus approach such potential alliances . To provide a lens for looking into this issue, the relational view distinguish between two classes of governance that companies take on to reach a common consensus. These are:

- third-party enforcement agreements (such as legal contracts)
- self-enforcing agreements (here no third party is used to ensure/prevent violations)

Within the self-enforcing agreements the theory further distinguish between two kinds of governance mechanism that is "formal" safeguards (eg. Investment/financial related hostages) and "informal" safeguards (e.g. embeddedness/ goodwill trust) and reputation Dyer & Singh, p.669 (1998). Since the view argues that depending on the level of trust in the relation, the alliances would either require or not require a third party element. This lens is particularly interesting to apply when considering how trust is impacted within the supply chain by BCT and thus also relevant to the sub-questions addressed in the problem statement.

Summing up the relational view is chosen to help interpret and explain how BCT affects the buyer-supplier relationship and relevant governance mechanisms, in a both an enabling and constraining perspective.

5.3.2 Network Theory and Power and Trust – Interaction Mechanisms

While the relational view provides an understanding of what constitutes value creation within supply chain networks another perspective is needed to provide an understanding of the structure of the network. Which brings us to network theory which stresses that the development in networks are developed through two separated but tightly closed types of interaction Halldorsson et al. (2007), that being:

- Exchange processes → On matters of, information, social processes, goods and services
- Adaption processes → On matters of logistics, personal, technical, legal and administrative elements

Treiblmaier (2018) argues that network theory "provides the underlying rationale for assessing the role and importance of companies interorganizational networks from a relational perspective" further confirming its complimentary aspect to the relational view (Halldorsson et al. 2007 ; Sriharan & Simatupang 2013) and thus this theory has also been chosen for this theoretical framework. Network theory does project a starting point for analysing how the interplay between the partners and the information-transparency could support managers and thus if personal relationships, in some sense could be substituted by BCT's ability to create increased information control. However as mentioned earlier, the descriptive nature of network theory needs to be supported by deeper insight in to what affects the efficiency and success of such networks and thus how these affect the overall collaboration. Though the network theory projects that trust and "personal chemistry" are essential to the dynamics of interorganizational networks, it needs a supporting perspective to address it. (Halldorsson et al. 2007 ; Kwon & Suh 2005 ; Sridharan & Simatupan 2013) further supports the importance of trust and also argues that the parties who negotiate and wishes to improve collaborative practices, must understand the role trust and power plays. Providing a conceptual framework for that, is that of Sridharan & Simatupang (2013), to further understand the reasoning behind interorganizational networks and the impact of trust in such dyadic relationships.

The power/trust framework considers three determinant factors as the foundation for the existence of trust and power in collaborations within supply chains:

→ Reciprocity

→ Collaboration (separated into value creation and appropriation)

→ Interdependence

They further argue that, power and trust are two interconnected concepts needed to generate confidence between partners in a network. As their framework suggests, the cooperative norms, power asymmetry, interfirm trust, influence strategies and interaction mechanism all together play an important role and impact on the success of value creation and value appropriation in supply chain collaborations.

Elaborating briefly on the above mentioned components of the framework, *Cooperative norms* constitutes the first part of the framework and is described as the common perception and expectations that the partners have towards each other's behaviours when then are working collaboratively to achieve shared as well as individual goals. The cooperative norms are linked to *Inter-firm trust* in that sense that the development of cooperative norms impact interfirm trust overtime. Sridharan & Simatupang (2013) describes *inter-firm trust* in relationships "as expectations that a partner can be relied on to fulfil obligations and negotiate and act fairly when possibility for opportunism is present".

Moving on the framework address , *Power asymmetry* which describe a relationship in which one partner is more powerful than their partner in the supply chain. It is further characterized by what each partner have of underlying capacity (capabilities//resources) that can benefit them in collaborations and thus the dependence degree they should have on one another. Sridharan & Simatupang (2013) defines power asymmetry in a network of partners "as a situational factor that represents its potential influence on other member's attitudes and behaviours". In an overall perspective power asymmetry differs from exercise of power in that sense that it portrays the potential power partners can contribute with to a collaboration rather than how they can exert it (Kim et al. 2015 in Sridharan & Simatupang 2013). From here the framework connects to i*nfluence strategies* that is defined "as the attempts to leverage

existing power capabilities through communication tactics with partners" Sridharan & Simatupang p. 85 (2013).

Power asymmetry is linked to influence strategies on premises of:

→ Difference in knowledge: That the different knowledge the partners possess allows the party with more power to exert influence strategies, based on their (perhaps superior) knowledge. While this ability to influence bilateral communication allows partners to contribute to the shared success it is exerted on the basis of their power advantages. The initial outcome is that power asymmetry in exerting influence strategies allows the members to reach outcomes that are more synergistic.

→Mutual dependence: Is the notion that power asymmetry forces the partners to co create mutual adjustments in order to perform joint task with success.

Next section in the framework evolves around *interaction mechanisms* which constitutes:

- Performance accountability
- Information sharing
- Decision synchronization
- Process integration
- Incentive alignment

Power and trust (inter-firm trust) is highly connected with creation and development of these interaction mechanism. Furthermore the framework argues that higher levels of trust is increased through the use of influence strategies which then increases the chance of partners aligning their interaction mechanisms to benefit the collaboration.

At the end of the framework is *Value creation / Value appropriation* that is of the outcome of the collaborations.

Putting this theoretical framework into a BCT perspective becomes interesting, as many of the interaction mechanisms the framework addresses relates to the main areas BCT have been argued to contribute to. Particularly the interaction mechanisms is interesting in connection to BCT and could be connected directly to matters of BCT, as such:

- Performance accountability/ Information sharing/ Process integration → Blockchain system
- Decision synchronisation/Incentive alignment → Smart contracts

Several authors stresses the importance of sharing information (Dyer & Singh 1998 ; Halldorsson et al. 2007 ; Mayer et al. 1995) in reaching successful supply chain coordination while limiting unnecessary additional inventory costs. Sridharan & Simatupang p.87 (2013) claims that it is the "glue" for collaborations but also agrees that convincing "exchange partners to share proprietary information is always a challenging task". This point addresses the uncertainty of sharing information and thus lack of transparency, which is interesting in the context of BCT, since this is one of the main area it is predicted to sustain. Thus remembering that trust is considered a precondition to collaborative success and sharing information, which are enforced trough efforts on influence strategies and that are considered very effective when implementing interaction mechanism such as information sharing or performance accountability.

Kwon & Suh (2005) found that in order to achieve the full benefit of collaborations in supply chains it is essential not only to share critical information on the supply chain (e.g financial or operational data such as production capacity, cost efficiency, production performance etc) but certainly also strategic information sharing (typically of forecasting character such as volume, market strategy, product capacity/switch-over). In this context (Halldorsson et al. 2007 ; Kwon & Suh 2005 ; Treibelmaier 2018) furthermore agrees that creating trust in relationship is a process that takes time to build-up, further supported by the network theory ideology. Which leads to considering if BCT opportunity of creating traceable, yearlong mapping of data, could perhaps "speed up" the process of partners trusting each other quicker due to data transparency (could be data on on-time delivery, production reliability etc).This framework is furthermore be interesting when addressing the sub questions as mentioned in the problem statement evolving around the matter of trust.

5.3.3 Principal Agent Theory

The principal agent theory Jensen & Meckling (1976) has an interesting approach on how to understand company relations and what influences them when they are interacting. The theory concerns the delegation of responsibilities in a relation and presents an interesting division

between the principal and the agent. The principal is the one who delegates a certain task to another part, that is the agent and in this transaction the principal sets up a payment or reward, which has to be high enough and provide the agent with incitements strong enough for the agent to conduct the task in alignment with the principal's wishes.

This approach is useful when addressing the external relationship in supply chains and the fundamental assumptions of the theory is that there exists a conflict between the interests between the two parties and that along with that the information between them is characterised as asymmetric. Meaning that neither of them has comprehensive knowledge of the other parties actions. Aside from that the theory assumes that both the principal and the agent always will work towards maximizing their own advantages, meaning both of them are acting opportunistically and would choose the scenario that benefits themselves best. Which arguably influence the interactions in relations making it more difficult to align incentives. All of these perspectives can be considered relevant in the context of BCT particularly because they could be connected to many of the issues which BCT is predicted to improve.

Additionally the principal agent theory mentions two issues which occur within principal agent relations, one aspect of the relations as being the 'principal-agent problem' that projects the issues that can arise in a conflict of interest. Such conflicts evolve around the priorities and handling of assets in a collaboration, where the principal and agent has not have the same intentions. The problem also comes down to the principals issues of not having, either or both, the resources and practical capabilities to keep the agent's actions under surveillance Jensen & Meckling (1976).
The other issue within this relation is the risk problems, as the principal and the agent attitude towards the willingness to take on risks may be divergent. If the principal cannot recognize the contributions of the agent they may tend to hesitate and if the risk affects the agent economy the agent may be very reluctant in terms of risk willingness.

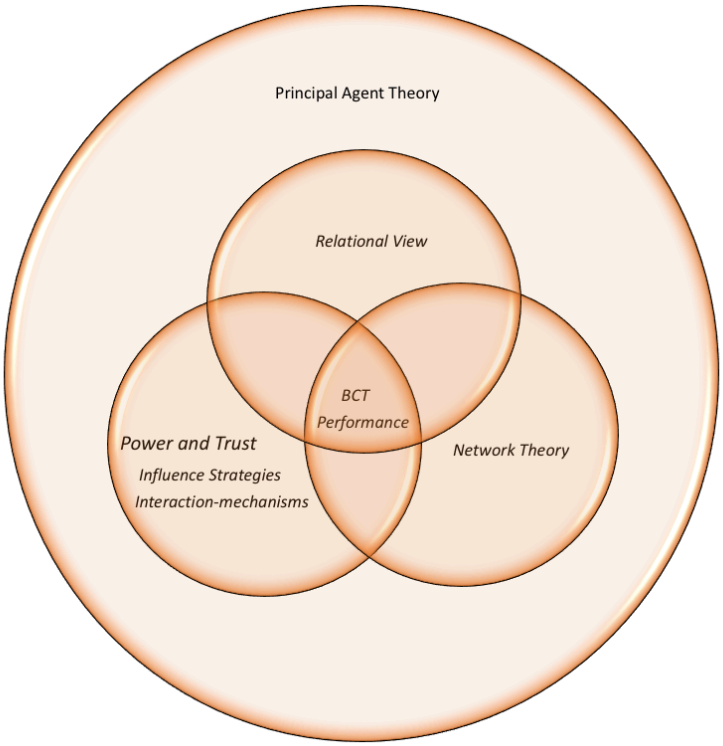
The theory provides a perspective to the issues of control and how the principal and agent acts when control and ownership is separated. Furthermore the theory suggests that to solve

the given problem between the two parties processes and priorities must be aligned to improve the information flow between them, which is interesting in the context of information sharing systems such as BCT.
Principal agent theory is taken into the perspective to explain how complex inter- and intra-organizational dependencies will be impacted when transactions and information transparency change, also in the external environment. Furthermore this theory is applied to explain how the relations changes as BCT enables better information flows.

Summing up, combining the relational view with the network theory should help understand relationships from an inter- and intra-organizational point of view and how these influence the creation of relational rents, while the conceptual framework by Sridharan & Simatupang (2013), should provide an approach to consider how power and trust influence this interorganizational relationship. While principal agent theory shall help understand the relations supply chains have with the external environment. These theories shall ultimately all together help understand how BCT influence the relations in an inter-, intra- and extra organizational supply chain network. These theories, sustaining and complementing different perspectives on the topic, shall function as the chosen framework for thesis.

Conclusively different perspectives, models and theoretical approaches has been discussed as to how they could contribute to this study. The most relevant has been selected, with consideration of how they could support the discussion of BCT. An overview of the selected theories and thus the theorical framework for this thesis is presented in the following table:

5.3.4 Theoretical Framework Table



6.0 Methodology

The purpose of this section is to describe the methodological approach applied to this thesis. The first section is discussing the different approaches to conducting a literature review and the chosen approach. It also presents the process applied to conducting the literature review. The second section discuss how this approach aligns with theory of science.

6.1 Conducting a structured literature review

There is different ways to conducting a valuable literature review. A meta-analysis, that is a statistical approach implying a combination of results from different studies that is then coded and eventually configured into a metric that enables an calculation of the overall effect. However, it is also a very comprehensive process and it is required that studies which is compared share the same statistical measures Snyder (2019). Which makes it irrelevant in the

scope of this thesis as its was intended to take on a more qualitative approach applying data from different studies.
Another approach is the semi-systematic review, which takes on a more narrative approach and is used for researching topics which has been studied within different disciplines and has been conceptualized differently, making it difficult to conduct a systematic review Snyder (2019). This approach is often used to look into how a particular field has developed over time and across research fields and not considered compatible with the scope of this thesis as the subject could be considered to unexplored for that.

A structured literature review offers an approach to comparing different qualitative studies across the same topic, which is why the structured literature review was chosen for this thesis and conducted following the tree suggested steps by Tranfield et al. (2003). This qualitative approach was chosen because the structed literature review process is considered interesting and very relevant when wanting to examine the impact and effect of something across studies on the same topic and thus to discover what future research could require Snyder (2019). Which aligns with the scope of this thesis, wanting to discover the relational impact of BCT across supply chains operating within different lines of businesses.

Step 1
From the scoping of the assignment described in the previous chapters the following keywords was identified as relevant for the research question and are as follows:

→ BCT / Supply chain
→Buyer-supplier-/partnership-relation
→ Governance mechanisms
→ Trust
→ Power / power asymmetry

These keywords was further searched in 'related words', which was important for step two when selecting the relevant sources, as words can be chosen differently by authors but thus project the same meaning (see attachment 1).

Moving on the literature review search, was conducted by searching blockchain and supply chain, using "and" in between so that the it will only retrieve sources that evolves around both. This gave 1.108 results on CBS LibSearch, that it the chosen search platform which has access to several relevant platforms, such as Sage publications, Elsevier, Emerald Insight, Science Directs etc.
Aligning the search with the research strategy the sample was further narrowed down to only including peer reviewed sources and lead to 632 samples.
From there on the search was limited to only including English literature while also adding some topic words which were blockchain, blockchain technology, supply chain management, supply chain, supply chains, Internet of Things, business, smart contracts, smart contract, privacy, security, logistics and Ethereum, which further limited the search to 203 sources.

Step 2
In the second step the 203 results were screened to find the most relevant sources to sustain a theoretical understanding of how BCT would affect the interorganizational relations in supply chains. The screening process included different selection criteria which first of all was that the source had to deal with blockchain and supply chain in the topic words. Secondly it had to discuss impact on relations / collaborations in supply chains that BCT would cause. Thirdly sources which dealt with issues of either power and/or trust was highlighted. Searching for the chosen keywords within the sources helped to identify the relevance of the source. Depending on the source these criteria was looked for in abstracts, introductions/conclusions, sections of contextualization or research findings and lead to a sample of 36 sources (see attachment 2).
Considering the descriptive information on the sample the sources consisted of 34 academic journal articles and 2 conference attributes, across different topic areas and research journals. Of the selected resources 22 % appeared in supply chain management journals, 18 % in

information management journals, 18 % in journals of computers and industrial engineering, 10 % in journals of physical distribution & logistics management, 7 % in technological forecasting & social change, 7 % in journal of production research and 7% in industrial management and data systems. The remaining 11% appeared in outputs concerned with supply-, purchase-,accounting-, finance-,retail- and distribution management as well as sustainability, trade, decision making studies and future of internet and computer integrated manufacturing.

Step 3

Considering the extraction of data from the selected sources and the needed research synthesis, two interpretive and inductive approaches are considered relevant. That is the realist synthesis and meta-synthesis Tranfield et al. (2003). These were developed to fill the gap between the approaches of narrative reviews and meta-analysis. The narrative approach aims at identifying information on a given topic but does not attempt to generate any "generalizations or cumulative knowledge" on the given review Tranfield et al. p. 217 (2003). Whereas the meta-analysis method is another approach to synthesizing information by pooling data together across individual studies and create statically based evidence. However within management research this is a difficult method to apply, firstly because the data for the review might be approaching a phenomenon differently both in terms of the research question and measurements applied to the field. Secondly because researches are more concerned with interpreting the organizational and managerial processes rather than the effectivity to the intervention Tranfield et al. (2003). Thus providing arguments as to why these two approaches was considered irrelevant to this thesis.

The realist synthesis idea is to acquire an understanding of the evidence (in both a positive and negative perspective) as to how mechanism makes an intervention function or not. Furthermore an realist synthesis considers "what works for whom in what circumstances" Tranfield et al. p. 218 (2013) and in this perspective the cases (of BCT implementation/pilot projects) which occurs in this literature review is gathered separately and is also considered relevant secondary data to support the research question in this thesis.

The meta-synthesis provides an interpretative research synthesis approach that considers different but related qualitative data to be able to identify "theories, grand narratives, generalizations, or interpretative translations produced from the integration or comparison of findings from qualitative studies" (Sandelowski, Docherty and Emden 1997 in Tranfield et al. p 217 2003). Which is an interesting approach when the intention is to discover and examine the sources on whether there is different, agreed or related perspectives on the same phenomenon. It is furthermore relevant to mention what makes meta-synthesis differ from and not to be mistaken with meta-analysis, is that it is not limited to restrictively considering comparable studies, as it interprets data rather than analyzing and making the data connections analogical.

Coding Process

The coding process was conducted to be able to identify the impact BCT has on the relationships in supply chains and both of the synthesizing approaches as mentioned above, are relevant when coding the sources from the literature review. A coding process of the qualitative data retrieved is necessary to create an overview and to support your literature review with a "thematic analysis" as Tranfield et al. (2003) argues. Extensively to be able to research various aspects of the chosen research field, to discover the different perspectives and if consensus is shared across the given researchers. Codes are identified as "tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study" Miles & Huberman p. 56 (1994) and this thesis used category labels of the retrieved data to pool it together to comparable or objecting perspectives. The different publications was firstly provided an individual code and then read through, by looking for the different keywords and asking relevant questions. Following Tranfield et al., (2003) systematic reviews allows practitioners to create an evidence-informed practice that is most effective if specific questions and keyword are set up to research upon and thus develop a "context sensitive" approach. The keywords were such as mentioned in the beginning of this chapter and the questions asked to identify how the relations would be affected by an BCT implementation to supply chains, were such as 'relationship influence', 'collaboration impact', 'cooperation', 'will impact trust' and 'supply chain management

relationship/collaboration' all in the context of BCT. The material was processed keeping these search terms in mind and reading through the data retrieved from the review, 6 out of the 36 sources were considered irrelevant to the chosen scope for the thesis, either because they were applying a mathematical approach, an irrelevant view such as too country or field specific or simply not addressing relational impact (leaving out number 3,5,27,28,33,34). Moving on from that the different findings was listed in a table, presented in the next chapter, to provide an overview of the outcome of the literature review and coding process with labels that derived from the search Miles & Huberman (1994).

6.2 Theory of science

The realist approach as described above takes on the interpretive approach to conducting a research synthesis. This approach is more likely to help create insight on and addressing issues connected to management Tranfield et al. (2003). Additionally the realist synthesis challenges the positivistic orthodoxy dominating the approaches to research reviews, as it suggests that a synthesis can be a process that offers a more holistic approach, as it is inductive, interpretive and based on an elective process Tranfield et al., (2003). Thus offering an approach compatible with the basic premises of hermeneutic.

The interpretive approach is characterized by emphasizing humans in a social context including social actions, motives, beliefs and relations which needs to be understood in order to interpret and understand the social reality. Meaning that in a study, human interests is integrated to make meaning of the phenomena that is studied. Additionally it favors qualitative data over quantitative in terms analyzing and thus uses interpretations to make meaning of the involved elements. It furthermore suggest that social science research that studies humans and their social world should not be done with same approach as to studying natural science. Instead interpretivism is critical of the idea of the universal 'laws' that the positivistic approach suggests applies to everybody and oppositely believes that human insights should be observed and understood in terms of its varying and complex patterns. With consideration of how social realities are influenced on matters such

as the different contexts, the cultural backgrounds and the time that the interaction is happening within Saunders et al. (2015).

The purpose of approaching the research with a interpretivistic research method is to generate an understanding of the phenomena considering the social context and the situation in which it takes place. In a management research context this entail understanding and interpreting the phenomena from the different social grouping and relations of people. Which could be considering how hierarchy and different roles in an organization impact, how the workplace reality is perceived. All in all interpretivist research is making account of the relevant social aspects in a complex context by collecting relevant data needed to research the given phenomena. A critique of the interpretive approach is however that it can be influenced by the researcher's own interpretation of the material and therefor impact the outcome which is why one has to be considerate of adapting to an empathetic stance Saunders et al. (2015).

This approach was furthermore considered relevant to the scope of this thesis, as it is dealing with a technology which is still in its early development. Furthermore because projects in many industries are often conducted in private behind closed doors where experience and outcome is not so often shared. Which is also evident in the case of BCT. In this perspective academia is considered to provide a different approach such as suggesting best practice approaches to the industry, for instance by comparing best practice from other but comparable industries Treibelmaier (2018).

However, some use-cases have been published and were considered relevant as using 'illustrative cases' as a part of this theoretical thesis. It should however be noted that an 'illustrative case' cannot stand alone and is not to be considered as a leading principle. Nevertheless using illustrative cases can serve the purpose of supporting the theoretical points or contrast provide an opposing perspective. While it displays practical relevance it can additionally methodologically be considered as a legitimate statement Ankersborg (2020).

7.0 Literature Review

In this chapter the purpose is to create an overview of the findings from the literature review and present the outcome of coding the process along with the use cases that was retrieved during this process.

7.1 Content analysis - Coding

Definition of the codes

Reading through the data retrieved from the literature review it was clear that the impact BCT could have on relations in supply chains are linked to different situations to which the relation is unfolding. That is the interorganizational relations, intraorganizational relations and the external environment relations, therefore the coding process has been divided in the respective subheadings. Interorganizational refers to the relations between the companies in the supply chain, as such the collaborative network, whereas intraorganizational refers to the relations within the company and external environment refers to the relations companies have with different entities such as legal institutions, local and global governments, NGO's etc. Furthermore its relevant to clarify that 'impact' as mentioned in table 2, is meant to cover BCT's influence in both a positive and negative manner. The table provides an overview of the relational impact retrieved in the literature review that has been piled together in to different 'impact areas' as seen in the left side of the table and has been compiled by the different 'category labels' as Miles & Huberman p. 56 (1994) defines it. On the right side of the table, the numbers represents the author(s) who supported this impact area (the numbers on the authors are as listed in attachment 2).

Table 2 – Coding Outcome

Impact Areas	Author(s)
Inter-Organizational Relational impact	
Conflict of Interests	6,18,20,22,24,25,26,29,31,32,35
Trust Issues	16,2,9,15,16,29
Safeguard Governance Rules	7,8,14,
Reduce Opportunistic Behaviour	1,13,16,21
Enhance Collaboration	7, 8,9,10,13,16,17,18,23,26,32,36
Increased Trust	1,2,4,7,8,13,14,15,18,19,22,26,29,32
Enhance Sustainability Activities	12,21,24,26
Relational Rents	1,7,8,12,24
Reduction of Bullwhip Effect	1,4,14,16,18,23,36
Investment Costs	4,6,9,20,24,25,26,27,32,36
Smart Contract Issues and Benefits	9,19
Cultural differences	4,6,21,24,25,26,29,32,35
Lowers Transactions Costs	2,4,6,7,13,18,23,26
Intra-Organizational Relational Impact	
Governance Mechanisms	6,8
Facilitate Better Decision Making (e.g. due to better performance measures)	1,4,13,16,22,23
Increase Firm Performance	7, 8,9,10,13, 16,18,23,31,36
Investment Costs	4,6,9,20,24,25,26,27,32,36
Lack of Management Commitment and Support	6,8,9,20,24,25,32,35,36
Organizational Structures / Readiness	4,6,8,9,11,29,35
Lack of Technological Expertise / Compatibility	6,9,11,20,26,29,32,35
External Environment Relational Impact	
Labour Availability	25,29
Technological Development	6,9,23, 25
Legal and Regulatory Conditions	6,13,25,26,29,32,35

The different impact areas, covers different aspects in the context of BCT which has an impact on the relations within supply chains. Following is a brief description of what the different

labels, as listed in the table above covers. In depth presentation and discussion of the outcome of the literature review is presented in context with the next chapter.

Inter-Organizational Relational Impacts:

Conflict of interest

Conflicts of interests covers different relational impacts when considering a BCT implementation. This category covers coordination complexity, information asymmetry, governance alignments, hesitation of information sharing, goal and purpose alignment, which all together can lead to a conflict of interests. As seen in table 2, this impact area scores quiet high, suggesting that this one of the major impacts on the relations and thus the success.

Trust Issues

This category label covers issues related to trust, despite the literature review indicated a clear consensus about BCT providing better conditions for trust in general, some authors argued both for and against, which is why they are represented in both category labels. Trust issues mainly comes down to matters of trust the technology in itself and the arguments for that a BCT implementation will naturally lead to new issues of trust.

Safeguard Governance Rules

This label covers the argument that BCT will function as a new tool for safeguarding governance rules and thus impact the relations in the sense that compliance is measured through algorithms. These rules can ultimately be executed through smart contracts.

Reduce Opportunistic Behavior

BCT is argued to have a positive impact on opportunistic behavior, which has a major influence on the success of the relationship in supply chains and this perspective was supported by many of the authors as seen in table 2, indicating that this could be considered one of the major relational impacts of a BCT implementation.

Enhance Collaboration

An successful BCT implementation leads to enhanced collaboration, which is one of the most repeated impacts through the literature review. However many of the other mentioned labels are prerequisites for the collaborations to be successful, such as the governance structures, management support, trust, willingness to share information, costs, cultural differences etc.

Increased Trust

Most authors mentioned increased trust as one of the major outcomes from a BCT implementation and it also seems like one of the highest motivation for businesses to engage with BCT. Increased trust comes due to the more transparent and accessible shared information access.

Enhance sustainability activities

This label refers both to sustainability activities in connection to the actual production and the environment. It also refers sustainability activities in terms of humanitarian working conditions and some authors argues that BCT can enable better conditions for these two perspectives. Production transparency can be considered an valuable asset for companies considering their stakeholders and also impact supply chain relationships.

Relational Rents

BCT was considered able to generate relational rents by some authors and this label is considered quiet relevant in the relational perspective.

Reduction of Bullwhip Effect

Different authors argued that BCT would have a positive effect on the bullwhip effect which can be considered to have a great impact on relations within the supply chain.

Investment Costs

The cost of implementing BCT into supply chain management and thus the ability and willingness to invest in it is considered an import aspect of the relational impact.

Smart Contract Issues and Benefits

Smart contracts are considered to both have enabling and constraining effects in the relationship. They are considered to be able to make some processes more effective and some more complex.

Cultural Differences

Many authors (see table 2) considered cultural difference of important influence to the relations and these may be present in aspects such as human behavior, difference in digital readiness, language (verbal/body) etc. that can challenge a BCT implementation.

Lower Transaction Costs

An BCT implementation is prospected to lower transaction costs, which has a great impact on the relations and the overall motivation for implementing BCT.

Intra-Organizational Relational Impacts:

Governance Mechanisms

Internal governance structures are important when managing information sharing complexity and standardization, as it impacts the outcome of the relations in the given network. This label also considers potential partners governance structures as considering their competence level before engaging in a collaboration is an important step when establishing relations.

Facilitate Better Decision Making

With BCT comes faster, increased transparency and more information sharing among partners in a network and it is argued to facilitate better decision making on an internal level, which

benefits the overall decision making. Decision making in this context refers to production change over, management initiatives and conditions for collaboration.

Increase Firm Performance

In connection to BCT facilitating better decision making, another parameter which many authors (see table 2) agreed upon was the increase of performance. More transparent information between partners increases the responsiveness and thus allows better production adjustment and management.

Investment Costs

The willingness and capability of a firm to invest in new technology is considered an important element in the supply chain network. Many times the unwillingness can come down to issues with fully understanding the actual benefits and truly understanding how the technology works and thus can impact the relations. Other times it can be because smaller partners in the supply chain simply does not withhold the finance to sustain such investments.

Lack of Management Commitment and Support

This label covers the lack of management commitment and support, issues of internal coordination and communication of the actions tied to the supply chain seems to be one of the most difficult aspects when engaging with new technologies in the supply chain network.

Organizational Structures / Readiness

Somewhat tied to the previous label, the organizational structures and readiness thus also project an impact on the success of the relations in the supply chain network. This label also covers the cultural aspect of organizational structures.

Lack of Technological Expertise / Compatibility

Intraorganizational technological expertise influences the compatibility of an relation and is thus considered an important label.

External Environmental Relational Impacts:

Labor Availability

This label covers an issue within the external environment that is the scarce labor availability and people with BCT expertise.

Technological Development

The speed of the technological development can have a considerable impact on the relationship and with the continuous development certain parts of the supply chain with less powerful position may be less flexible, opposed to those with greater power (and economy).

Legal and Regulatory Conditions

The most dominant impact on relations seemed to be issues of legal and regulatory conditions. This aspect considers the implications of how regulations on a global and local level can differ and thus create relational barriers.

7.2 Use case presentation

The literature review presented different relevant use cases listed in the following table 3:

Table 3)

Case Nb:	**Company**	**Blockchain use**	**Source**	**Industry**
1	AgUnity	Has created an app, that eliminates the current paper-based approach amongst farmers and suppliers, since this collaboration most often entails unfair negotiation conditions and thus prices. BCT was used to create transparent information regarding market prices and eliminate the need for personal trust.	https://www.agunity.com/	Farming

2	IBM & Maersk	BCT was tested in pilot projects to reduce heavy amounts of paperwork in the logistics industry and optimise its digitalization. Prospectively to create a system which could create more transparency on information on the containers such as capacity and thus help reduce the amount of empty containers shipping back and forth.	https://www-03.ibm.com/press/us/en/pressrelease/51712.wss / https://www.maersk.com/news/articles/2019/07/02/hapag-lloyd-and-ocean-network-express-join-tradelens	Shipping/logistics
3	Carrefour	Carrefour use BCT to track different food products through their range of products to provide customers with information on product origin/journey.	https://www.reuters.com/article/us-carrefour-blockchain-idUSKCN1T42A5	Foods
4	Alibaba	Applied BCT to create a system for tracking goods on their platform and thus generate more transparency for costumers.	https://www.securingindustry.com/alibaba-launches-blockchain-initiative-for-t-mall-/s112/a7051/#.XqhC5C061Bw	Logistics/Online Marketplace
5	DHL & Accenture	BCT tested in the pharmaceutical logistics to create a system that could help rule out counterfeit medication.	https://newsroom.accenture.com/news/dhl-and-accenture-unlock-the-power-of-blockchain-in-logistics.htm	Pharmaceutical Logistics

6	JD.com / Walmart / IBM	An alliance amongst JD.com, Walmart, IBM and Tsinghua University, working towards creating standards for how information and data should be gathered and shared in food supply chains in China.	https://jdcorporateblog.com/walmart-jd-com-ibm-and-tsinghua-university-launch-a-blockchain-food-safety-alliance-in-china/	Foods
7	Petroteq	This project implied a BCT application together with an IoT integration to improve supply chain management	https://petroteq.energy/news/press-releases/detail/256/petroteqs-petrobloq-announces-capabilities-of-blockchain	Energy
8	Walmart / IBM	BCT driven system for ensuring food safety by enhancing the overall traceability and transparency, minimize data redundancy and thus reduce amount of counterfeit.	https://www.ibm.com/blockchain/solutions/food-trust	Foods

8.0 Analysis

In this chapter the data retrieved from the literature review is presented and discussed in the context of the theoretical framework. Taking on the different subheadings created in the literature review, this chapter build on to that structure, discussing the relational impact of firstly the interorganizational relations, secondly the intraorganizational relations and thirdly the external environment relations. Lastly followed with a discussion of the considerations the management should make when considering BCT implementation in supply chains. Furthermore, when relevant, the different relational perspectives are discussed in the context of the different use cases, presented in the literature review.

8.1 Inter-organizational relational impact

8.1.1 Conflicts of interests - Organizational structures, governance and complexity

The interorganizational relations in a supply chain network is complex and influenced by many parameters and in the context of an BCT implementation it would have an impact on these interorganizational relations. Normally when doing business in supply chains, transactions or exchanges are confirmed or registered by a third party, trusted by both partners doing business with each other in the network. When implementing BCT as an information managing and sharing tool in a supply chain network, it implies that the value proposition of BCT removes the otherwise traditional need for a central intermediary and so occurs a so called “disintermediation” Tönnissen & Teuteberg p.7 (2020). Disintermediation is the notion that there is an elimination or reduction of the middlemen involved in transactions between the partners in the network Tönnissen & Teuteberg (2020). Middlemen in a supply chain context could be those such as brokers, retailers, dealers and banks. Disintermediation also refer to a relation where the partners in the chain are conducting business directly with each other and have a relation to each other, without any intermediary. This perspective is especially interesting in the light of increased digitalization as a market conditions and opportunities are changing, which have had an impact on the roles and functions of intermediary’s. BCT could be considered yet another one. To clarify, the central functions of an intermediary is usually being the middleman in transactions of goods or services in a supply chain environment. The intermediary’s job is to mediate information regarding supply and demand, information on prices and trade conditions as well as information on knowledge- and material- flow. Value is added by the intermediary as they are relied on for the reliability and efficiency on aspects such as, payment arrangements, logistic management and additionally create value by functioning as a consultancy entity that generates a trusted middleman, allowing businesses to create relationships with new unknown partners with a sense of a reduced risk scenario. The intermediary thus function as a service provider in itself as they offer a platform and technology for the business environment. Additionally an intermediary also functions as a regulatory entity in that sense that it covers the high costs of controlling bilateral contracts and uncertainty regarding legal aspects Tönnissen & Teuteberg (2020).

However, some of these processes conducted by intermediaries are considered to be up for rearrangements and renewal to increase efficiency and potentially reduce costs. For example the capacity of containers are not always fully exploited and generally the administrative processes around shipping are quiet extensive. In case number 2 of IBM and Maersk, the companies engaged in a collaboration with the purpose of modernizing the ecosystems of supply chains and thus created TradeLens. Up until then trading and transporting goods had been very expensive partially because it relied heavily on manual handling and the industry of logistics was generally identified as less digitalized. An example of this was a case that was tracked and analyzed in 2014, of a shipment from East Africa to Europe containing refrigerated goods. The shipment had been undergoing 200 interactions by different parties and been processed by neatly 30 employees and organizations (*Maersk and IBM Unveil Supply Chain Solution on Blockchain*, 2017). It was estimated by IBM and Maersk, that the cost of managing documents concerning cross-border trade, is up to one fifth of the physical transportation costs (*Maersk and IBM to Form Joint Venture Applying Blockchain to Improve Global Trade and Digitize Supply Chains - Jan 16, 2018*, 2020). This case example projects the conditions for the supply chains logistics and is a good example of what initiated the creation of Tradelens.

The platform, Tradelens, enabled information exchange across the ecosystem and participants across the network could collaborate more efficiently. Several stakeholders were engaged in the process and that included, government authorities, trading partners and other logistic companies. Within the application every participant are allowed access to an overview of where in the process the cargo is located and. They can furthermore view the status of the state costumes'-documents as well as display data on location as well as time of arrivals and shipping. This provides a transparent, real time visibility of cargos in the supply chain. TradeLens is furthermore industry neutral and is promoted as initiating more efficiency, secure and transparent information sharing while fostering greater trust and collaboration Wang et al. (2019).

This pilot case is probably one of the most successful ones and since the pilot, the two companies announced that they would engage in a joint venture with the goal of commercializing the Tradelens platform (*Digitizing Global Trade with Maersk and IBM*, 2018). This initiative would prove to further succeed when two logistic companies, that is Hapag-Lloyd and Ocean Network Express (ONE) adapted the BCT node to engage in a larger network of logistic information and communication being driven based on BCT (*TradeLens Blockchain-Enabled Digital Shipping Platform Continues Expansion with Addition of Major Ocean Carriers Hapag-Lloyd and Ocean Network Express*, n.d.). The press release states that the adaption of the two new logistic companies will also take on the role as "Trust Anchors" and collaboratively strive towards the goal of advising participants in the network on making the ecosystem of the supply chains more transparent and collaborative.

Moving on from this case example, Tönnissen & Teuteberg (2020) argues that BCT takes on the role of safeguarding governance rules when implemented in supply chain management. Though it is argued that BCT removes the need for a trusted third party, as Wang et al., (2019) and Tönnissen & Teuteberg (2020) argues it may give rise to the emergence "new breed of intermediaries". Which is the idea that a new intermediary is the outcome of the peer-to-peer characteristics of BCT and along with that the need for a central entity, which determines the rules for the collaboration this process is referred to as "reintermediation" Tönnissen & Teuteberg (2020). Making the "new-breed of intermediary" a commonly created entity which agree on the same terms for its function and thus creates the foundation for future collaboration, as it builds on the shared expertise, experience and industry/market knowledge. Its however important to notice that the expertise of the intermediary's along with their market and industry knowledge can cannot be replaced, Tönnissen & Teuteberg (2020). Nevertheless creating a common new intermediary system can be difficult when considering the *conflicts of* interests that may arise. Some companies may be less willing to share information as they may still view some information as a source to competitive advantages (Astarita et al. 2020 ; Wang et al. 2019) which may be considered a relational barrier. Though sharing information through a BCT driven system is argued to generate better conditions for collaboration and performance it could also be considered to intensify the competition among

partners as argued by Kumar et al. (2020). Unwillingness to share information and the potentials of intensified competition thus indicates that information disclosure policies can give rise to conflicts of interests and withholds great influence on supply chain relations and are very important to success thereof (Kumar et al. 2020 ; Saberi et al. 2019). The same goes for information asymmetry, which can also be considered an element causing conflict of interests as well as add to difference in power that also challenges the relational aspect Asteria et al. (2020).

Moving on from that it become evident that the information disclosure policy and the configuration of the rules within the business channels must be balanced correctly between the information visibility and competitive edge in the network to reach any successful BCT implementation Kumar et al. (2020). Because despite challenging the "original intermediary who executes and controls legal matters, there is still a need to make parts of the supply chain more efficient, for example by automating some processes. In this context smart contracts can be considered a way to sustain this balance. Smart contracts is argued to enable a more secure management of logistics and help reduce the need for paper based and manual activities and thus make some processes of the supply chain automated such as smart contracts executing penalties when agreements are not met (Chang et al. 2019 ; Helo & Schamsuzzoh 2020). Despite recognizing the potential improvements that can derive from smart contracts such as more efficient service as well as a more authentic information flow and increased levels of trust, deploying smart contracts which automatically executes when a partner within a chain fails to meet the obliged contractual agreements, could lead to relational issues within supply chain partners Chang et al. (2019).
When an organization is changing their model for conducting trade to rely on automatic processes which may be relying on algorithms, instead of relying on individuals, it may trigger their willingness as their understanding for the automatic processes and algorithms may be insufficient Cole et al. (2019). Besides that, smart contact agreements face some issues with respect to its complexity and technological functionality. As they can only carry the task they were initially assigned to, which means that if the coding contains any errors, it will fulfill its instructions regardless LegalVision (2018). Which could be considered one of

the major reasons as to why smart contracts cannot replace contractual agreements in a broader picture and thus only be applied to arrangement which allows and are suitable with an automation.

Supporting the findings of conflict of interests and governance issues as being as one of the major barriers to a successful BCT implementation, one of the sources from the literature review consisted of expert interviews about the potentials and barriers of BCT. It interviewed people, with backgrounds within blockchain, asset management, a mix of these and were either in practice, consulting or academia Kurpjuweit et al. (2019). Here conflict of interests and governance issues, was some of the barriers given the highest scores further supported by following statement "Obviously, governance is a challenge. Especially when the consortium grows" and "It will be the task of a dedicated team to develop a governance system that defines participation and influencing rights.(…)That would be very complicated" Kurpjuweit et al. p 12 (2019). Which confirms the importance of recognizing and acknowledging that BCT will only have the ability to take on some of the needed intermediary task within the supply chain and that undertaking a BCT approach requires considerable managerial investment to be successful Tönnissen & Teuteberg (2020).

Matching governance mechanism with other partners and creating common governance initiatives, would in the light of network theory be considered as the *adaption process* and the information disclosure policy, governance structures and the smart contracts, all together the projects the *cooperative norms* as Sridharan & Simatupang (2013) argued in their framework. Besides that conflicts of interests that can be argued to be closely related to the 'interaction mechanisms' in the same framework, as it's a part of the 'process integration', 'incentive alignment' and 'decision synchronization'.
The development of cooperative norms and interaction mechanisms are important for creating trust and aligning the intentions for the relation as well as reaching the final goal of generating value.

Considering the governance classes that the relational view Dyer & Singh (1998) suggests that companies takes on when reaching a common consensus, a supply chain without BCT and where transactions would have to go through a trusted third party, would be what the relational view defines a as “third party enforcement agreements”. Meaning that supply chain activities would go through an trusted intermediary. Opposed to that, a supply chain with a BCT implementation with a peer to peer approach, that would be classified as a “self-enforcing agreement”. Meaning that transactions within the supply chain is managed and administered in the way the partners has agreed to, without any intermediary to control these agreements.
Though the relational view suggests that agreements can be of a self-enforcing character, two governance mechanisms within this kind of agreement is relevant when considering, just how agreements are still safeguarded in a non-intermediary relation. The initial access that has been given to the chosen partners and operators across the supply chain, is arguably an informal safeguard. Since its impossible to ensure against that the authority given to the BC is not misused or passed on therefore goodwill trust is the plausible informal safeguard in such case.

Smart contract on the other hand is arguably an formal safeguard, since it holds partners accountable for by having economic hostages such as penalties for failing to meet the agreed business terms, initially with the intention of preventing opportunistic actions within the network.

Overall investing in BCT technology for interorganizational supply chain management can be considered an both formal and informal safeguard and would impact the relations in that sense that they would need to develop shared governance structures. It could however be discussed whether there is a mix between the two classes of governance considering the relational view, when BCT is implemented in an supply chain. Because in a case where BCT is supporting the supply chain, the smart contracts does function like a legal contract between the partners in the network, equally legally binding compared to a regular contract, LegalVision (2018). Nevertheless, there would to some extent always be a need to substitute

this way of engaging in contracts in some aspects, with an impartial intermediary. Though the relational view argues, whether or not a collaboration requires a trusted third party element, comes down to the level of trust in the relation it could be anticipated that BCT could be considered as a tool to transform relations as well as the scope for practical operations within supply chain, rather than a tool that results in a complete disintermediation.

Summing up it is argued that BCT would add an intermediary to the already existing pool of intermediaries and thus increase the overall complexity in the supply chain network Tönnissen & Teuteberg (2020). Complexity which has in particular been argued to be one of the major barriers to BCT implementation Kurpjuweit et al. (2019) and reason as to why conflicts of interest could arise in the supply chain relations, Clohessy & Acton (2019).

8.1.2 Trust and power asymmetry

The reason as to why trust is so important in supply chain contexts is that it influences the participants risk willingness to engage in collaborative projects and therefor trust is closely related to measures of collaborative innovation and supply chain performance. Making trust a perquisite to strangers engaging in a business relationship Tönnissen & Teuteberg (2020). When the trust level is high it enhances the changes for collaborative decision making and the willingness to solve problems, which in turn help mitigate some implementation problems and as well as reduce opportunistic behaviour. Trust is considered the most important factor for a BCT implementation is to succeed (Gurtu & Johny, 2019).

Many authors in the literature review (see table 2) were found to argue that BCT would lead to an increase of trust and according to Wang et al., (2019), with a BCT implementation trusting other partners in the supply chain network may be considered more irrelevant. That is since trust in now more embedded or so to say ‘programmed’ into the BC, and as Wang et al., (2019) argues the relational investment is less necessary in that context, opposed to traditional supply chain relations. Which could be considered an attractive perspective for less powerful part of the supply chain. However as Wang et al., (2019) further argues the trust only stretches to the agreed action at a specific point in time, that is prone to rapid changes

and conditions, indicating that is questionable if the level of trust BCT would provide, is extensive enough.
Which is why an BCT implementation into supply chain management in turn, may create what could be understood as “system trust” Schmidt & Wagner (2019) or “digital trust” that may be a system for supply chain activities that has a higher level of trust since it was engaged with in a more collaborative manner and one way to establish trust among partners in a supply chain network is by developing interdepended measures Wang et al., (2019)

However it was also evident that an BCT implementation is exposed to treats such as faulty data/information, counterfeit and data manipulation and therefore trust issues will always prevail, even after a BCT implementation (Longo et al., 2019). A supply chain relationship that is very prone to experiencing failure and behaviour of an opportunistic character, need a trustworthy authority that provides security, reduce risk and can mediate the interests of all parties in the supply chain. That is often the role of the traditional intermediary, which is where BCT receives criticism in a supply chain relationship context, as the scope of the BCT does not offer any additional service or consultancy outside the system, as an intermediary in comparison would Tönnissen & Teuteberg (2020). Further confirming this view, Tönnissen & Teuteberg (2020) conducted a case research in which they found that none of the BCT based solutions they analyzed, could offer a level of trust and confidence on a digital platform, compared to that of a traditional intermediary

Aside from an intermediary, governance mechanisms is used to reduce uncertainty and to structure the exchange relationships within the supply chain, by means of both formal and informal measures and thus governance safeguards is an important aspect of the relation. The problem of safeguarding is connected to trust and levels of power asymmetry. Particularly power is a challenge within supply chain relationships and further connects to trust, in the sense that power and trust is two major factors for creating confidence in a collaboration Sridharan & Simatupang (2013). Nevertheless, when power asymmetry is significant it is argued to be an condition under which a harmonious supply chain network can be easier maintained and created. When partners are identifying the level of dependence in the network

it suggest that they are willing to break out of from an isolated approach and sacrifice a part of their independence that they perhaps value very highly, indicating that they see what these sacrifices can in turn give of collaboration. Adding to that actions of the counterpart could be considered of a less opportunistic character since they might be aware that a violation on the cooperative norms would have more comprehensive consequences (that could be such as getting a bad reputation that could be difficult to restore).

Therefore power asymmetry enhances and simulates the creation of cooperative norms and management of dependence which is particularly interesting in a BCT context Sridharan & Simatupang (2013).

Moving on to considering the aspect of trust on governance mechanisms. When partners engage in collaborations with a self-enforcing governance structure, implementing BCT as a management tool, still implies that parties would have to rely on relations build on personal trust, that is according to the relational view the 'direct experience'. Particularly interesting to the formation of such relations is the relational views notion that it requires a iterative process to create relationships of trust. An iterative process where partners have a direct face to face interaction that is both personal and extensive is proven to give the most successful collaboration Dyer & Singh (1998). Investing in an iterative process of continues exchange of information and sociotechnical interactions is thus argued to lead to the generation of relational rents. Which could be discussed if that is what could be missing in the BCT functionality, despite its transparent approach to information sharing and if it thus becomes to impersonal.

Considering a case where one of the goals of implementing a BCT driven platform, were to increase the general levels of trust is that of AgUnity. AgUnity is an app which is developed with the intentions of creating more fair market conditions for farmers and thus grant them a more transparent and reliable information access. In a line of business that is highly characterized by power asymmetry, where buyers exploit their superior information access and can take advantage over the farmers, such as dictating prices. The App make use of BCT in two ways, that is firstly providing farmers with transparent market price information along with an overview of previous transactions and secondly eliminating the role of trust among

the parties in the network. The app works by suggesting a price which both parties must mutually agree on before an transaction is confirmed. Schmidt & Wagner (2019) argues that in this case, personal or "relational" trust is ruled out and thus the different parties behavior is exposed to all users in the network, but however also argues that it creates a system based of computational trust or 'system trust' as described before.

Despite the intention of limiting power asymmetry amongst farmers and byers, its however important to note that the challenge of this case that everyone is needed to participate in this network for it to reach its intentions and have any effect. This case does however also project exactly what kind of influence power asymmetry has and how it can be exerted to generate better collaboration and value. Adopting BCT is still a struggle in practice as well as in academia, such as when considering how firms who operates with opportunistic behavior can still participate in the BC Schmidt & Wagner (2019). The problem is that the shift of the trust mediator, making trust based of the system thus forces parties who previously acted opportunistically to act differently Schmidt & Wagner (2019).

Though it is theoretically argued that BCT can eventually prevent opportunistic behavior to some extent, it will however not remove the need for safeguarding mechanisms and BCT will not significantly change governance measures including both internal- as well as relational-governance structures that relies on long-term trust and interdependence Schmidt & Wagner (2019). Which leads to considerations of the point of view, as to how BCT can benefit supply chain management, needs to be adjusted and thus be viewed as a supplement to enhancing trust rather than a technology that completely eliminating the need for trust developing measures.

8.1.3 Increased collaboration, relational rents and reduction of bullwhip effect

As the previous sections indicated, governance mechanisms, trust and power plays has an considerable impact on the formation of relations in supply chains and are very important in considering the success of a BCT implementation. If they however are aligned properly in a interorganizational perspective BCT can help sustain increased transparency and better

information sharing routines along with a private system in which all participants can learn Cole et al. (2019). In connection to the general consensus that implementing BCT technology can reduce opportunistic behavior as transparency increase so does collaboration (see table 2). Companies today are far more dependent of data accuracy, as the consequences of counterfeit data as well as data asymmetry can have considerable consequences for supply chain relations Longo et al. (2019). BCT is argued to further digitalize supply chain management and overall create better conditions for a more trusted collaboration in a very suitable manner (Longo et al. 2019 ; Rejeb et al. 2019 ; Van Hock 2019).

Furthermore a reduction of opportunistic behavior as a result of better knowledge sharing routines, is argued to foster better conditions for generating relational rents. On this notion, the relational view presents an interesting distinction on knowledge sharing routines and how these are created. At first to clarify, knowledge-sharing routines are described as "interfirm interactions that permits the transfer, recombination, or creation of specialized knowledge" Dyer & Singh p. 665 (1998). The relational view's suggests that to understand how knowledge sharing can benefit an organization, they must first recognize that there is a divide of what kind of knowledge that can lead to the development of relational rents. The distinction of knowledge is thus

1) Information
2) Knowhow

Where 'information' is characterized as, information that without loss of integrity, can be easily coded or systematized and shared once the parties has agreed upon a common consensus on the collaboration. In contrast to that, knowhow is information of a more strategic, tactic and more challenging to codify, ultimately something that is difficult to imitate and take on. From a business perspective, sharing knowhow is more likely to generate sustainable advantages in comparison to only sharing information. Particularly companies who manage to share and transfer knowhow are deemed more likely to generate relational rents in comparison to their competitors Dyer & Singh (1998). Besides understanding the different forms of knowledge sharing and the benefits of engaging with the different kinds, another important aspect is the "partner-specific absorptive capacity" which is the ability to

understand how to generate value from the knowledge shared in an interorganizational relation Dyer and Singh p. 665 (1998). Generating value is such as knowing how to assimilate the given knowhow and eventually make use if it within commercial ends. However it should be noted that a prerequisite is that the relation has agreed on an interorganizational consensus on how to identify and transfer valuable information and knowhow. The successful assimilation of knowledge is most often up to the similarity or overlapping of the partners knowhow and thus if they manage to assimilate it to existing intraorganizational structure.

This distinction is interesting in the context of BCT, as it could be argued that the success of a BCT implementation depends on the type of knowledge that is shared as well as the different parties ability to make something out of the knowledge. In connection to that it could therefore be argued that it is not enough to only share information that is possible to code into a shared BCT driven system, but also to share company specific knowledge and knowhow in order to generate relational rents. Making it evident that if BCT were to function as the intermediary, it would be insufficient if it is not supplied and sustained outsides its technological interoperability. In consideration of "partner specific absorptive capacity" and exchange process as the network theory projects it, BCT could however potentially benefit companies with being able to faster identify and compare their information in the formation of new relationships or ventures. Before moving on to figure out if sharing knowhow is the next step for collaboratively generating relational rents. In the in the light of Sridharan & Simatupang (2013) framework, this step projects the interaction mechanisms needed to generate value in the relation and evolves around setting up the frame for the collaboration.
Ultimately implementing BCT in supply chain management seems to have the chances of establishing a positive effect on relations and the general collaboration. In this context, matters of the bull whip effect was also argued to be significantly influenced by a BCT implementation. Since better collaboration, entails better and more transparent information sharing it enables supply chain managers to adjust production according to matters of demand. It furthermore enables management of the supply chain to reduce processes, transportation, costs, waste time, over-/under- production and generally the potentials of a reduction of bull

whip effects seems to be among the highest incentives to engage with BCT (Longo et al 2019 ; Rejeb et al. 2019 ; Rubio et al. 2018 ; Schmidt & Wagner 2019).

8.1.4 Cultural differences and enhanced sustainability activities

Despite living in a globalized world where borders are more fluctuating and trade has been made more accessible than ever before, cultural differences is still considered to have major impact on business. Many authors in the literature review (see table 2) argued that cultural differences has a great impact on relations in supply chains and the success of a BCT implementation.

Organizational cultures is considered one of these differences, that has an impact on relations. The organizational culture is influencing the values, work flow cultures and the rules for appropriate business and behavior Saberi et al. (2019) and thus impacts the overall attitude towards BCT. Which in turn may influence the interorganizational relations, since the risk willingness and level of cooperativeness is highly connected to the organizational culture Kurpjuweit et al. (2019). In Sridharan & Simatupang (2013) framework it is clear that differences in organizational culture is a big hindering to the development of cooperative norms and if the cultural aspect of partners organizations it is evident that it can hinder the interorganizational development Kurpjuweit et al. (2019).

Digital readiness and compatibility can also be considered a cultural difference perspective. Since some parties in a supply chain network may be more superior in terms of technological knowhow and technological development or simply have more financial availability to support it Gonczol et al (2020). Especially technological knowledge and expertise levels are considered low in agriculture Astarita el al. (2020) and can be a difficult aspect for wanting to further digitalize some parts of the supply chain. Besides that BCT is criticized of ignoring social contexts in its automated approach to transactions. Considering smart contracts in this aspect is a good example of how technological expertise can have a negative impact on supply chain networks. The contracts and the data provided to the chain can only be as good as the one who writes them in, meaning that bad coding in a smart contract context or data implementation can cause unwanted relational impact, if they are poorly carried out. Since it

would entail that immutability of the BC as well as information reliability may not prevail. In this context it is argued that objectively it is easier to reach a common data consensus than it is to achieve a social consensus that is influenced by expectations and values Cole et al. (2019). Overall indicating that BCT to some extent ignores the social context in which they are to function within.

Adding to that, challenges of communication such as differences in language can also create challenges to the integration of BCT Nayak & Dhaigude (2019) and are considered to be worse when partners in a supply chain are dispersed geographically Saberi et al. (2019). Styles of communication, hierarchy and formality expectations could also be considered to impact the relations expectations and this could in connection with the relational view indicate that the appropriate level of governance development is very important. Cultural embeddedness may have an influence on the expectations the organizations have as to how relations are developed as such how trust is established through direct experiences Dyer & Singh (1998).

Despite recognizing the importance of cultural consideration, BCT is also argued impact the relations by enabling better conditions for sustainability activities and thus increase conditions for less fortunate parts of the chain. Which in a B2C context can have a valuable impact on reputation and thus brand value but also in a B2B context as reputation could impact positions on the market. Since BCT would allow more transparency through the supply chain it would entail that opportunistic behavior is easier discovered and therefore less attractive to outperform on.

BCT furthermore argued to better conditions for workers, improving poverty and changing social inequality, which is also considered a sustainability action and something that impacts the relationship Yadav & Singh (2020), however that is when the technology has matured.

The AgUnity case as mentioned before is an example of how transparency provided by BCT can increase and impact sustainability actions through the supply chain but also an example of how technological expertise can be a hindering to implementation.

However this case particularly displays the issue with cultural difference impacting the understanding for and implementation of BCT. Aside from the AgUnity case, is another case from the retail company Carrefour, who started tracking chickens using BCT and providing customers with the opportunity of QR scanning the chicken to track the products journey. This entailed information on everything from processors, farmers and distributors, basically the whole supply chain journey. This was received very well amongst their costumers and Carrefours say sales on different products which was BC tracked increased. In 2019 they had 20 items which was traced using BCT technology and planned to add 100 more the following year. However Carrefour did experience trouble with getting some suppliers to share information on parameters such as employees and payments, especially with loose sold fruit and vegetables with origin from different farms. Furthermore they argued that providing tracking opportunities on just a few products within their product selection would lead costumers to think, recognize and acknowledge a greater range of products as reliable, than the particular one they traced. Which could lead to question what the real intentions and impact on the sustainability aspect of the initiative thus is, firm performance or improving working conditions.

8.1.5 Investment costs and lower transaction costs

In an overall perspective a positive outcome of a BCT implementation, is its ability to lower transactions costs which arguably has a positive influence on interorganizational relations in supply chains. It provides an incentive to be more transparent with information (and knowhow) and increases the willingness to share it with existing or potential partners (Cole et al. 2019 ; Chang et al. 2019 ; Gurtu & Johny 2019 ; Rubio et al. (2019) ; Wang et al. 2019). Despite bringing positive impact of a reduction of transactions costs, BCT is considered to require quiet heavy investments in terms of both software, infrastructure and time investment (Nayak & Dhalgude 2019 ; Preuveneers et al. 2017).

In continuation of the cultural aspect in the previous section. investment costs of BCT is furthermore considered in this perspective, as it may influence some parties ability to engage with new technologies. It cannot be assumed that all parties within the supply chain are able

to afford and sustain the need technological investments, needed to adapt BCT or other related devices Cole et al. (2019). Which is why it is suggested that parties of the chain who has the ability to financially aid the less fortunate parts of the chain by funding or providing the needed technology to run a shared BCT system Cole et al. (2019) Rubio et al. (2019) This would be an example of how power asymmetry could have a positive impact on relations, because if there weren't one party in the collaboration who were more financially superior, a development could possibly not have been initiated or aided to begin with. Furthermore partners who possess more or different knowledge is thus allowed them exert influence strategies in the collaboration and influence bilateral communication (Sridharan & Simatupang (2013). Nevertheless, if the power is exerted in a non-opportunistic way it could be argued that it thus fosters better conditions for trust and where power is 'shared', to benefit the network as a whole rather than only the individual. This would in context of the relational view also be the most sustainable way to generate relational rents. While power asymmetry can help exerting influence strategies, but if used in the relational spirit the final result can create outcomes that are more synergistic.

However looking past the high costs associated with a BCT investment, both financially, management-wise and technologically, a BCT implementation is according to an application study conducted by Longo et al. p.68 (2019) a "cost-convenient tool to increase collaboration and issues with trust".

8.2 Intra-organizational relational impact

8.2.1 Governance Mechanisms

Commitment in collaborations may be among the most critical factors to a successful development of a shared platform, however possibly also one of the most overlooked ones, particularly in a project without an intermediary and 'self-enforcing agreement', as the relational view suggests. Collaborations is closely tied to matters of relational issues which is an outcome of governance structures and mechanism, or the lack thereof Rejeb et al., (2019). This notion is further confirmed by this statement *"Overall the panel considered the development of appropriate interorganizational governance structures as the most*

challenging relational barrier" Kurpjuweit et al. p. 14 (2019). Because if management fails to establish the needed structures and formalities of governance then the collaboration is designated to fail. Governance mechanism in context of BCT would involve considerations of responsibilities of operations, platform formation and reformation, maintenance, access/authorization management and design/development rights (Kurpjuweit et al. 2019 ; Sheel & Nath 2019). 'Effective governance' is as Dyer and Singh (1998) suggests a key to generating relational rents and governance mechanism has a huge impact on relations and thus a BCT implementation.

What could furthermore be a considerable treat to a successful development of a collaboration around BCT, is that supply chain management ecosystems seems to be characterized by a quiet considerable degree of heterogeneity Saberi et al. (2019). Which could impact the cooperative abilities but also entail that the partners interests were quiet conflicting and thus difficult to align. This perspective in the light of the relational view could impact the partners in the given collaboration, ability to share knowhow and actually benefit from it. Summing up, BCT driven platforms could therefore be argued to clash in a trade-off between the complexities of coordinating and generating valuable networks Kurpjuweit et al. (2019).

8.2.2 Better decision making and increased firm performance

Moving on from previous section, it is clear that if organizations manage to align governance mechanisms, BCT is prospected to impact the general decision making which is due to overall transparency and improved performance measures Schmidt & Wanger (2019). Allowing more transparent information between partners on a shared system, with information on things such as order or production status, forecasts and estimates on supply and demand and knowhow would eventually also foster greater incentives for trust Kumar et al. (2020). Following improved conditions for making better and more precise decisions it is argued to increase the firm performance, which has a positive impact on supply chain relations. BCT could enable partners to adjust many processes, which can lead to more satisfactory relationships Kumar et al. (2020). This could in the context of Sriharan & Simatupang (2013)

framework be considered as interaction mechanisms, that plays an important role for the final common value as well as the establishment of trust.

Considered one of the most mature cases and implementations, which projects increased firm performance is that of IBM and Walmart Goncol et al. (2020). In this case BCT driven systems is the foundation for these projects for ensuring food safety through the supply chain, by enhancing the overall traceability and transparency, minimize data redundancy and thus reduce the amount of counterfeit cases. This collaboration is under IBM's initiative named Food Trust and first part of the project was piloted between the two companies in 2017. The project claims that back-tracking is reduced to around two seconds compared to previously seven days and has been in function since 2018. The project furthermore collaborates with Maersk and Tradelens (which was also founded with IBM) on tracking food in its logistics (Walmart Case Study – Hyperledger).

Considering another case example of how BCT is prospected to have an impact on performance is that of DHL and Accenture who created a prototype of a system, based of BCT that traced pharmaceuticals from production origin to the end consumer. The main idea behind the prototype was to create a BCT system providing a serialization of the production process through the whole supply chain that could help rule out counterfeit medication. The prototype test found that the BCT implementation would be able to handle more than "seven billion unique serial numbers and 1.500 transactions per second" (*DHL and Accenture Unlock the Power of Blockchain in Logistics)* which was considered a valuable increase.

Summing up, the incentive alignment that shall foster better decision making and increased performance must aim the right balance between information and the preservation of the competitive edge.

8.2.3 Management commitment and organizational structures

Moving on from the previous section, a precondition for fostering better decision making and reaching better firm performance by implementing BCT into management systems, is

preconditioned by the support and commitment from management (in particular top management) Clohessy & Acton (2019). Developing and changing company cultures and patterns is a time consuming process and not so straight forward. Furthermore a successful BCT system development would require management to share ideas and information that they normally would not share and in ways they are unfamiliar with. It would stand in total contrast to 'business as usual', with managers tendency towards typical NDA agreements or patents and thinking of information asymmetry as a competitive advantage rather than a way to generate relational rents when shared and assimilated properly. Arguing that mangers would where conforming to the 'traditional' mindset would create a barrier and in an overall perspective impact the relationship and efficiency of it, it if were to run in BCT. Nevertheless an impact on the internal relations when implementing BCT would thus be a reorganization of organizational structures, adding new roles and perhaps departments, responsibilities as well as acquiring the needed expertise to adopt the technology Saberi et al. (2019). Failing to address and consider these hurdles by changing and adapting the organizational culture and processes is thus a great barrier to BCT.
Additionally the coordination and lack of understanding between different departments can be a considerable relational impact. Since the missing understanding and coordination between technical experts and managers who writes the given policies can create an internal management issues, which can hamper the implementation of BCT Gonczol et al. (2020).

Further confirming the importance of management support and organizational alignment, is the outcome from the DHL and Accenture case prototype as mentioned in the previous section. Which pointed towards the conclusion that the success of BCT depends on the gathered efforts of the network, of working collaboratively on transforming the current processes, on an intra-organizational level too, as well as adapt to and adopt the new technological possibilities to creating logistic value Clohessy & Acton (2019).

In this context the relational view further confirms that most often the reason as to why acquisitions, joint ventures or alliances fail is because their processes of decision making, organizational cultures or operating systems are incompatible, which what they refer to as

‘organizational complementarity’. It is thus not because they do not share strategic complementarity resources, rather they fail because they do not manage to align their organizational process and structures.

Another reason as to why managers fail to recognize the potentials of BCT aside from lacking technological understanding (this aspect is elaborated on in the next section), could be the lack of use cases Chang et al. (2019). Such as successful use-cases displaying the benefits and possibilities of implementing BCT into supply chain management. Further confirming this perspective, a survey conducted by Clohessy & Acton (2019) , management was in a case reluctant towards even considering BCT until employees demonstrated an engineered showcased a BCT prototype and employees explained real case value. They found that managers were more convinced of BCT potentials after they were presented to an innovative blockchain prototype and actually changed and restructured their supply chain prior to this along with the establishment of a new department to manage the project. In connection to the lack of use cases it therefore suggested that companies develop a small pilot project of BC in supply chain management with a scoping that has a clear focus and narrow focus, so it is not a too wide and overcomplicated and slowing pilot. This way of piloting should be especially interesting to supply chain management as it considers inputs from existing technologies opposed to having to replace them van Hoek (2019).
However it should be noted that running a pilot does not entail that the technology will fully applicable and up and running after and thus further work and development remains van Hoek (2019). Additionally the costs of investing in BCT technology or a pilot project can also be considered, as a reason to why management are more reluctant to engage with BCT in the first place (Longo et al. 2019 ; Rubio et al. 2018).

Summing up the lack of management support, BCT use-cases, traditional management mindsets and lack of organizational alignments, creates a considerable impact on the formation of supply chain relationships and eventually the success of a BCT implementation.

8.2.4 Lack of technological expertise and compatibility

As mentioned in the considerations of the interorganizational relations, technological expertise projects an important aspect of supply chain relations and thus BCT. In connection to that the technological capabilities and expertise the partners have within the supply chain projects another barrier to implementing BCT on an intra organizational level. Furthermore the relative complexity of the technology can act as a barrier in connection to the need for changes in the management culture and organizational structures Saberi et al. (2019). Aside from the lack of technological expertise, particularly issues with the scalability of BCT has an impact on relations in that sense that it is difficult to standardize procedures and policies around the technology that can be easily transferred and applied elsewhere Gonczol et al. (2020).

The company Petroteq worked on conducting how an BCT and IoT integration could improve supply chain management in the energy sector, by suggesting BCT based system and platform for the management of oil and gas supply. BC was also considered in terms of how it could help improve and optimize the workforce, IoT sensors should help monitor operations through the plants and thus allow employees to benefit from the quick and more accessible information.
However, it could be argued that in such a case the technological capabilities of the employees could be a hindering for this project to succeed.

8.3 External environmental relational impact

8.3.1 Legal and regulatory conditions and stakeholder involvement

What seemed to have the most considered impact on the formation of relations which uses BCT, seemed to be that of the legal conditions (see table 2). External stakeholders play an important role on the supply chain relations as stakeholders of different kind, influence the conditions under which these relations operate. These stakeholders involve entities who in the end does not directly benefit from the supply chain activities, such as governments and institutions. Particularly external involvement, support and pressure is considered important as their influence actually results in more organization adopting new technologies, which can

lead to more technological and sustainable practices, which many governments desire Saberi et al. (2019).
However the conditions and regulations around BCT are still considered a barrier to BCT as they lack clearness, structure and appropriateness. There is no clear governmental or industry policy of BCT operations and generally the adverse attitudes and efforts on BCT differs across governments acts as a huge barrier to its success. Furthermore the different legal frameworks across supply chain partners can have an impact of its initial implementation and thus projects and important issues on the relations

This scenario could in connection to the principal agent theory be considered in the risk willingness perspective, as the intentions between the companies who operates the supply chains and the governments creating the conditions for them, could be considered difficult to align, as their intentions and goals would perhaps be somewhat divergent. Perhaps the governments would be more interested in improving sustainability actions with the technology whereas the companies would perhaps focus more on generating profit and lower transactions costs.

Governments could further be considered as being hesitant, simply because they fail to recognize the contributions on engaging with the principal on the technology, which is especially confirmed by the fact that many of them still considers BCT in the perspective of Bitcoin Saberi et al. (2019). So if the government fails to recognize the potentials the potentials that the companies suggest BCT has, it could be a case of the principal agent problem as the conflict of interests is clear. Furthermore it could be argued that power asymmetry in this scenario entails that there is an imbalance in the mutual dependency which thus the influence strategies is affected, ultimately affecting the potentials for generating value in the relations Sridhana & Simatupang (2013).

When considering what is needed to change the conditions for BCT usefulness it was evident that stakeholder involvement is projected as the most important factor to help the development of BCT. IT companies and managers of supply chains should establish contact with governments and regulatory entities, to inform of the intentions and benefits of BCT while

force them to agree the needed legal frameworks for operating BCT Sheel & Nath (2019). In this context it is furthermore important that, that is done with different and relevant stakeholders across different cultures, within different legal areas and with consideration on the importance and difference in these Kurpjuweit et al. (2019).

A case example of that would be that of JD.com, Walmart, IBM and Tsinghua University, who engaged in an alliance with the prospects of creating a standard based method for how information, evolving around food in China supply chains, should be gathered and thus what it should entail. The takeaway from this collaboration, that were the ability to provide information on the tracked products way quicker than usual and the less administrative heavy process also made it a lot easier for the supplier, allowing quicker product expedition which is quite appropriate considering expiration dates of foods. Besides it was also recognized as one way to generate more attention to the technology and generate more awareness in the context of governments perceive the technologies capabilities.

8.3.2 Labour availability and technological development

Within the external environment another identified barrier was the lack of educated labor availability Kurpjuweit et al., (2019), which could be considered to impact the relations in the sense that depending on the location they have more or less access to BCT expertise.

Along with that, the speed of the technological development in the environment is furthermore projected to have an impact on both inter and intra the organizational relations and causes power asymmetry (Astaria et al. 2020 ; Kurpjuweit et al. 2019). This could be in the sense that the partners ability to align their technological resources and keep them up to date with current technology and their partners technological. In a principal agent perspective, it could cause problems, if the technological capabilities are not aligned and if the actions and intentions of the agent is not transparent to the principal.

8.4 Discussion and considerations on BCT management implementation

From the three different perspectives of organizational relations, it was clear that a successful applicability of BCT highly depends on the relations internal firm structures and their ability to align these so that they can cooperate with their inter-organizational relations Kurpjuweit et al. (2019).

In answering the sub-question of what role governance mechanisms play when implementing BCT into supply chains it was clear that it would arrive with implications for structuring governance mechanisms on an interorganizational level while avoiding conflicts of interests. BCT would influence interorganizational relations in that sense that governance mechanism would needed to be aligned with partners, organizational structures would need to change and management would have to actively engage in the restructuring across departments. Management is suggested not to consider BCT as a replacement for already existing technology but rather as an supplement and that BCT could be considered as a tool to re-engineer the relevant business processes that could function with a BCT system. A great part of the governance mechanisms then persists in understanding the difference of what information that needs to be shared and management is suggested to consider which part of this particular information that should be included in the collaboration and which should stay as an internal legacy Chang et al. (2019). Therefore a relation with BCT implementation, would be impacted by how efficient the information disclosure policy and the configuration of the rules within the business channels were balanced. Balanced in terms of information visibility and restoring the competitive edge within the network.

In answering the sub-question of how BCT in supply chains affect the role of trust in a buyer-supplier relationship, different perspectives were found. While in an overall perspective, BCT were sought to increase trust, it was also argued that it would more so imply the creation of ‘system’ trust. In the light of the principal agent theory, it could perhaps then be considered as a tool to mitigate a systems which creates more transparency for both partners, lowering their risk unwillingness and gives an incitement to align their purpose of collaboration. It was furthermore not found that BCT would replace the need for personal trust but it could

however be argued that the it could create a better foundation “digital-trust”, that would still be considered necessary. Therefore management could perhaps consider BCT as a trust enhancing tool rather than a replacing tool, which some has projected it to be.

Answering the sub-question of how BCT impact the creation of relational rents, it was identified that BCT could create better conditions for knowledge sharing routines. However it was also evident that would only be the case if the governance were effective. Governance would be impacted by the change of the intermediary role with a BCT implementation and in overall perspective it was argued that a complete removal of an intermediary could lead to further complicating the relations. In addition to that BCT does not offer any value for outside the system application which increases the importance of the governance mechanisms. Which is why it could be argued that effective governance as a cause of BCT will only be the case if managers implement it with consideration for the current intermediary functions and thus as a supplement.

Furthermore a common BCT implementation could be considered a relation specific asset and with more transparent supply chain flows it could contribute the overall relational rents. This could in the context of principal agent theory perspective, address the issues the principal and the agent have, with not being able to monitor and trust the actions of the other party. While also fostering greater incentives to the agent from of the principals actions. Moreover considering the complexity of evaluating how a potential partner would have complementary resources and/or capabilities is argued by Dyer & Singh (1998) to be one of the most timely and costly affairs. Which is where BCT could be considered to sustain a process and system which makes identifying potential partners more transparent and faster. Furthermore the creation of relational rents sustained by implementing BCT, was also considered highly dependent on the conditions in the external environment and it is clear that this project a major impact on the relations in supply chains.

However in an overall perspective BCT seems to have an positive effect on relations in terms of generating relational rents.

9.0 Conclusion

BCT is an interesting technology which could still be considered relatively new in academia and also relatively unexplored on a business operational level. This thesis was set out to discover how relations in supply chains are influenced when BCT is implemented to improve supply chain management. It lead to the identification of different relational impacts connected within interorganizational, intraorganizational and external environment relations. Conclusively BCT impact several measures of supply chain relations.

Conflict of interest were found to have major impact on the success of the relations and it was concluded that if companies could manage to develop shared governance structures on a BCT project, it would not remove the need for safeguards, which can furthermore lead to the conclusion that the need for trust will not be removed from relations. Despite BCT is being implemented.

In this context BCT were not found to influence the internal need for governance mechanisms. Which were argued to be because of the shift of the trust mediator as BCT makes trust based on a system rather than a trusted third party. BCT were not found to remove the need for long-term trust relations, but it could be concluded that it would create better conditions for generating trust within relations.

In addition to that it was concluded that differences in power could have positive outcomes on the relations, as it could foster collaboration and value. That were however concluded to only be the case, if the one in power could manage to exert the power with a non-opportunistically approach.

It was also concluded that BCT could in some way make business more complex, by adding a new intermediary, that lack some capabilities compared to a traditional one and could give further rise to conflicts of interest. With that being said, BCT were also found to have a positive impact on relations, in terms of creating a system which allows companies to be more transparent with each other within relations. In this context BCT were found to affect relations with increased collaboration and performance, reduction of bullwhip effect and thus increased incentives for generating relational rents.

If management fail to adjust the organization, their own mindsets and work across departments it would impact the relations and not enable more transparency. It were concluded that most often the reason as to why acquisitions, joint ventures or alliances fail is because their processes of decision making, organizational cultures or operating systems are incompatible, that is the tasks assigned to the management to change these. Within relations, cultural differences, governmental differences and lack of technological expertise were also concluded to have an impact on how BCT were perceived to benefit supply chain management.

However it was also concluded that a reason why BCT could face lack of management support, could be due to the relatively scarce amount of use-cases, providing a real case comparable example. Meaning that management would be less willing to take risks. Concluding that perception of how BCT can benefit supply chain management, needs to be adjusted and thus be viewed as a supplement to enhancing trust and collaboration, rather than a technology that eliminating the need for trust developing measures.

It could furthermore be argued that the literature review lead to more perspectives related to the inter- and intra- organizational relational impact than the external relational impacts. This could be considered as a consequence of the scoping of the assignment, as well as the search terms in the literature review. However it could also be considered to be due to the lack of research on this particular perspective in general.

Future research

Moving the research area of this thesis further, it could be interesting to look into specific organizational structures, in terms of how these would look prior and after a BCT implementation and thus how they would be adjusted and changed properly. At the same time, conducting pilot projects with relevant companies to sustain this perspective could be an interesting approach and a way to generate more use cases.

Additionally to the external perspective it could be interesting to discover how GDPR management could benefit from a BCT implementation, which has become an important

aspect of many companies’ daily management activities and also influences their relations..

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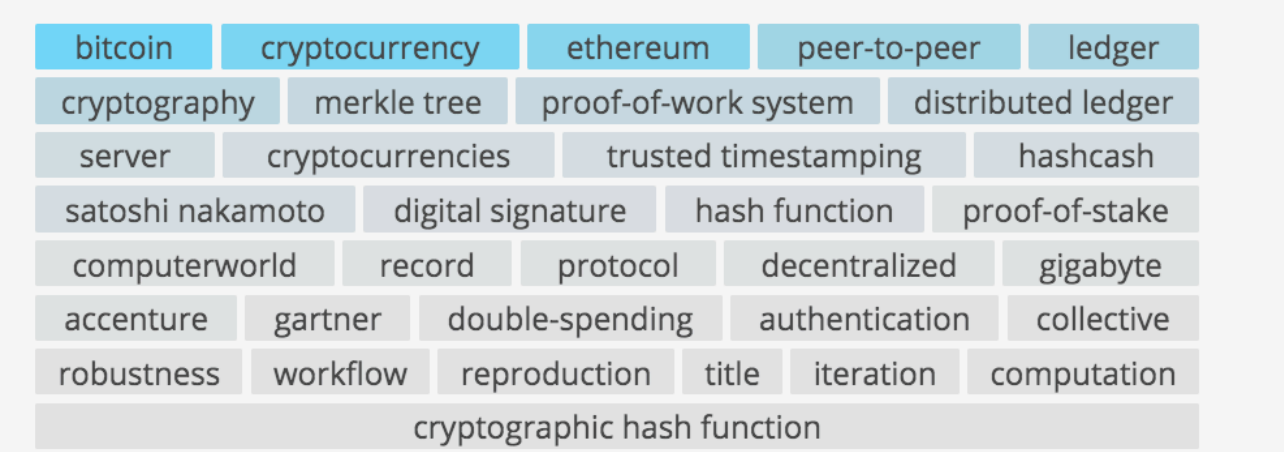
11.0 Attachments

Attachment 1)

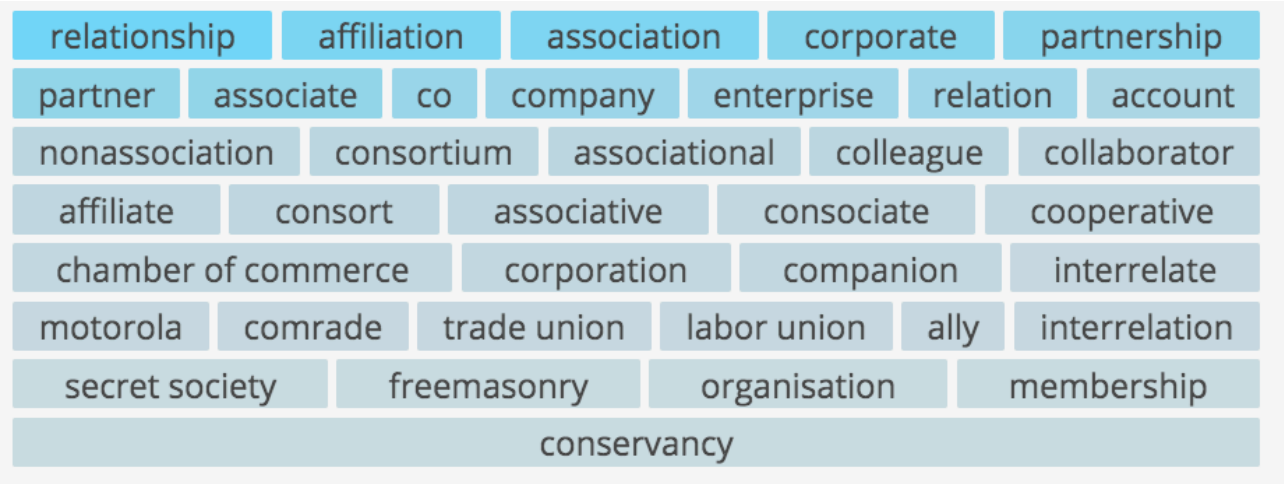
Source: https://relatedwords.org/

Blockchain:

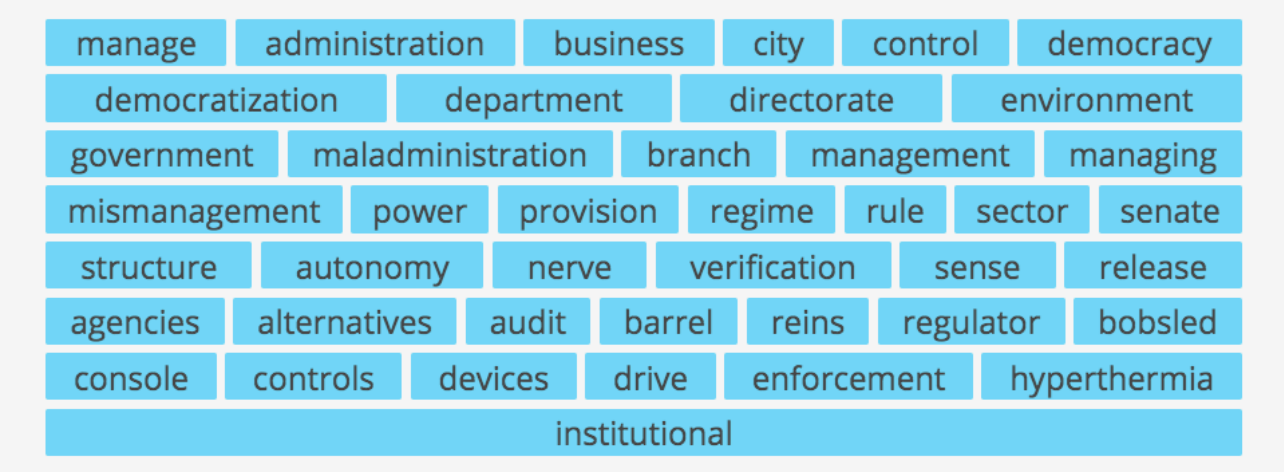


Supply chain:

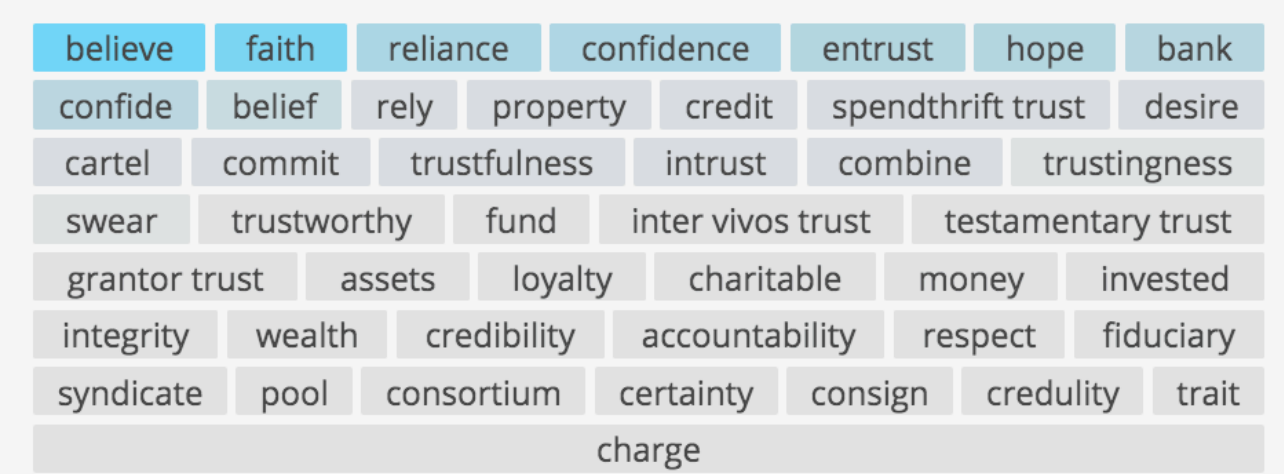
Business relationship



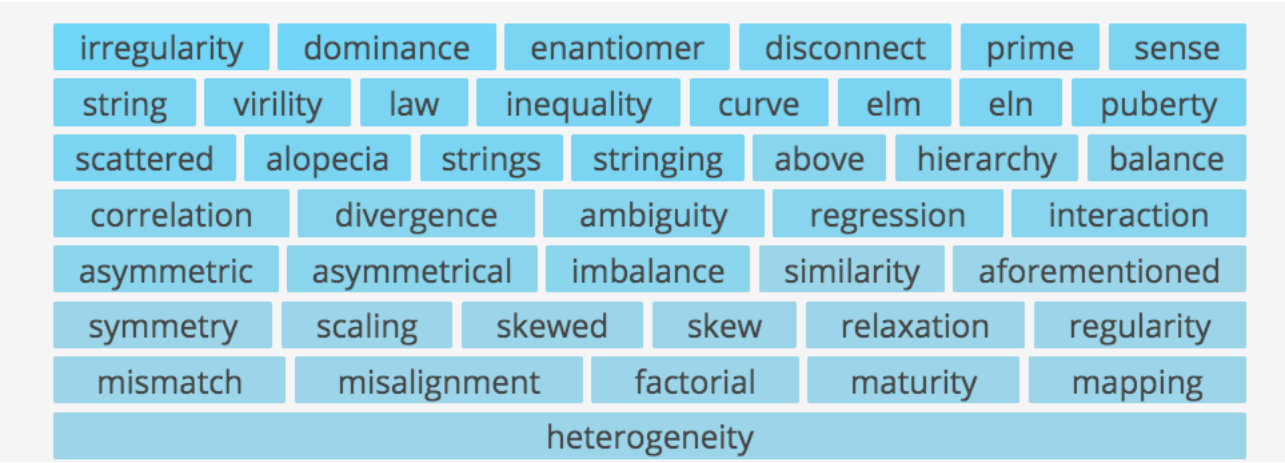
Governance mechanisms



Trust



Power asymmetry



Attachment 2)

Number	**Title**	**Author(s)**	**Source**
1	"Blockchain and supply chain management integration: a systematic review of the literature"	Queiroz et al. (2019)	International Journal of Supply Chain Management
2	"Blockchain and supply chain relations: a transaction cost theory perspective"	Schmidt & Wagner (2019):	Journal of Purchasing and Supply Management
3	"Blockchain critical success factors for sustainable supply chain"	Yadav & Singh (2020)	Resources, Conservation and Recycling
4	"Big data and blockchain basis for operating new archetype of supply chain"	Rubio et al. (2018)	Department of Engineering
5	"Configuring blockchain architectures for	O'Leay (2017)	Intelligent Systems in Accounting, Finance & Management

	transaction information in blockchain consortiums: The case if accounting and supply chain systems"		
6	"Blockchain technology and its relationships to sustainable supply chain management"	Saberi et al., (2019)	International Journal of Production Research
7	"How the blockchain enables and constrains supply chain performance"	Hald & Kinra (2018)	International Journal of Physical Distribution & Logistics Management
8	"Leveraging the internet of things and blockchain technology in supply chain management"	Rejeb et al., (2019)	Future Internet
9	"Blockchain technology: implications for operations and supply chain management"	Cole et al. 2019	International Journal of Operating Supply Chain Management
10	"Blockchain in the operations and supply chain management: benefits, challenges and future research opportunities"	Wamba & Queiroz (2020)	International Journal of Information Management
11	"1 Blockchain's roles in meeting key supply chain management objectives"	Khsetri (2018)	International Journal of Information Management
12	"How blockchain improves the supply chain: case study alimentary supply"	Casado-Vera et al., (2018)	Porcedia Computer Science

13	"Effect of blockchain technology adoption on supply chain adaptability, agility, alignment and performance"	Sheel & Nath (2019)	Management Research Review
14	"Analyzing the impact of blockchain-technology for operations and supply chain management: an explanatory model drawn from multiple case studies"	Tönnissen & Teuteberg (2020)	International Journal of Information Management
15	"The Impact of blockchain on the supply chain: a theory based research framework and a call for action"	Treibelmaier (2018)	International Journal of Supply Chain Management
16	"Blockchain enabled supply chain: an experimental study"	Longo et al., (2019)	Computers and Industrial Engineering
17	"Unblocking the chain: findings from an executive workshop on blockchain in the supply chain"	Van Hoek (2019)	International Journal of Supply Chain Management
18	"Potential of blockchain technology in supply chain management; a literature review"	Gurtu & Johny (2019)	International Journal of Physical Distribution & Logistics Management
19	"Real-time supply chain – A blockchain architecture for project deliveries"	Helo & Schamsuzzoha (2020)	Robotics and Computer Integrated Manufacturing

20	"Developing a framework for considering blockchain pilots in the supply chain – lessons from early industry adopters"	Van Hoek (2019)	International Journal of Supply Chain Management
21	"Blockchain critical success factors for sustainable supply chain"	Yadav & Singh (2020)	Resources, conservation and Recycling
22	"Is Blockchain a silver bullet for supply chain management? Technical challenges and research opportunities"	Kumar et al. 2020	Journal of Decision Science
23	"Supply chain re-engineering using blockchain technology: A case of smart contract based tracking process"	Chang et al., (2019)	Technological Forecasting & Social Change
24	"A Conceptual model of sustainable supply chain management in small medium enterprises using blockchain"	Nayak & Dhaigude (2019)	Cogent Economics & Finance
25	"Blockchain in additive manufacturing and its impact on supply chains"	Kurpjuwei t et al., (2019)	Journal of Business Logistics
26	"Understanding blockchain technology for future supply chains: a systematic literature review and research agenda"	Wang et al., (2019)	International Journal of Supply Chain Management

27	“Blockchain in Global trade”	Duan & Patel (2018)	Journal of global trade
28	“The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics”	Ivanow et al., (2019)	International Journal of Production Research
29	“Blockchain implementations and use cases for supply chains a survey”	Gonczol et al. (2020)	IEEE Xplore (blockchain, supply chain)
30	“Blockchain 3.0 applications survey”	Di Francesco Maesa & Mori (2020)	Journal of Parallel and Distributed Computing
31	“Analysis of coordination mechanisms of supply chain management information systems from the perspective of block chain”	Yuan et al. (2019)	Information Systems and e-Business Management
32	“A review of blockchain-based systems in transportation”	Astaria et al. (2020)	Information (logistics/transportation)
33	“New business models in supply chains: a bibliometric study”	Delafenestre (2019)	International Journal of Retail and Distribution Management
34	“Smart contract-based approach for efficient shipment management”	Hasan et al., (2019)	Computers and Industrial Engineering

35	“Investigating the influence of organizational factors on blockchain adoption: a innovative theory perspective”	Clohessy & Acton (2019)	Industrial Management and Data Systems
36	“Trustworthy data-driven networked production for customer-centric plants”	Preuveneers et al., (2017)	Industrial Management and Data Systems