

Understanding the Factors Affecting the Usefulness and Acceptance of Blockchain Technology:

An explanatory research within the Nordic region and technology-intensive firms



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Abstract

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Key Words	Blockchain Technology, TAM, UTAUT, Value creation, technology acceptance
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Purpose	<p>The interest around blockchain technology (BT) has spread for the last decade from academia and industry. Meanwhile, there is a lack of studies on the acceptance and use of blockchain within the Nordic countries. This research provides an exploration of blockchain acceptance and use combined with the identification of factors generating value through this technology. We highlight factors that influence blockchain adopters as well as factors being less relevant for non-adopters. Through the Technology Acceptance Model (TAM), we examine the intentions as a motivation factor, behaviours of BT users and non-users. Furthermore, the Unified Theory of Acceptance and Use of Technology (UTAUT) model's utilisation allows us to analyse the social influence, the efforts required, and performance expected from BT acceptance.</p>
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Methodology	<p>Our methodology follows a qualitative research approach, primary data collection is established through interviews with executives and managers having major experiences in blockchain within Nordic corporations established in terms of technology application. We use two different frameworks completing each other from the theory perspective to identify relevant factors. Our interviews results will confirm those factors. To broaden our data collection, semi-structured interviews are conducted resulting in a thorough results' analysis and the theoretical backgrounds.</p>
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Theoretical perspectives	<p>Two main frameworks TAM and UTAUT are determining our investigation: The first objective is to widen and deepen TAM and UTAUT by exploring new factors as well as confirming the current factors in the model. The second objective is an investigation of factors influencing value creation through blockchain technology use; providing an interest according to the process of innovation based on blockchain technology within the Nordic market (Valtanen, Backman & Yrjola, 2019). The third objective arises from an internal and external firm's perspective. Moreover, the exploration of additional factors affecting the acceptance of blockchain is essential for both research and application (Arning & Ziefle, 2007).</p>
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Empirical foundation	<p>The collected data highlight (1) the exploration of the factors within TAM and UTAUT, (2) the identification of additional factors affecting acceptance and use of technology, (3) the investigation of factors allowing value creation as an outcome.</p>
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Conclusion	<p>We have found strong interconnections between factors of TAM, UTAUT and additional factors such as cost efficiency, automation of decision-making, government regulations, trust, transparency, influencing acceptance and use of blockchain. These interconnections influence to some or different extent adopters and non-adopters in the Nordic regions. As a key role in BT acceptance, value creation appears to result from cost efficiency, trust, transparency, automation of decision making and social influence.</p>
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List of Abbreviations and Acronyms

Blockchain Technology	BT
Technology acceptance model	TAM
Unified Theory of Acceptance and Use of Technology	UTAUT

1. Introduction

In this era of technology and digital changes, digitalisation as blockchain technology appears to become a widespread concern in the business context shaping the Nordic organisation (Ross, Sebastian, Beath, Mocker and Moloney, 2017). Furthermore, companies' performance is often linked to their digital system. As such, emerging technologies play a vital role in creating opportunities while enhancing companies' growth (Ross et al. 2017). Nowadays, Nordic firms are highly driven by data transfers which are often considered as slow, costly and less adapted for transfer of information (Morabito, 2017).

Since 2008, the interest of blockchain technology (BT) has skyrocketed enabling the foundation for trust-free economic transactions that relied on its own technological characteristics (Risius & Spohrer, 2017). According to Dai & Vasarhelyi (2017), BT will be an impactful breakthrough as much as the internet on the next generations. The use of BT is a new concept uncommonly established, meanwhile considered by researchers as the foundation in future business models (Cong & He, 2019; Dai & Vasarhelyi, 2017). BT's research moving toward several areas of application in the Nordic market are lacking (Risius & Spohrer, 2017). In terms of motivations for this topic, new research can solve blockchain underestimation by comprehensively understanding the factors of acceptance and use of BT. Companies, events and transactions strongly rely on the use of digital tools requiring their acceptance and customised implementation (Arning & Ziefle, 2007). Factors providing an understanding of users' adoption of blockchain is, therefore, significant for researchers, executives and managers (Hernandez, Jimenez & Martin, 2008). Several problems arise due to the research gap in BT factors' use are difficult to comprehend for executives in the Nordic context. This lack of factors' comprehension could lead to inefficient use of BT as the influence on each factor differs from the Nordic region to Europe, America or Asia. These disparities of the use and acceptance's factors are represented through diverse economic and political backgrounds, as a consequence, some factors could appear to be irrelevant or unknown depending on the region.

Technology acceptance model (TAM) is considered to be one of the most widely used and established frameworks to understand the acceptance of new technology (Gao & Bai 2014). The perceived ease of use and usefulness are considered to be determinant factors of the actual acceptance as well as successful usage of technology, here, blockchain technology (Arning & Ziefle, 2007). Secondly, the Unified Theory of Acceptance and Use of Technology (UTAUT) model has been selected as a theoretical lens to identify the factors influencing the acceptance and use of blockchain (Venkatesh, Morris, Davis, 2003; Rogers, 2003; Davis, 1993; Davis, Bagozzi, Warshaw, 1989; cited in Gao & Bai, 2014). The relevance of its selection is explained through its high explanatory power providing comprehension of factors appearing under investigation (Mosweu, Bwalya & Mutshewa, 2016). To strengthen our study, these two models are used as complementary. Likewise, we use TAM and UTAUT as a theoretical foundation to design and structure our interview guide. Two fields of research appear, firstly, the comprehension of factors influencing acceptance of blockchain, secondly, factors resulting in value creation from BT adoption in Nordic firms. Through this thesis, the arising objectives

are to investigate factors' implications, to highlight interconnections between them and identify the ones generating value creation.

To sum up, Nordic countries are considered as early adopters in emerging technology and present a spread BT application across different sectors (Deloitte, 2019); this concept is supporting the relevance of our market selection. In addition, an investigation of the factors restraining BT acceptance and use is conducted. Finally, the identification of factors resulting in value creation would allow executives and managers to emphasise them to a higher or lesser extent in order to enhance their operating and financial performance.

1.1 Research Problem

Current researches have focused on blockchain design and features, while only a few have tackled the aspects of blockchain application, value creation, and government compliance (Risius & Spohrer, 2017); mostly originating from the United States, Germany, and Switzerland (Gausdal, Czachorowski & Solesvik, 2018). The acceptance and use of BT are dependent on the prerequisites that every organisation has. These aspects could differ from one country to another depending on the level of technological advancement, competences in the personals or economical resources. Therefore, the factors that enable the acceptance and use of BT could vary depending on the prerequisites of the country. We identify that a focus on blockchain acceptance and use in the Nordic countries has not been tackled yet and this region has a unique situation with high technological advancements (Deloitte, 2019). A growing concern appears about where and how BT is efficiently implemented and where it provides valuable results. According to Glaser (2017), the recurrent expressed interest of BT is mainly in academic innovative technology instead of comprehension of application cases. Exploration and application of blockchain should be emphasised in Nordic regions and targeted on restricted subjects (Glaser, 2017). Research provides support to overcome this gap by understanding the factors influencing blockchain acceptance (Risius & Spohrer, 2017).

1.2 Purpose and objectives

The main purpose of this study is to understand elements influencing blockchain acceptance in the Nordic companies. These firms have the common ground of being large multinationals, technology-intensives with high technological resources, operating in different segments in the economy. As a result, their drivers of implementing blockchain might differ within each industry. Additionally, the purpose of this research to examine the implication of TAM, UTAUT resulting in additional factors from the interviews.

Hence, the first objective is to investigate factors that emphasise blockchain adoption. Using TAM and UTAUT will provide an understanding of the role that the appearing factors have. The second objective is to show the relevance of these factors and their influence on Nordic adopters and non-adopters. Bringing breadth research of blockchain acceptance factors would allow better comprehension and tailored use of these factors by the top management. The third purpose highlights that the selection of these factors impact the acceptance and use of

blockchain can generate value creation. Hence, our objective is to identify factors having implications within value creation. The core elements of BT are defined as sharing information faster and scalability being achievable over time (Kamble, Gunasekaran & Arha, 2019). The purpose of studying specific factors such as trust through blockchain's acceptance is explained by the constant growth of data trustworthiness. Additionally, the development of new business models in the Nordics area where value creation emerges through the improvement of the decision-making process (Angelis & Silva, 2019).

1.3 Research Question

This study is aiming to focus on the blockchain acceptance and use in the Nordic region focusing on technology-intensive firms. Therefore, the authors of this thesis attempt to provide an examination of the factors affecting the acceptance and use of blockchain. This thesis research questions are:

RQ1: What are the factors that affect the acceptance and use of blockchain in the Nordic region?

RQ2: What are the factors allowing value creation from blockchain adoption in the Nordic region?

1.4 Contribution of the study

This research contributes by providing an understanding and exploring the factors affecting the acceptance of BT in the Nordic countries. A lack of understanding appears where and how blockchain technology is effectively applicable, accepted and has recognised practical impacts (Risius & Spohrer, 2017). Therefore, this study adds an additional value to the body of the literature in the acceptance and use of BT focusing on the Nordic countries. We investigate companies in technology-intensive sectors through interviews. We identify a research gap about the exploration of factors affecting blockchain's acceptance, by giving a meaning of "How" and "Why" these factors are playing a key role. Additionally, this contribution attempts to provide an exploration of companies that have adopted BT combined with Nordic firms that have made the decision to not implement it defined as non-adopters and understand the restraining factors of BT acceptance.

This study contributes to the need for more research widening and deepening TAM and UTAUT's current factors (Bagozzi, 2007). The research also participates in the identification of additional factors that will result from the interviews. Relevant factors that provide value creation within the Nordic region through the use and acceptance are emphasised. As such, this thesis seeks to clarify the comprehension for executives, CFOs, CEOs, managers to identify characteristics affecting blockchain's implementation in the context of DLT within Nordic market. This knowledge will allow them to use these factors identified based on the company's needs, to achieve tailored-made customisations between BT and their systems.

1.5 Outline of the study

The study is structured into eight sections. The first section starts with the introduction background, the purpose and contribution of the study. The second section addresses the introduction of blockchain technology. The third section consults with relevant literature reviews about TAM, UTAUT, their relationship, additional factors and value creation. The fourth section provides the methodology process and the chosen research design. The fifth section provides a presentation of the findings from the interviews. The sixth section encompasses a breadth analysis followed by section seven with discussion and implications with the theories. Section eight focuses on the writer's conclusions of the thesis.

2. The Blockchain technology

2.1 Definition of blockchain technology within technology-intensive firms

According to Lin & Chen (2005), technology-intensive firms are companies that intensively develop or use technology within their business strategy. Hence, highly reliant on technology in order to continue with their core business. Nowadays, the Nordic countries are seen as early adopters of the new emerging technology, with broad technology-intensive sectors that strive for technical development (Deloitte, 2019). The countries are considered to have stable economic and political positions (Messelt, 2020). The growth in the development and use of technology is linked to the economic prosperity of the region (Tiemer, 2020). In addition, Deloitte (2019) highlights that the Nordic region is recognised as world-leader regarding developing and using state-of-the-art technologies such as BT. Therefore, a growing development has emerged within the Nordic region to develop the application of BT through government agencies and central banks working with BT integrated cases (Riksbank, 2020; Chavez-Dreyfuss, 2016). Besides, the use of BT in a private context is present within the Nordic companies, describing them as a hub for BT and new innovative integrated business cases (Wallenberg, 2017; Gustavsson, 2018).

This new system is considered as a distributed database of public ledgers and records, allowing for each event or transaction to be shared between the chosen parties in the network (Underwood, 2016; Crosby, Verma & Kalyanaraman, 2016). Defined by Fanning and Center (2016 p.3) as: “A block chain or Blockchain is a distributed database that maintains a continuously growing list of data records that are hardened against tampering and revision, even by operators of the data store’s nodes.”. BT originated in 2008, as a result of the cryptocurrency, Bitcoin. The Bitcoin cryptocurrency is based on the BT and invented by an unknown person(s) under a pseudonym name, Satoshi Nakamoto (Lemieux, 2013). According to Crosby Rosby, Verma and Kalyanaraman (2016), BT is recognised by the decentralised structure of the data records. The researchers explain that each “block” represents information about a transaction or event and is shared in the network. The “block” is only verified when a consensus from the majority of members is achieved, allowing for safe decentralised storage that prevents manipulation of the information (Fanning & Centre, 2016). Further, the property of secure verification allows for fast data transmission between parties. The benefits of the technology are not limited to cryptocurrency, instead, they include all industries that require shared, secure, fast data storage (Cong & He, 2019).

David (2020) mentioned that "Blockchain will change the way we see competitiveness in the world". The usage of BT has grown rapidly, commonly used and developed for the financial sector (Fanning & Centre, 2016). The recording of the transaction allows secure and rapid transactions between parties in real-time (Abeyratne & Monfared, 2016). Thus, making the application of BT relevant for financial exchanges, stock market and currencies. According to Kshetri (2018) additional sectors where the application of BT can be beneficial is identified within the industrial sector, especially within supply chain and logistics. Blockchain facilitates traceability, distribution of information and authenticity (Abeyratne & Monfared, 2016;

Kshetri, 2018). Furthermore, the auditing and accounting industry have focused their attention, as well as their resources, on the use of BT (Dai & Vasarhely, 2017). The decentralisation of data through distributed ledger enables the safe distribution of data streams in real-time (Dai & Vasarhely, 2017). Henceforth, allowing interconnection between the auditors and auditees throughout real-time auditing. Finally, according to Lamberti, Gatteschi, Demartini, Pranteda & Santamaria (2017), the application is only limited to the value drivers and enablers of BT.

2.2 Value drivers of blockchain

Angelis and Silva (2019) investigates enablers and values where BT can contribute to. These two aspects can be integrated into multiple sectors. Categorised into stages of maturity, previous authors have labelled the different versions of the blockchain stages based on its capability.

The evolution of Blockchain 1.0 and the direct effect on reducing transaction costs (Angelis & Silva, 2019). The evolutions of BT are summarised in table 1 for detailed comprehension. The main feature is the ability to guarantee secure transactions, therefore removing the need of the middleman (Efanov & Roschin, 2018). The middleman refers to the intermediary party in a transaction, facilitating the business relationship for every fee (Witzig & Salomon, 2018). Therefore, Angelis and Silva (2019) describe the value driver combined with the usage of Blockchain 1.0 through the reduction in transaction costs. The next stage presented is Blockchain 2.0 which enables the use of additional services in combination with the technology. Swan (2015) presents that the additional services could be smart contracts, defined as automated actions when specific predetermined conditions are fulfilled. Furthermore, smart contracts allow collaboration with other and new parties in the network because of the increased security. Therefore, the use of the added services in Blockchain 2.0 will increase automation and decrease the risk of error or manipulation (Angelis & Silva, 2019). Continuing, Blockchain 3.0 further developed the use within a network of peers. This upper stage allows shared, decentralised data and collaborations outside the organisational boundaries (Lamberti et al. 2017). As a result, this enhancement enables direct linkage between users and providers in an interconnected network (Angelis & Silva, 2019).

The main stages 1-3 grasps the current value drivers and the situations where it could be beneficial to use BT (Swan, 2015). Lastly, Angelis and Silva (2019) present the latest emerging stage, Blockchain 4.0. This stage introduces autonomous decision making as the final value, involving the use of artificial intelligence (AI) technology side by side with BT. As this stage is under development, only potential use can be presented. Further, all stages are summarised in table 1. the evolutions are not required to be presented simultaneously, instead, an organisation selects only the stage of the desired value drivers (Angelis & Silva, 2019).

Table 1: Presenting the different evolutions of blockchain and their enablers, value drivers and situations of use (Angelis & Silva, 2019; Efanov & Roschin, 2018; Swan, 2015; Lamberti et al. 2017).

	Enablers	Value driver	Situations of use
Blockchain 1.0	Decentralisation	Reduced transaction cost	Cryptocurrencies
Blockchain 2.0	Smart contracts	Added services and privacy	Financial transactions and automatic condition-based decision making
Blockchain 3.0	Decentralised application and decentralised distributed ledger	Operate outside organisation boundaries	Non-financial applications such as healthcare, supply chain and education
Blockchain 4.0	Artificial intelligence in blockchain	Autonomous decision-making	Regulatory compliance and audit

2.3 Distributed ledger technology

Grover, Kar, Janssen and Ilavarasan (2019) mention that the core foundation of BT is the distributed ledger technology (DLT). They further mention that the system is defined as the distribution and decentralisation of data, by storing the information with machines connected to the network the database is distributed. Therefore, the exchange of information is divided and stored within all participants. The information is stored and written on the blocks only when confirmed and approved by the majority of the machines in the network (Grover et al. 2019). Thus, making written data in the system impossible to tamper with. DLT differs from current standards, centralised networks that instead rely on one single data point. Additionally, to encrypt data DLT uses a method called cryptographic, the encryption method allows for a verifiable record of tampered free information (Deshpande, Stewart, Lepetit, & Gunashekar, 2017).

Furthermore, DLT owns different properties depending on whether it is considered as a public or private distributed ledger (Schmitz & Leoni, 2019). The first usage, presented by Schamiz and Leoni (2019) of BT introduced a public DLT, the main characteristics hereinafter are openness and traceability. Public DLT are networks that any user can join, mostly used within cryptocurrencies. Hence, sharing all data and transactions in the network to all parties. Without any single controlling entity in the network, no restrictions in who and what information is shared can be applied. Therefore, public DLT is limited to only specific applications of use (Natarajan, Krause & Gradstein, 2017; Bashir, 2018).

Private DTL is based on the public DLT features, however, the parties must instead be invited and accepted to join the network (Bashir 2018; Schmitz & Leoni 2019). Nevertheless, each participant in the network can be restricted to specific areas, allowing restriction in what

information can be accessed (Ølnes, Ubacht & Janssen, 2017). Therefore, the characteristics are more suited for business and organisational usage, meanwhile require high trust from the participants. The administrators of the network have complete control of the participants and the restrictions in information (Natarajan, Krause & Gradstein, 2017).

Consequently, the combination of both types of DLT is a hybrid version of the private and public DLT. The hybrid ledger enables predetermined rules in a private environment, combining features from both private and public ledger. Besides, it permits the whole network to determine the participant and restrict access to information. Nevertheless, the hybrid DLT remains relatively new and not widely adopted (Bashir 2018; Natarajan, Krause & Gradstein, 2017).

The use of private DLT allows for further integration between participants in addition to other technology (Li, Wu, King, Miled, Wassick & Tazelaar, 2018). Using the DLT, within a BT network allows the distribution of data and seamless integration with internal or external systems as well as real-time actions. According to Paikh (2018), the integration could be linked to the used Enterprise resource planning (ERP) allowing for direct linkage with it and between the network. The ERP refers to the internal system that coordinates, manages resources, processes and data for day-to-day actions (Romney & Steinbart, 2017). Global ERP software providers have implemented the service of using and integrating BT with DLT in their software. In addition, it highlights the great importance of integrating ERP with the DLT in the future (Microsoft, 2018; Oracle, 2020; SAP, 2020).

In this fashion, integration could include other aspects of the information system. DLT embraces the usage in the audit and account sector, permitting direct accessibility from the accountant or auditor (Schmitz & Leoni, 2019). The functions of audit and accounting are to record, verify as well as inspect financial transactions (Coyne & McMickle, 2017). Therefore, the use of shared databases (DLT) transactions could be recorded, booked and verified in real-time. Additionally, no manipulation can be done to record transactions when the database is shared and decentralised. Lastly, the integration between parties introduced the capability of predetermined actions when the conditions are fulfilled in forms of smart contracts such as payment as well as booking of transactions (Schmitz & Leoni, 2019). The case of integration of DLT is noticeable within the big audit firms, thus, acknowledging the technology to achieve the advantages in the auditing and accounting context (Deloitte, 2020; EY, 2020; KPMG, 2018; PWC, 2020). Additionally, the IBM Food Trust is a software built on BT allowing precision tracking and monitoring of shipping as well as delivering within the food industry (IBM, 2020). Using a private DLT allows for an integration in the ecosystem, between conveyors, supply chain, regulators and consumers, resulting in higher sales as well as fewer expenses (IBM, 2020).

2.4 Smart contract

Turning now to smart contracts extending the possibilities of BT, supporting data transfer while combined with automation of processes (Schmitz & Leoni, 2019). A smart

contract is defined as a preprogramed contract with conditions that are encoded in BT and action that executes when the conditions are fulfilled (Hofmann, Strewe & Bosia, 2017; Schmitz & Leoni, 2019). Smart contracts rely on a shared DLT in addition to allowing multiple parties to participate (Hofmann, Strewe & Bosia, 2017). The fundamental aspect is the consensus from every participant, agreed-upon rules that develop trust.

The DLT will allow all parties to verify transactions or if events have occurred, thus, reducing the risk for any manipulation or error (Hofmann, Strewe & Bosia, 2017; Schmitz & Leoni 2019). According to Morkunas, Paschen and Boon (2019), the benefits from smart contracts will result in more secure, rapid, and less expensive transactions. Additionally, the structure of smart contracts allows flexibility in a variety of different actions that can be executed. Therefore, smart contracts are widely used within companies, such as global shipping, financial trades, audit and accounting (Morkunas, Paschen & Boon, 2017; Schmitz & Leoni, 2019).

2.5 Challenges of the Blockchain technology acceptance and use

Moving on to consider the choice of accepting BT that is equally founded on the benefits and its limitations. Factoring in the decision, limitations are a crucial aspect that defines any technology or system. According to Hughes, Misra, Rana, Raghavan and Akella (2019), the limitations can be divided into two categories, technical factors and non-technical factors.

Technical factors of the technology can lead to restraining the development and the adoption. Hughes et al. (2019) highlight multiple limitations, nevertheless, focusing on two factors. Firstly, the high costs associated with the use of BT. The conveyed argument is based on the underlying operation that comes with the acceptance and use of BT, mostly in terms of the expenses related to the computer computation. Secondly, high transparency can result in a lack of privacy. As the network preserves the data with complete traceability it could be perceived as a risk in certain circumstances that would require privacy (Hughes et al. 2019).

Furthermore, non-technical factors include government inertia through the acceptance of new technology. According to Hughes et al. (2019), the acceptance from the government perspective legitimises a wider use from companies. Thus, signalling the acceptance of the technology within organisations. Additionally, the factor includes the aspects of data privacy laws, such as the General Data Protection Regulation (GDPR) which results in additional complexity. Thus, introducing regulatory aspects that can affect the acceptance of BT (Staples, Chen, Falamaki, Ponomarev, Rimba, Tran & Zhu, 2017). Further, deficiency in the level of trust and knowledge in BT can act as a hindrance. The right level of trust and knowledge in technology is necessary when choosing the adoption of new technologies (Staples et al. 2017). Currently, multiple stakeholders are involved in the adoption process, all parties involved must presume to receive value creation requiring trust and knowledge. Yet, the lack of knowledge and trust in the system can reduce the perceived usefulness (Staples et al. 2017).

Further, Coyne and McMickle (2017) mention constraints with smart contracts. The ability to record a transaction in the BT cannot guarantee the authenticity or quality of the transaction. Thus, the true validity of the transaction cannot be confirmed, as the technology is solely relying on the data input. Moreover, the complexity of smart contracts needs to be accounted for (Coyne & McMickle, 2017). Mik (2017) highlights the need for further understanding of the technical and legal factors. Highly complex transactions are currently difficult to record as well as verify in a satisfactory manner. Therefore, the use of smart contracts for extremely complex transactions can be limited.

3. Literature review

3.1 Technology acceptance model (TAM)

TAM is defined as the impact of external influences such as system design features and individual disparities on the user's intention, which is connected by its own perception concerning easiness and usefulness of the new system (Kesharwani & Bisht, 2012). As such, clarification of the differences between terms as “*adoption*” and “*acceptance*” is significant to be apprehended. Likewise, only a few studies have conducted a separate analysis of the perceptions connected to adoption and the perceptions linked to acceptance as a “post-adoption” (Hernandez, Jimenez & José Martín, 2009). A weak disparity appears between these two terms considered as behavioural differences between adoption and acceptance (Hernandez et al. 2009). The objective of TAM is to provide an understanding of the main factors of user acceptance and behaviour with technology. The acceptance of new technology should be a tailored action, TAM can perform and test in higher efficiency than other theoretical models due to its simplicity (Yang, 2019). The results of TAM focus on individuals' behaviour support predictive explanation ability (Belanche, Casaló & Flavián, 2012). Grover et al. (2019) established the technology acceptance model for blockchain (Davis, Bagozzi, & Warshaw, 1989). As such, TAM is composed of four main factors explaining the acceptance of technology; (1) attitude toward the technology (ATT), (2) perceived usefulness (PU), (3) perceived ease-of-use (PEOU) and (4) intention to use (Belanche, Casaló & Flavián, 2012).

First of all, (1) ATT is defined as a specific behaviour commonly described as “the level to which an individual has a positive or negative evaluation of the behaviour in question” (Ajzen, 1991 cited in Belanche, Casaló & Flavián, 2012 p .198). Previous researches have drawn the significance of attitude as one main factor of TAM (Davis, 1993). In this instance, the attitude has a strong or fragile relationship with PEOU and PU influence the intentions of an individual towards technology changing them into a real use of technology whether deemed positive (Singh, Jain, Munjal & Rakesh, 2019). The (2) PU has the meaning of a person believing that the utilisation of a new system would enhance its work performance (Davis Bagozzi & Warshaw, 1989). In other words, the extent of a user's acknowledgement that a system eases their activity (Warkentin, Gefen, Pavlou & Rose, 2002). As a component of PU, Shih (2004) has established a framework including previous research by integrating trust into the TAM. This model highlighted that the integrated framework provided a better understanding of users' behavioural intentions relative to other established models (Gao & Bai, 2014).

Only a few researchers have investigated the relationship between trust in combination with the TAM framework. Gefen, Karahanna, and Straub (2003) discusses how trust can result in acceptance of a system or technology. It can be argued that PU can increase based on the level of trust, specifically highlighting the long-term perspective (Gefen et al. 2003). Further, Reid and Levy (2008) state that trust can have an effect on the acceptance of the technology that enables remote connectivity and accessibility. Hence, signalling that the trust factor has a crucial effect on the decision and intention to accept the use of the technology.

According to Davis (1993), (3) PEOU defines a person convinced that using a special system would be effortless as a means of “being easy”. Hence, the ease of using BT should not be undervalued by Nordic governments in the digitalisation of firms due to the broad range of potential users in the business field (Warkentin et al. 2002). (4) Intention to use paints a person’s motivation to undertake a specific attitude (Ajzen, 1991 cited in Belanche, Casaló & Flavián, 2012) while deeming a strong understanding of how the person will act in the future (Belanche, Casaló & Flavián, 2012). Likewise, it is related to the arising intention defined as a direct effect on attitude toward the use of the technology (Belanche, Casaló & Flavián, 2012).

According to Arning & Ziefle (2007), TAM provides comprehension of positive reception, utilisation of newly implemented technology and systems. TAM envisions that a user's decision-making to use a new digital solution is influenced by the behavioural intention to use the system. Additionally, TAM assumes some variables as age and gender to influence the PEOU as well as the usefulness. Extensions of the technology-acceptance-model already exist as several variables were added such as trust and perceived risk (Venkatesh, 2003; Davis, 1993). Meanwhile, even in the extended TAM the integration of influential variables is not completely satisfying (Arning & Ziefle, 2007). At this time, only one article has explored blockchain acceptance and use through the glance of TAM. According to Grover et al. (2019), users feel that blockchain may provide security to digital transactions; their study suggests exploring this topic further in future research.

3.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

Moving on now to consider UTAUT model created by Venkatesh et al. (2003) was founded on the Behaviour Intention to Use (BI) is considered as “a measure of the strength of one’s intention to perform a specified behaviour” (Cimperman, Brenčič & Trkman, 2016, p.10). This concept is influenced by four main factors: (1) Performance Expectancy (PE), (2) Effort Expectancy (EE), (3) Social Influence (SI), and (4) Facilitating Conditions (FC). PE and EE are depicted as two variables derived from PU and PEOU originally from the TAM model (Cimperman, Brenčič & Trkman, 2016).

To provide a definition of PE is the extent of using a technology resulting in benefits through the operation of certain activities (Cimperman, Brenčič & Trkman, 2016). In the UTAUT model, PE is influenced by PU, relative advantage, extrinsic motivation, job-fit, and outcome expectations (Yu, 2012). EE is defined as the degree of ease related to the use of the system (Rempel & Mellinger, 2015). Yu (2012) developed three factors of PE, EE, and SI to explore what influences individual intention to adopt new technology as for instance mobile technology and data service. These researches conclude that effort expectancy strongly affects human intention to use new technology.

SI is considered as the concept of an individual perceiving from significant surrounding individuals thinking he/she should use the new system (Rempel & Mellinger, 2015). SI can be exerted by members, employees and peers within a network of individuals (Queiroz & Fosso Wamba, 2019). Considering the distributed ledger context, there are multiple interactions

between managers, internal colleagues and external parties (Queiroz & Fosso Wamba, 2019). In regard to behaviour is defined as individual behaviour that can be predicted and affected by individual intention of use. UTAUT included and certified behaviour to have an important influence on technology usage (Venkatesh et al. 2003; Venkatesh & Zhang, 2010). Consequently, the ultimate goal of businesses is to attract consumers to utilise their services rather than the intention of adopting them, extensive research has examined the relationship between behavioural intention and actual use (Yu, 2012).

FC represents the relative extent of an individual convinced that a firm and technical infrastructure exists to encourage the use of the system (Rempel & Mellinger, 2015). In UTAUT, Yu (2012) encompassed 32 factors through eight disparate models into five clusters. The authors empirically concluded that behavioural intention and FC are two direct elements of adoption behaviour (Yu, 2012). Having that said, Rempel & Mellinger (2015) argue that the worker's interaction through a network as a distributed ledger can affect the perception of the firm technical infrastructure.

In addition, UTAUT encompasses four variables connected to the extent of technology acceptance and behaviour: previous technology experience, voluntariness, gender, and age (Rempel & Mellinger, 2015). The UTAUT model has been tested through several areas and appears to be an efficient tool aiming to analyse users' acceptance (Cimperman, Brenčič & Trkman, 2016). The UTAUT model has been established to support managers and directors making decisions about how their workforce would use new technologies. Only a few UTAUT articles are highlighting the potential to support technology system acceptance and use questions of blockchain in the business field. Until now, none of them has explored blockchain acceptance and use through the lens of UTAUT (Cimperman, Brenčič & Trkman, 2016).

This model has been selected for this research as contrary to other frameworks, it encompasses the impact of SI, such as the influence of managers, employees, or peers on technology acceptance and use. As illustrated in appendix 1, a summary of the literature highlights relevant articles between TAM and UTAUT. A presentation of several studies using either TAM or UTAUT is highlighted as technology acceptance frameworks for the acceptance of information systems in both the public as well as private sectors of the developed and emerging countries. Finally, several contextual factors affecting the acceptance of information systems show that there can never exist global standards or similar blockchain implementation strategy within companies due to environmental disparities (Cimperman, Brenčič & Trkman, 2016).

3.3 Factors affecting the acceptance of BT: Relationship between TAM and UTAUT

This section highlights the factors of TAM and UTAUT influence the acceptance and use of BT. This concept delivers a massive change in the finance industry and also being impactful on other industries. Likewise, TAM is commonly used in different industries while appreciating the stake of acceptance towards internet-related technologies resulting from all the parameters to grasp the user's acceptance (Singh et al. 2019; Folkinshteyn & Lennon, 2016;

Holden & Karsh, 2010). Blockchain acceptance and use can be assessed from a TAM perception (Saber, Kouhizadeh, Sarkis & Shen, 2019). The use of TAM in the analysis of blockchain has started to spread (Folkinshteyn & Lennon, 2016; Li, 2017; Thiruchelvam, 2018; Saber et al. 2019; Queiroz & Fosso Wamba, 2019).

3.3.1 TAM

Connecting TAM to the BT concept, from Davis, Bagozzi and Warshaw (1989) as well as Grover, Janssen and Ilavarasan (2019) was drawn in figure 1; (a) the PU of BT to the characteristics of blockchain; (b) the PEOU to the score of use cases among users on social media; (c) the ATT use and advantages of blockchain; and (d) the variables linked to downsides of blockchain. This figure illustrates features that could potentially influence BT acceptance from an application and technical perspectives. The advantages and downsides of BT appear to affect PU and PEOU of BT. In addition, it highlights that external downsides are connected with factors influencing the users' or firms' acceptance of blockchain technology. Within the ATT, users are open to accepting blockchain technology for digital transactions, notwithstanding that they are largely unaware of the drawbacks (Grover et al. 2019). Firms such as IBM, SAP, Microsoft, Walmart as pioneers are enforcing the interest regarding the use of BT in business, however, there is limited information available on post-implementation (Saber et al. 2019; Yang, 2019). A study found that senior executives can be less open to new technologies showing a sceptical attitude about the advantages of blockchain technology (Yang, 2019). In terms of PU, one study has extracted and agreed factors as customs clearance, management, digitalising and easing paperwork as being the most important track for the application of blockchain technology (Yang, 2019). In addition, BT applications' studies have identified the enhancement of the PU which deems the value of BT in terms of enhancing efficiency and effectiveness within the firms (Yang, 2019).

In terms of PEOU, Yang's (2019) research has validated standardisation and software development as a core factor for managers considering it to improve the ease of using blockchain technology by enhancing opportunities to develop a network in a supply-chain and industry context. Blockchains could revolutionise the digitalisation of paperwork within the firm, industry and the ease of use with which they can be treated, hence enhancing and changing the whole industry processes (Yang, 2019). Therefore, the ease of use can increase because of the automation allowed through the use of smart contracts (Schmitz & Leoni, 2019). Intention to use is affected by standardisation and software development in a company, being a key driver to strengthen intentions to adopt and use blockchain technology (Yang, 2019). Several researchers within the topic of BT have recommended or been undertaking the TAM view focusing on intention to use (Kamble, Gunasekaran & Arha, 2019; Wong et al. 2020). Additionally, literature has tackled singular aspects of DLT such as transparency (Francisco & Swanson, 2018), trust and traceability within the emerging interest in BT's acceptance and use research (Wong et al. 2020).

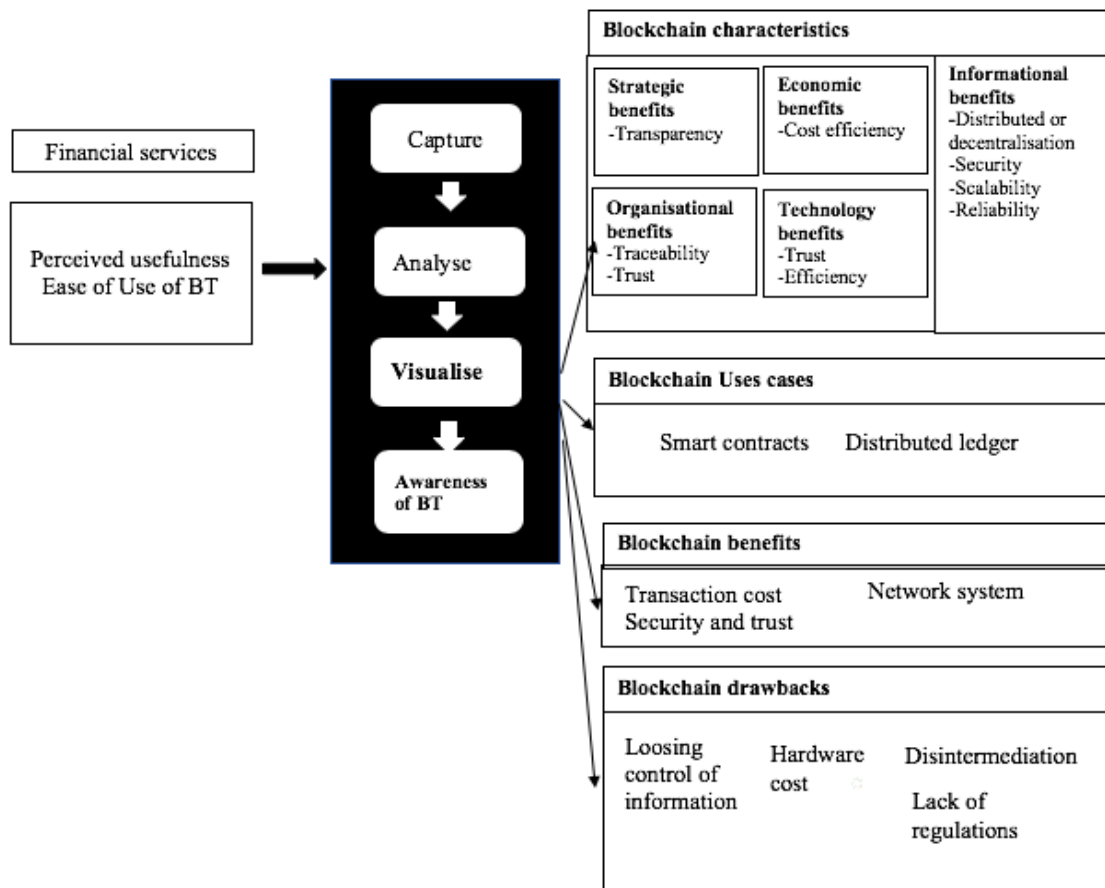


Figure 1: Diagram representing the application of blockchain within a firm adapted from Grover et al. (2019)

3.3.2 UTAUT model

Previous literature on technology adoption had already emphasised the power of performance expectancy (PE) (Venkatesh et al. 2003; Queiroz & Fosso Wamba, 2019) in blockchain and DLT context. Within PE, blockchain transparency and trust of stakeholders are considered as predictors of intention as well as expectation, therefore, influence blockchain acceptance (Queiroz & Fosso Wamba, 2019). PE factor relates to the enhancement of expectancy in job activities that blockchain can provide in a distributed ledger (Queiroz & Fosso Wamba, 2019). Studies from Batara, Nurmandi, Warsito & Pribadi (2017) and Oliveira, (2014) have shown interest in some experience in the area of blockchain, the construct was not included in their studies “usage behaviour”. As such, BT remains new and has not yet raised a strong extent of awareness (Batara et al. 2017; Queiroz & Fosso Wamba, 2019).

Effort expectancy (EE) within the blockchain environment suggests that the complexity of the diverse activities will strongly decrease (Queiroz & Fosso Wamba, 2019). In the context of the network, researchers have discovered that the EE factor is insignificant in blockchain acceptance (Lai-Wan Wong, Garry Wei-Han Tan, Voon-Hsien Lee, Keng-Boon Ooi & Amrik Sohal, 2020). This statement is extruding from existing literature that has upheld PE and EE

on Blockchain acceptance and use (Chong, 2015; Francisco & Swanson, 2018; Wong et al. 2020). Social influence (SI) is directly affected by PE with blockchain in a business context. Blockchain literature has stated that efficiency in the process and within the employee's performance would be enhanced with the acceptance and use of blockchain (Queiroz & Fosso Wamba, 2019). BT applications within the DLT allow employees to achieve their missions by reducing their efforts. In this instance, to simplify the complexity of the activities, a smart contract could be used (Kim and Laskowski, 2017), combined with the effort with traceability (Lu & Xu, 2017; Tian, 2017). As a result, these factors will impact the productivity and performance of the employees (Queiroz & Fosso Wamba, 2019).

SI affects blockchain technologies evolving through a peer-to-peer network model (Christidis & Devetsikiotis, 2016; Queiroz & Fosso Wamba, 2019). This feature means that in a decentralised network which is the case of DLT, there is an absence of intermediaries (Aste, Tasca and Di Matteo, 2017; Scott, Loonam & Kumar, 2017). Moreover, the validated transactions by the network members are operated cryptographically and saved into linked blocks (Kshetri, 2017). Recent studies have verified that social influence exerted an effect on coworkers, stakeholders to make them accept and use blockchain (Queiroz & Fosso Wamba, 2019). Focusing on facilitating condition (FC) factors, researchers have proved that it highly affects blockchain acceptance (Queiroz & Fosso Wamba, 2019). FC's research had an interest linked to how the infrastructure of firms is established to support blockchain transactions (Queiroz & Fosso Wamba, 2019). In the same vein, TAM factors as PU and PEOU, which own the same features with PE and EE, are used as an element to measure the intention to use Blockchain technology in business environments (Kamble, Gunasekaran, & Arha, 2019).

3.4 Additional factors influencing the acceptance and use of BT

3.4.1 Trust

Trust in the business context according to Barney and Hansen (1994, p.12) is defined as “the mutual confidence that no party to an exchange will exploit another's vulnerabilities”. This study considers that employees with executives' trust in BT as a platform of information in the relationship between four basic components of TAM: PEOU, usefulness perceptions, ATT and intention to use (Belanche, Casaló & Flavián, 2012). The inclusion of trust is essential as it eases the adoption usage behaviour (Gao & Bai, 2014), being one of the most efficient tools for diminishing uncertainty and risk resulting in the raise of awareness for safety (Lin, 2011 cited in Gao and Bai, 2014). The relevance of trust in this thesis is based on the significance of this variable appearing in the business context under vulnerability and uncertainty perceptions of several employees (Gefen et al. 2003; Harris & Goode, 2004; Gao & Bai, 2014). Mari Sako (2006) highlights the factor of trust in a business environment, valuing trust as the most important factor in the success of partnerships and networks. Likewise, Sako (2006) recognises the link between advantageous business performance and trust. Trust in a network environment paints the degree of confidence that blockchain can provide to the transactions as well as their stakeholders.

On the other side, behavioural intention to use is associated with blockchain acceptance, Queiroz and Fosso Wamba (2019) highlight the behavioural expectation was deemed with the subjective probability for professionals behaving in favour of BT acceptance and use. Furthermore, authors state that organisations must rely on trust to create value, linking the elements of value creation with trustworthiness. Noteworthy, the creation of value can be closely linked to the relationship in the network where the technology is used rather than the technology separately (Ryssel, Ritter & Gemünden, 2004). Further, Barney and Hansen (1994) investigate the relationship of trustworthiness (e.g trust), they acknowledge that trust can be seen as the source of achieving competitive advantage depending on the level of trust. Hence, the level of trust will partly affect the potential presence of competitive advantage. Opposite, Nakamoto (2008) stated that BT is to be based on cryptographic proof instead of trust, enabling any two parties to transact directly between each other without requiring the factor of trust for the other party, hence trust is not always compulsory in BT application.

3.4.2 Transparency

In the regards of transparency, it is described as an appearing factor from TAM. Transparency can be composed of two types having transparent features. (1) single-cycle throughput transparency, (2) multi-cycle throughput transparency (Yoneda, Shuto, Ichihara, Inoue & Fujiwara, 2010). Single-cycle throughput transparency-based TAM is a concept that reduces the area overhead of additional gate counts. This concept can handle area overhead co-optimisation issues in and power control constraints in. Single-cycle has higher advantages compared to multi-cycle throughput transparency such as (a) short verification time, (b) capability to preserve timing information (Yoneda et al. 2010). Dong, Yin, Yongqiang, Li & Wang, (2017) suggest transparency through the architecture of TAM, to measure the network performance of technology applications and obtain content from them. Queiroz and Fosso Wamba (2019) researched blockchain's transparency defined as the exchange and visibility of information between companies. In this instance, it is an essential predictor of the behavioural intention of using blockchain. Blockchain transparency enhances members' cooperation in a network environment, thus triggering a significant transformation in the industry and the society widely (Queiroz & Fosso Wamba, 2019). High levels of transparency with corporate governance will have positive effects and are strongly valued by the market as they raise awareness (Spence, 1972 cited in Morris, Pham & Sidney, 2011). Thus, the company attempts to provide credible information for potential investors and insider employees will not expropriate wealth from outsider shareholders (Morris, Pham & Sidney, 2011).

3.4.3 Cost efficiency

Cost efficiency is considered as one of the main drivers resulting in the acceptance and use of BT (Efanov & Roschin, 2018; Witzig & Salomon, 2018). Cost efficiency highlights the ability to reduce cost without decreasing the quality and outcome of the specific task (Palmer & Torgerson, 1999). Cost efficiency is the main factor for management in terms of selection of new strategies for adoption, long-term goals to maintain profitability and growth (Jonas, 1988). The use of BT allows a reduction in transaction costs due to less monitoring required by higher secure data transfer (Witzig & Salomon, 2018). Additionally, the use of smart

contracts increases efficiency, reduces human error and manipulation (Lamberti et al. 2017). Therefore, the collective features of BT can increase cost efficiency.

3.4.4 Automation of decision making

Automated decision making is one value driver that leads to the acceptance and use of BT (Angelis & Silva, 2019). The use of automated decision-making technologies will reduce the need for human interaction for specific tasks. The use of BT introduces automated decision making in forms of smart contracts, allowing for pre-determine decision making for, usually, generic tasks (Swan, 2015). According to Angelis and Silva (2019), smart contracts are widely used and identified as a key driver for the acceptance and use of BT. Furthermore, they state that the use of automated decisions introduces the use of AI. Likewise, the authors describe that the upcoming use of BT can allow the integration of AI for smart automated decision-making, enabling for decision-making in more complex and less predictable settings. Thus, thanks to automated decision-making, the cost reduction, efficiency and trust can be enhanced.

3.4.5 Compliance from governmental regulation

The use and acceptance of BT is limited to governmental and regulatory compliance (Hughes et al. 2019). Governmental regulations are rules enforced by laws, in the business context enabling or limiting strategies or actions (Hughes et al. 2019). According to Yeoh (2017), a challenge for adoption is the factors of governmental regulation and compliance. Consequently, these aspects need to be taken into consideration when accepting and using BT.

Hughes (2019) highlights that the main regulatory area that can conflict with the use of BT is data privacy. Nevertheless, Yeoh (2017) mentions that current governmental rules can act as a hurdle when adopting new digital tools (i.e BT) in different sectors and industries by increasing trust in technology. Furthermore, Yeoh (2017) recognised that governmental use of the technology can be seen as a driver for acceptance and use for companies. Governmental use of BT can increase trust in the technology (Yeoh, 2017). Therefore, future acceptance and use rely on the respective governments' acceptance as well as use.

3.5 Value creation outcoming of additional factors

In the case of value creation which is defined as a holistic nature driven by the use of an institutional and recurrent view to emphasise the involvement of stakeholders in the structure of the resource and exchange (Valtanen, Backman & Yrjola, 2019). Investigation of value creation through BT use has proceeded to the process of innovation based on BT in Nordic firms (Valtanen, Backman & Yrjola, 2019). Value creation is the generated outcome of the factors that enable the acceptance and use of BT. Within the value creation outcome, the management perspective is of utmost significance in the process of BT acceptance (Risius & Spohrer, 2017). Throughout the use cases of BT, the business frameworks focused on value creation processes selected as units of measurement. As noted by Valtanen, Backman and Yrjola (2019), the structure of the resource framework highlights a system-based, thus value creation allows to establish a structured configuration. Hence, the more efficient the gathering

of the data occurs, the higher is the value creation potential. Furthermore, the authors mention several improvements influence the use of BT and the value creation potential, through a new way of using resources. In a business context, BT as a value creator enables billing automation, multi-side auction and creation of new products (Valtanen, Backman & Yrjola, 2019). Finally, sharing business-critical data between firms in a network system can be facilitated with the use of BT allowing organisations to control their own data and enable information traceability. On the other side, to deliver the full value creation of BT standards encouraging a wider acceptance, laws and regulation should be required to; (1) extend for decentralised information and governance, (2) enhance the system compatibility, (3) data sovereignty be ensured in a business network environment (Valtanen, Backman & Yrjola, 2019).

4. Methodology

This chapter aims to firstly present and explain the selected research approach including the motivation of the selected method of the qualitative research approach. Secondly, the next section aims to motivate the selection of the theoretical framework, the layout of the interview as well as the process of data collection. Lastly, the author's reflection on the research design of this thesis.

4.1 Research approach: Motivation of the selected method

This first part provides an explanation of the research selection method. Qualitative research allows a useful contribution to the design of blockchain research and being more adapted to the context of technology acceptance (Toye, Williamson, Williams, Fairbank, Lamb, 2016). The research methods should assist the identification of the factors influencing BT adoption. Moreover, this research is based on theories that have identified factors through an analysis approach (Lee, 1999 cited in Cornelissen, 2017). Our research methodology encompasses qualitative data collected from observations and interviews providing a better comprehension of the data while explaining factors use and acceptance implication (Cornelissen, 2017). Hence, qualitative research depicts an interpretive framework illustrating knowledge in a dialectic template occurring between individuals having their unique world perception (Toye et al. 2016).

This study is using the semi-structured interview as the research methodology. Due to a lack of research in the application of blockchain, the data collection is drawn through a primary collection with the support of interviews. Cornelissen (2017), states that interviews highlight the intersections between concepts and cultural frames. The interview has the benefit of considering social experiences through events of interaction between ideas and emotions (Rinaldo & Guhin, 2019). Semi-structured interviews follow a guided process which allows interviewees the flexibility and leeway when answering (Bryman & Bell, 2011). The interview methodology is defined as interpretative research being both more precise and descriptive (Magnusson & Marecek, 2015). An interview provides an interpretation of the meanings that executives experienced through events/actions and illustrates their interactions with the company. In addition, it enhances the research's analysis of the interview and knowledge gained through the interviewee's experience (Rinaldo & Guhin, 2019).

4.2 Research design

4.2.1 Selection of model

The model's selection is based on two models that are interconnected. This study uses TAM and UTAUT to examine factors spreading an impactful influence on employees, managers, executives in the Nordic region (Belanche, Casaló & Flavián, 2012). These highlighted factors that are deemed to be relevant in the existing literature will support us to design and structure our interviews. TAM is considered as one of the most efficient frameworks to understand technology-related adoptions that can be extended and adapted to different

features (Belanche, Casaló & Flavián, 2012). Combined with the UTAUT model they have been tested extensively in diverse areas of research and is considered as a great use for analysing users' acceptance of technology (Cimperman, Brenčič & Trkman, 2016). UTAUT's validity, viability and stability have been verified with multiple technology adoption studies within several business environments (Mosweu, Bwalya & Mutshewa, 2016). The two models can be applied through variables and/or factors. For relevance purposes, the authors decided to mainly focus on the factors of UTAUT and TAM.

4.2.2 Selection of the interviewees

As aforementioned, authors decide to focus on the Nordic countries that include Iceland, Finland, Denmark, Sweden and Norway (Kester, Noel, Zarazua de Rubens & Sovacool, 2018). These regions are strongly connected to each other as cooperating partners in the technology industry (Møller, 1988). We define Nordic firms as global entities operating in one of the Nordic countries. Technology-intensive industries are defined as "high technology" or "new economy" organisations, characteristics of radical innovations for technological purposes (Duch-Brown, Panizza, Rohman, 2018; Vaaler & McNamara, 2010). As a matter of fact, the selection of the interviewee was essential. The first criterion expects each interviewee to have relevant academic knowledge and/or working experience in blockchain technology.

The second criterion requires the interviewee to have reached a manager position within the corporate industry; as top management employees have a better understanding of the business context and stakes of blockchain technology (Cici, Gehde-Trapp, Göricke & Kempf, 2018). Hence, employees from the digital transformation and financial department as a manager or executive position were selected. Initial contact with the interviewee was established through networking events, job interviews and social platforms such as LinkedIn. In order to ensure the knowledge and experience in blockchain verification through targeted questions were processed with the interviewees. Candidates having a weak blockchain's comprehension and unable to answer these questions were not selected. Once the potential interviewee fits with the criteria of the interview selection, the writers contacted him/her. An agreement was established with the interviewee to set a schedule and proceed to the interview on the day agreed. Bearing this in mind, the interviewees involved in the interview stated their interest and voluntarism several times before and during the interview.

4.2.3 Data collection

The research proceeds with a deep understanding of the literature to proceed with the semi-structured interviews. Based on this topic's nature, the study will be based on primary data through interviews. The primary and secondary data are including theoretical literature, case studies, books, journals articles and various websites sources. This study has used a mixture of the mentioned data sources for the discussion and analysis of empirical findings. According to Galletta (2013), a literature gap appears from researches leading the authors to build a range of structured questions to better answer this gap. Semi-structured interviews tailor qualitative analyses aiming to open new solutions in understanding complex phenomena as

blockchain (Galletta, 2013). The results are collected through a record and transcript of the discussion.

Six interviews were processed with durations between 30 and 60 minutes. For accuracy reasons, English was the only language used. Irvine (2010) investigates two main forms of conducting interviews, phone and face-to-face interviews; concluding that phone and online voice calls interviews were more efficient and less costly in specific situations. Moreover, due to the pandemic COVID-19 and for safety reasons, all of the interviews are conducted via online voice calls or phone calls. Ethical principles and confidentiality are aspects that the writers took into consideration. According to Bryman and Bell (2011), the code of conduct is important in order to ensure no harm to the participants or their respective company. Therefore, the interviewees were asked about confidentiality and anonymity before the interviews were conducted. Names of the individual interviews are not presented as it is often confidential and not adding extra value to this thesis. As a result, interviewees that requested anonymity will be presented as confidential. All interviewees are or have been evolved in the blockchain industry developing the digital transformation of their company or clients within Nordic countries. In addition, their education and background experience can be considered as diverse, as can be noted in table 2.

Table 2: Information about interviewees and their background

Interviewee	Position in the company	Nordic countries the firm is operating in	Duration	Education and previous experience
Interviewee A	Partner and chairman of the board of the XBRL (Extensible Business Reporting Language) in Ernst & Young.	Sweden, Denmark, Norway, Finland	60 min	Bachelor's degree in business and IT. Over 15 years of experience in auditing and accounting, supporting business and digital transformation with a team of 50 peoples across the Nordics countries.
Interviewee B	Blockchain business Executive of global software implementation firm (confidential name)	Sweden, Denmark, Norway, Finland, Iceland	60 min	Experience in business development of blockchain technology Nordic executive position, possesses an MBA in business.
Interviewee C	Finance transformation manager in United Technology Carrier Corporation	Sweden, Denmark, Norway, Finland	35 min	Completed an MBA in business, over 5 years of experience in finance digital transformation, strong focus on accounting corporate-based transformation
Interviewee D	Senior director of Nasdaq Nordic, Blockchain development	Sweden, Denmark, Norway, Finland, Iceland	50 min	Possesses a technical oriented master and an MBA. Over 18 years of experience working with technology in Nasdaq.

Interviewee E	Confidential name of the company. Head of product, manager at software implementation company	Sweden	40 min	Over 6 years of experience in information technology and corporate strategies
Interviewee F	Manager consultant of Blockchain, Deloitte Nordic	Sweden, Denmark, Norway, Finland, Iceland	45 min	Worked over 9 years of experience in digitalisation in the company, including 4 years at Deloitte. Graduated of a PhD within the field of Blockchain.

4.2.4 Data processing

Every interview is addressed through a memorandum encompassing transcripts from the recorded interview, which is mainly key ideas thus, word-for-word. Through the collection of the core concepts and thoughts, the authors classify the findings based on relevant concepts developed within the literature review. In this regard, direct quotes are used in the findings section. The retracing of relevant statements for quotation is, therefore, more convenient by verifying the memorandum. The data collected are presented and reported in the empirical findings. Hence, these results are analysed and reported in the results section. As such, the findings are compared and discussed, reflecting from previous theoretical backgrounds.

4.2.5 Data triangulation

This research combines triangulation as an understanding of validation (Campbell & Fiske, 1959 cited in Fielding, 2012), as a comparative method encompassing data from diverse sources (Fielding, 2012). It appears four levels of triangulation: (1) data triangulation, (2) investigator triangulation, (3) theory triangulation and (4) methodological triangulation (Patton, 1990). Having interviews with several executives enhances the sample size, the analysis and convergence of findings. Thereby, the interviews are run by a pair of students resulting in the use of triangulation methods (Eisenhardt, 1989 cited in Patton, 1990). As such, both writers have participated at each interview allowing the establishment of a detailed and structured memorandum.

4.3 Reflection on the research design

According to Bryman and Bell (2011), it is suggested to apply three main measurements: (1) external reliability, (2) internal reliability and (3) external validity when reflecting on a qualitative study. External reliability (1) highlights and evaluates the degree of replication for this study. Data gathering in the form of interviews reduces external reliability, as the context is hard to reproduce (Bryman & Bell, 2011). Therefore, it is questionable and hard to maintain high external reliability in this thesis. Nevertheless, the published interview guide and our approach choosing, gathering and evaluating the data can help the replication of the study (Yin, 2018). Internal reliability (2) is the tool that measures the degree in the relationship between the theoretical ideas and the observations of the study (Bryman & Bell, 2011). This thesis will compare and analyse the empirical findings to maintain high internal

reliability. External validity (3) measures the level of the findings and results can be generalisable (Bryman & Bell 2011; Yin, 2018). Therefore, to achieve a high external validity the sample should represent the whole population (Yin, 2018). As this thesis is conducting interviews there are limitations with the sample size and the degree of external validity questionable. Nonetheless, the selected companies cover a wide area and the result could, to some degree, possibly be generalised.

The author's decision to conduct six interviews can reflect the quality and breadth of the result. The authors aim is to find a relative balance between quality and width. Therefore, the number of interviews conducted can limit the thoroughness of the result. Nevertheless, the choice of companies includes multiple sectors and could partially represent well-established technology-driven firms in the Nordic regions. Writers of this thesis decided to set one interview with each company to allow a large and diverse analysis in the blockchain environment. Furthermore, the choice to conduct one interview per participant can weaken the level of the data's quality. This aspect was reflected by us and the decision to conduct semi-structured interviews can increase the depth of answers by allowing for open-ended questions. The surveys' selection is not recommended for this type of research as it delivers different types of data from the executive interviewed. The paradoxes with the survey are their predictability, resulting in less valuable results for an in-depth research by mainly expressing close-ended answers (Rinaldo & Guhin, 2019).

5. Results of the interviews

This section aims to present the results of the interviews. At first, an introduction for the interviewee will be conveyed. Followed by an explanation of real examples of blockchain application. Secondly, the factors identified are described as well as additional factors providing a clearer understanding of their connection with the acceptance and use of BT. Finally, the factors restraining the acceptance and use of BT are highlighted to illustrate their influence on BT implementation. The questions presented in appendix 2 are clustered into four main parts, the introduction of blockchain in the Nordic market, TAM, UTAUT and additional factors identified.

5.1 Understanding Blockchain Technology in the Nordic region

The comprehension of BT is a significant parameter; therefore, the interviewees were firstly asked to define their understanding of BT and its usefulness in a business context. Question 2 highlights the main consensus from the interviewee suggesting BT as a tool that will increase the transmission of secure and verified data in a smarter fashion. Accordingly, smarter transportation of information included more efficiency, more integration to other systems and the use of smart contracts. Further, the interviewee highlights that the use of BT can be applicable in a wide variety of sectors and uses due to the flexibility that it allows. Additionally, interviewee A mentions that the understanding of public BT is often related to Bitcoin, described as one among many cases of application. In the meantime, interviewee D expresses similar thoughts.

Our findings from question 2 underline that BT is useful to create and utilise new business models. Integration of databases with other internal systems, such as ERP, or external systems in a private network is considered as useful. According to these findings, the aforementioned sectors where the use of BT seems most apparent is in finance, audit and supply-chain. These sectors mainly rely on exchanges of information in a fast, traceable and trustworthy way. Further, according to the interviewees, the usefulness of BT extended to the use of smart contracts suggests being beneficial due to the improvement of automation. According to the interviewees, the view on the usefulness of BT is founded on a new relationship with trust. Interviewee F highlights that BT allows for a more transparent and trustworthy network where less monitoring is required. The interviewees emphasise that trust in the system reduces the need for trust in the counterparty. Reducing the necessity for middlemen, allowing trade and transactions with less trustworthy counterparts.

“The future of finance could be in smart contracts. The transactions can instead be used through smart contracts where both parties know the rules in advance” - Interviewee C

5.1.1 Example of Blockchain integration

Turning now to question 3, the interviewees are asked to explain whether they are currently using BT at their workplace and to what extent. Interviewee A, B, D and F are

currently working with the BT. Interviewee A highlights that the implementation of BT is a service that EY provides to their clients. Supporting and enabling the use of BT in their operations, as of now enabling for some integration with external auditors. In the meantime, interviewee A mentions that EY encounters BT with their Nordic clients, working with cryptocurrencies in the general ledger for payments and investments. Additionally, interview F explains that Deloitte integrates BT in a similar manner, focusing on supporting and enabling BT implementation within their customers.

Besides, interviewee B highlights that BT is used in multiple projects, internally and externally. Highlighting multiple examples of situations which are confidential where BT has been implemented. The main areas are financial services, audit and supply chain. The use within financial services included an invoicing project that increases accuracy and reduces errors when sending or receiving invoices. According to interviewee B, the benefits of BT in auditing include, increasing speed and accuracy resulting in a cost reduction. Furthermore, interviewee B explains that the use in the supply chain is focusing on tracking and monitoring of food, from production to retail. Hence, enhancing the quality of the food as well as reducing food waste with the increasing speed of transportation. Lastly, interviewee D expresses that BT has been used in Nasdaq Nordics for several years. Besides the internal use, Nasdaq acts as an outsourcing company, providing the technology to other companies as a service. Furthermore, multiple projects allow secure, fast transactions between central banks, stock exchanges and banks. Our findings demonstrate that the use of BT is often associated with situations where trust, security and speed are needed. The interviewees explain that the customisation of the private network permits tailored rules and conditions matching with participants' needs. This could include restriction in access for specific parties or the level of transparency in the network.

5.2 Findings in relation to blockchain usefulness and acceptance

During the interviews, we have based our questions on the two frameworks combined with additional questions to identify relevant factors. Eight factors influencing blockchain were identified as (1) Usefulness of BT, (2) Ease of using BT, (3) Motivation of using BT, (4) behaviour toward BT; (5) Performance expected, (6) Expected Effort, (7) Network influence, (8) enabling condition. A summary of the findings for the aforementioned factors is available in appendix 3.

The context of the behaviour toward BT is introduced in question 4 focusing on managers' attitude influencing BT acceptance. We acknowledge that the agreement of managers and team members to use BT is essential. It seems that the relationships with managers have a high effect, meanwhile, in case of lack of confidence from the managers the acceptance will not take place.

“You need to have the agreement of your manager and from your team. If there is a lack of confidence from the managers, then the acceptance of Blockchain won't happen. Manager's attitude toward the technology is important.” - Interviewee C

Applied to the current situation, companies interested in BT could feel strongly influenced by their peers to adopt it. Hence, each manager's behaviour toward technology is significant. Moreover, it has been found that the executive's attitude will also affect in a greater or lesser extent the behaviour toward BT implementation. According to the findings, the acceptance of BT requires patience and long-term planning to be implemented. It leads the authors of this thesis to suggest that the behaviour toward BT influences the acceptance and use of BT.

From the data collection of question 5 in appendix 2 which introduces the transparency of the information. Defining the right level of transparency is essential, however, due to data confidentiality, it would allow firms to emphasise their shareability. Our findings report that transparency is a strength connected with trust and the distributed manner to obtain information is unique to BT. Interviewees B, C and F highlight the relevance of transparency within the BT network. Interviewees acknowledge that within the usefulness of BT, the factor trust between the stakeholders enables effectiveness, cost efficiency in the operating and financial performance. Two interviewees have conceded that the firms have weak comprehension of BT characteristic challenging the usefulness of BT. The interviewees emphasise that transparency of information shared through BT would allow a higher influence on the usefulness of BT. Hence, it appears that the usefulness of BT is influenced by trust between stakeholders and transparency of the information within BT's acceptance.

“Blockchain could give better transparency to the business processes and get information on where you are in terms of financial status, in supply-chain and delivery.” - Interviewee A

The automation of decision provided by smart contracts is strongly suggested as being a prerequisite of the motivation of using BT. From question 6 in appendix 2 emphasises the perceived risk factors. Smart contracts introduce a new risk as a threat of the unknown with the use of BT negatively affecting the intention of adopting BT. Writers of the thesis witness that the lack of early adopters accepting and using BT influences its acceptance. Interview C mentioned that firms do not aim to be pioneers in new technology implementation. Meanwhile, their experiences using BT will be a pillar for the next generations of users. These pioneer organisations will give the dynamic to adopt this state-of-the-art technology affecting Nordic industries within their sectors. It appears that the network environment emphasised an impact on the intention to use BT. In a network context, interviewees claim that each stakeholder expects to receive benefits from the use of BT to influence their intention to use it. Therefore, the automation of decision making, and the network environment can influence the intention to use BT.

Within question 7 the use of smart contracts combined with BT is addressed. A common view amongst the interviewees was that ease of using BT occurs through the withdrawal of the middleman by the utilisation of the smart contract allowing timesaving and cost reduction. From our results, it appears that the ease of using BT is affected by one's perceptions wherein a network environment individual can influence each other depending on their subjective

observation and experience. Interviewees B and C have suggested that the movement toward the decentralisation of the data through DTL could also affect the ease of using BT.

“Look at the data as one version of the truth combined with the redundancy and security create trust which is good for the adoption decentralised data” - Interviewee B

Question 8 addresses an interest in the financial performance purpose. Our findings suggest that the performance expected of BT has a strong influence on BT acceptance. According to interviewees B and C, as a feature in the performance expected, the financial results are essential within the Nordic region. Hence, cost efficiency through the automation of documents allows time saving, coordination of events between organisations and reducing human errors. From appendix 2, our results highlight that it increases speed transactions and accuracy are elements affecting financial performance expected, thus, the performance expected. Therefore, the improvement of financial performance may influence BT acceptance and use. Question 9 examines the internal and external compatibility of the BT system. It appears that the high compatibility of BT with digital software enables a low effort in both cases for companies operating in the Nordic region. Results reveal that the effort expected by top management and stakeholders will influence the degree of willingness to use BT. Hence, the main efforts allowing BT acceptance will be the comprehension of BT features and its implementation. Our findings highlight that depending on the effort required to implement blockchain, the Nordic firms will be more or less able to use BT. Hence, this effort expected will be deemed in time spent and financial investment.

“We live in a world where everybody is not using the same digital platform, so the effort expected is definitely a key selling point. With blockchain, the effort is reduced as you don't need to adapt it” - Interviewee C

Furthermore, it was suggested that network influence owns a significant role in the Nordic business context and its acceptance of new technology. BT is meaningful as long as it is involved in a network environment. In order to have an effective throughput, each company within the Nordic network should accept and use BT to make it work. Hence, interviewee B suggests that mutual agreement is necessary for the industries and companies to transact between each other. Interviewee F states that behaviour intentions of managers and executives as a part of the network influencer play a key role in BT adoption. Therefore, the results lead to the explanation that Nordic firms' acceptance, executives, stakeholder's involvement within a network influence the acceptance and use of BT. Lastly, the findings point out that smart contracts facilitate the automation of transactions between Nordic firms. Consequently, it indicates that this automation of decision-making can be perceived as enabling conditions provided by smart contracts. The conditions of infrastructure should be established to support blockchain transactions. On the other hand, it seems that companies will struggle to use BT without the acceptance of smart contracts. Question 10 addresses the overall objectives of BT. Thus, the end objective of BT through smart contracts is to provide a facilitating condition influencing the acceptance and the use of BT. As it can be seen in appendix 2, a summary of

the data collection is provided combined with relevant explanations in order to understand each factor and their extent as key roles in BT acceptance in Nordic organisations.

5.3 Additional factors identified

Previous subsections found the factors that contribute to the acceptance and use of BT connecting with the TAM and UTAUT models. Continuing with the additional factors that have been identified from the data collection. Our additional findings highlight further factors that the interviewees stated in question 11 to 15 from appendix 2. Relevant factors of our results are summarised in appendix 4.

The gathered data from question 8, 11 and 12 highlights that cost efficiency appears to influence BT acceptance enabling improvement of shared processes. The respective question addressed financial performance, additional factors, as well as how trust can affect the acceptance and use of BT. Interviewee C emphasised the fact that the cost efficiency does not have a direct impact on operating cost. However, it strongly affects the financial cost as the bottom line considerably reduces the general administrative cost. Several interviewees revealed elements to be connected with cost efficiency such as automating transactions, reduced human errors, faster transactions, and increased accuracy. Hence, the influence of using BT will be apparent from an internal firm perspective.

Our findings from question 12 addresses trust in a network and introduces the concept of decentralising the data in DLT could affect BT acceptance. As a result, this question suggests that trust between parties should be based upon an agreement. The authors of this thesis have discovered that traceability of data during the whole chain can enforce trust as a factor of BT acceptance. In addition, since some sensitive data is needed to remain private, the settings of the network play a vital role for the company. Security in the data accessibility is a part of trust within data sharing. Our results arise that transactions without the middleman have gained importance over the years. Diminishing the need for trust can become a key selling point for blockchain adoption due to the reduction in transaction cost and monitoring. Besides, trust appears to build upon the product and service quality. In such, the findings of our study lead to an element that trust in the counterparty might not always influence the acceptance of BT. Hence, the risk perceived of decentralisation can appear as trust seems not always being compulsory. The interviewees highlight the existence of a balance between trust in the technology and in the counterparts, as both complement each other when deciding for adoption and use of BT.

Question 13 addresses if DLT affects the acceptance and use of BT. The outcome of the question emphasised that one of the early drivers of BT acceptance is decentralisation. Our results show that this factor plays a key role as it can be central in a private BT. Decentralisation allows the network to be able to secure and verify information that is exchanged, underlining that the benefits of BT remain in the distribution of information. From the interviewees' point of view, there is a remaining risk of decentralising the data, even though it is not currently apparent. Nevertheless, it will depend on how the risk of decentralising data is perceived with

the involvement of BT. As a result, through decentralisation, stakeholders have the feeling of losing the power of their own information and controlling. Furthermore, one interviewee mentioned that BT is still new research highlighting that it appears a lack of knowledge in decentralised information with BT. Finally, our results support the fact that the power of controlling information and the perceived risk by using BT influences the decentralisation of the data within the distributed ledger. Factors identified from the interviews deemed relevant by the authors have been summarised in appendix 4.

Additional factors that affect the use and acceptance of BT are presented in question 14. The interviewees witness mainly one additional factor as the automation of decision making. This highlights the possibility of saving money by automating the processes. Through this automation, business managers, as end users, will need to receive value in a BT solution. Interviewee B advised one way to process which is through user based visualised dashboards and several features such as workflow automation of the decision making. According to interviewee A, within a business encompassing a high amount of transactions and standardised contracts, the automation of decision making can be considered as a factor improving the speed. Furthermore, interviewee F explains that the acceptance of BT does not always rely on the ability to automate decisions, instead, the benefits depend on the use case. In addition, interviewee F mentions that the automation of decision making is limited to the input of conditions from the managers, limiting the use to the quality of input. Our results spotlight that as long as the BT network is established on open permission resulting from the participants' agreement the automation can occur easily. Consequently, it reinforces the fact that the agreement from the beginning of each party is a prerequisite for the whole use of BT. These elements outline that automation of decision affects the acceptance of BT through the automation of processes and executives' acceptance.

Furthermore, question 15 frames how the factors of compliance from companies and government regulation impact the acceptance and use of BT. The interviewees stated that this factor can either encourage or restrain BT acceptance and use. As such, the government will always be a core influencer in the BT acceptance. Henceforth, from interviewee C's perspective, it results in a need of regulators to support BT adoption as it is considered as a complex product. Interviewee F affirmed that current regulation in the Nordics remains not up to date with aspects such as compliance with GDPR. Underlining that the clearer the regulation the better the usage BT. As a consequence, compliance regulators influence the degree of the acceptance of BT. Whether a third party is involved adding regulators institutions or governments is strongly recommended to create trust through association market compliance. Interviewee E emphasised that regulations trigger and monitor the blockchain acceptance and use. Evidence of compliance fosters proactive responses and better collaboration between firms as well as real time audit. Interviewee C also suggests that regulators ought to be updated with the development of the technology around BT. Whether government agencies and institutions are at the forefront of adopting this technology could be highly impactful. According to interviewee A, government regulations affect the acceptance and adoption of BT. It leads the writers of this thesis to suggest that regulators are playing a key role in influencing the acceptance and use of BT.

*“Government regulations are very important because it is technology-driven, without the regulators and the laws in parallel with BT, it won't be fully usable. Some aspects are not limited by technology but by the government.”
- Interviewee D*

5.4 Factors involved in the value creation

Further results were seen in appendix 5, the authors of this thesis found that value creation is a key outcome from the factors affecting BT acceptance and use. The interviewee states that the end objective of BT is to create value for all participants in a network. Besides, it suggests that every stakeholder ought to receive value from BT, otherwise the acceptance will be weakened. As such, the participants will not invest their time nor their financial resources, in the absence even low of value received from BT. In addition, interviewee D asserts that the use of BT can provide the opportunity making processes more efficient enabling the creation of new business opportunities and new products. Alternatively, interviewee B highlights the risk that the investment does not always deliver the expected value. Consequently, it would require from the firm, a high understanding of how to address many of these risks to develop a valuable blockchain solution. This element suggests that there is a risk of adopting at an immature stage a new technology solution or a risk of status quo resulting in a missing opportunity to create an industry solution.

“With BT you are able to create a new type of product and new business model, it allows for value creation.” - Interviewee E

5.5 Factors restraining the acceptance and use

Question 16 addresses factors that can restrain the acceptance and use of BT. Concerns regarding regulation were widespread according to the interviews. Regulation can, according to the interviewees, affect how rules and legal agreements are proceeded. More specifically, whether regulators embrace the BT with current legislation can reduce the friction occurring when adapting to the technology. The interviewees indicate that whether the regulator fathom and/or uses the technology resulting in an increase of the legitimacy and trust. Additionally, the interviewees' answers suggest that a use of BT can counteract with a current compliance of regulation, implying that fear of non-compliance is depicted as one factor restricting the acceptance and use of BT.

Moreover, the answers from question 16 further imply that the lack of scalability of the user can become a hindrance. Scalability refers to the use of BT on a wide scale, acceptance of technology in the network or industry. The use of BT relies on the adoption from a broad front, the use in an ecosystem, in order to achieve the perceived benefits. Interviewee D highlights that the lack of early adopters can act as a restriction to initiate scalability. Involvement of other participants is, therefore, recommended to be one factor narrowing the acceptance and use of BT. Interviewee B mentions that broad acceptance of BT must result in benefiting all involved participants as well as stakeholders. Moreover, interviewee C implies that acceptance in a

network (i.e. ecosystem) is important. Additionally, mentioning that the motivation to accept BT is higher whether there is a collective acceptance in the network. According to interviewee D, across specific relationships in a network, the restriction can arise from members of the ecosystem. This view is mutually shared with interview F, indicating that the end objective, even if very unlikely of BT, is to reduce all middlemen such as layers, banks and even states. BT diminishes the need for middlemen causing current parties within a network to become obsolete. Interviewee D advises that BT implementation could result in a “*structure resistance*” that hinders the network from adopting BT.

“Industry acceptance of the solution and lack of executive support from an organization, lack of other stakeholders’ benefits from BT use.” - Interviewee B

Furthermore, interviewee C recommends that the lack of a broad adoption mainly is a result of the high costs associated with BT. The cost of implementation and operation is deemed to be a factor restraining the acceptance and use. The interviewee highlights that the use of BT improves core structure of how information is shared, stored and managed. Therefore, interviewees indicate that the cost of operation is a factor that can restrain the acceptance and usage.

The perceived risk with the use of BT additionally appears to be a restraint according to question 16. The perceived risk is defined through the tenuous belief within the capability of BT. Interviewee C highlights the uncertainty of the BT application and can reduce acceptance. Thereby, it can be noted that the lack of proper knowledge and competences can restrain the use of BT. According to some interviewees, BT is classified as an emerging technology, therefore, the knowledge of the possibilities and the restraints are limited. The deficit of established use of BT results in few cases where the effect of BT can be proven. Moreover, due to the reasons that BT is relatively new, there is a shortage in the right competence, such as software developers supporting and building the technology. As a result, the constraint can be resulting in the lack of comparison or additionally the lack of the right competences.

6. Analysis

This part aims to provide a breadth understanding and connection between the theoretical background and the results. The analysis provides a deep understanding of our findings and connection with the theoretical background. Factors identified in our findings (1) Usefulness of BT, (2) Easiness of using BT, (3) Motivation of using BT, (4) behaviour toward BT that seems connected with TAM factors; (5) Performance expected, (6) Expected Effort, (7) Network influence, (8) Enabling condition appeared to be linked with UTAUT factors. We identify interconnections between these factors showing their influence between each other, a summary of the analysis is presented in appendix 6.

6.1 TAM: Analysis of factors influencing the blockchain acceptance and use

6.1.1 Perceived usefulness

PU can increase based on the level of trust from a long-term perspective (Gefen et al. 2003). Connecting with this aspect, results highlight an interconnection between the usefulness of BT and trust of the stakeholders enabling trustworthiness. Additionally, trust enables cost efficiency in long-term objectives within Nordic firms. Thus, the trustworthiness from the parties involved within the acceptance of new technology can influence the perceived usefulness (Gefen et al. 2003). Hence, it indicates that PU has higher or lower influence in the acceptance and use of BT between Nordic firms. As trust affects the transparency factors, PU is influenced by transparency. The smart contracts provide automation of decision making has a high influence on the PU of the Nordic companies. As aforementioned, the extent of a user's acknowledgement that a system facilitates their activity influences its willingness to accept BT (Warkentin et al. 2002). Our results complement this concept that firms have weak comprehension of BT characteristics affecting their perception of BT's usefulness. Interviewees emphasise that raising awareness of BT characteristics would allow a higher influence on the PU. Hence, from the analysis seen in appendix 6, we deduce that the PU of BT is interconnected with trust between participants, transparency and automation of the decision making. Therefore, these factors identified provide a meaningful impact in the BT acceptance and use.

6.1.2 Perceive ease of use

From the findings, we interpret that the ease of using BT is interconnected with PEOU through the withdrawal of the middleman allowing time saving and cost reduction. Our results support the study of Schmitz and Leoni (2019), as the ease of use is enhanced because of the automation enabled thanks to the use of smart contracts. PEOU is considered as a factor affected by one's perceptions wherein a network environment individual can influence each other depending on their personal observation and experience. Moreover, PEOU seems interconnected with PU and facilitating conditions. Yang (2019) has confirmed that standardisation and personal experience are core factors for managers considering the improvement to ease the use of blockchain technology by enhancing opportunities to develop a network in a business context. Hence, this analysis led the authors to believe that experience,

personal consideration, standardisation of BT influences its acceptance and use. Our results reinforce the theory of BT revolutionising the digitalisation of firms by decentralising data within the Nordic firms while enhancing the entire business processes (Yang, 2019).

6.1.3 Intention to use

Our results from appendix 6, emphasise that the intention of adopting BT can be diminished as new risks appear by using BT. In addition, the risks have resulted in an absence of early adopters accepting and using BT. Our findings indicate that firms do not aim to trigger the implementation of new technologies. Meanwhile, one of the interviewees highlights that BT should not introduce new risks ensuring its worthiness. Interviewees claim that each stakeholder expects to receive benefits from the use of BT to influence their intention to use it. Supporting this idea, transparency within networks as well as traceability in a company can positively affect the intention to use BT, hence, being a key driver to strengthen behaviours of adopting BT (Yang, 2019). As a matter of fact, it leads us to acknowledge that the network environment as social influence emphasised an impact on the intention to use BT. Blockchain transparency and trust of stakeholders are predictors of intention to use as well as expectation, therefore, influence blockchain acceptance (Queiroz & Fosso Wamba, 2019). Trusted corporations will catalyse the adoption of this state-of-the-art technology affecting the Nordic network. As a consequence, trust in BT itself and the network's participants influence the intention to use BT. Thus, this interconnection persuades the writer of this thesis to interpret trust, transparency and social influence as influencers of the intention to use BT. Henceforth, these factors have an influence on BT acceptance and its use.

6.1.4 Attitude toward the technology

Firms such as IBM, SAP, Microsoft, Walmart as leaders in BT technology are enforcing the interest regarding the use of BT in business. However, there is a limitation of available information occurring within post-implementation (Saber et al. 2019; Yang, 2019; Wong et al. 2020). From our empirical results, we believe that the acceptance of BT requires experience and long-term planning to be implemented. This fact indicates that the behaviour toward BT has an influence on the acceptance and use of BT. Senior executives and managers can jeopardise new technologies showing a sceptical attitude about the advantages of blockchain technology (Yang, 2019). Complementing this idea, the writers found that the agreement of managers and team members to use BT is essential. Our findings indicate that managers' attitudes have an influence as the main aspects involve a lack of knowledge and resistance to being an early adopter. On the one hand, they will affect to a greater or lesser extent the attitude toward BT adoption, on the other side, acceptance will not occur whether a lack of confidence from them appears. Hence, SI seems to be interconnected with ATT. An increase of awareness and adoption in each Nordic region will support managers to accept and use BT. Appendix 6 highlights the connection between the theoretical background and our analysis from our results within the TAM framework. Connecting with our research question, these four factors analysed seem to influence to a greater or lesser extent the acceptance and use of BT. As a result, their influences differ on the importance the company will emphasise on them.

6.2 UTAUT model: Analysis of factors influencing blockchain acceptance

6.2.1 Perceived expectancy

From our results, PE has been identified as playing a vital role in BT acceptance and use. PE is influenced by PU, relative advantage, extrinsic motivation, job-fit, and outcome expectations (Yu, 2012). Our findings reinforce the idea that BT's performance expectancy has a strong connection with the PU of BT. PE factor is connected with the enhancement of expectancy in job activities that blockchain can provide with a distributed ledger (Queiroz & Fosso Wamba, 2019). Our results highlight that it alleviates immediate clearing and settlement, enhances speed transactions and accuracy which are elements affecting financial performance expected, thus, the performance expected. As a result, we argue that the improvement of financial performance has to be significant by reaching the target or even outperforming it. The financial impacts will be indirectly noticeable on the net profit in operating costs and management costs. Combining BT with DLT could diminish cost and improve the firm's business efficiency. Henceforth, PU and the financial aspect affects the PE influencing BT acceptance and use.

6.2.2 Effort expectancy

The EE has a strong relationship with the ease of using BT connected with the UTAUT model. Research shows that EE strongly affects human intention to use new technology (Rempel & Mellinger, 2015). Our data collection shows that the EE has a strong relationship with the PEOU of BT. Hence, the endeavour to implement BT and how easy it can be to use this technology will affect the intention of the managers and stakeholders. Within the blockchain environment, it is expected that the complexity of the diverse tasks will strongly decrease (Queiroz & Fosso Wamba, 2019). Our results concede that the high compatibility of BT with digital software enables a low effort for the company aiming to implement BT. An interconnection with PEOU is noticed as BT facilitates the effort within the company's operations. Certain research has highlighted a connection between PE and EE on Blockchain acceptance and use (Chong et al. 2015; Francisco & Swanson, 2018; Wong et al. 2020). Adding to this concept, our results from appendix 7 demonstrates that EE is influenced by the results based on BT features. Hence, EE can be defined in terms of time spent and financial investment. In the context of the network, Lai-Wan Wong et al. (2020) have deemed that EE factors were insignificant in blockchain acceptance. Contradicting this aspect, our results lead us to conclude that the EE from top management and stakeholders will influence the degree of willingness to use BT. The data highlights that the main efforts expected from executives and managers will be the comprehension of BT itself and its implementation. As a result, PEOU and PE affect EE influence the acceptance and use of BT.

6.2.3 Social influence

From the results summarised in appendix 7, we outline that network influence plays a noteworthy role in the business context and its acceptance of new technology. SI affects blockchain technologies evolving through a peer-to-peer network model (Christidis & Devetsikiotis, 2016; Queiroz & Fosso Wamba, 2019). SI can be exerted by members,

employees and peers within a network of individuals (Queiroz & Fosso Wamba, 2019). As aforementioned, behaviour intentions of managers and executives act in a network playing a key role whether BT will be adopted. Therefore, our results lead to the explanation that the involvement of executives and stakeholders in Nordic firms act on the acceptance and use of BT. Adding to this concept our results demonstrate that BT is meaningful as long as it is involved in a network environment. Considering the distributed ledger context, there are multiple interactions between managers, internal colleagues and external with the subsidiaries (Queiroz & Fosso Wamba, 2019). In order to have an effective throughput, each company within the Nordic network should accept and use BT to make it work. Additionally, the intention to use BT is connected to SI. Henceforth, to allow the most effective use of BT through a network context, every party must be intentionally committed using BT, otherwise, the technology on its own will be inefficient. Consequently, the government as regulator, industries, executives and stakeholders as involved parties influence the acceptance and use of BT.

6.2.4 Facilitating condition

Behavioural intention and FC appear to be two direct elements of adoption behaviour (Yu, 2012). We interpret that through DLT systems wherein employees' interaction affects the firm way of communicating, hence, software systems should be established to support blockchain transactions. We deduce that smart contracts facilitate the automation of transactions internally and externally between firms. FC have been proved to highly affect blockchain acceptance (Queiroz & Fosso Wamba, 2019); results indicate that the automation of decision making provided by smart contracts is an enabling condition and FC feature. It appears to be an interconnection between PEOU and FC; the higher the FC the higher the PEOU will be affected. FC's research had an interest linked to how the infrastructure of firms is established to support blockchain transactions (Queiroz & Fosso Wamba, 2019). The analysis emphasises BT's adaptation flexibility is a part of FC factors. Therefore, automation of the decision making and speed enhancement through smart contracts are a characteristic involved in the FC as well as the flexibility of adaptation influencing the acceptance and the use of BT. Appendix 7 highlights the connection between the theoretical background and analysis of the findings within the UTAUT model. Connecting with our first research question the four factors of UTAUT appear to influence to a greater or lesser degree the acceptance and use of BT. Their influences differ regarding the significance of the company's performance and how influential the Nordic market exerts on each company.

6.3 Additional factors influencing the acceptance of blockchain

6.3.1 Trust

According to the literature, the factor of trust is an important aspect when accepting new technology (Gao & Bai, 2014). More specific previous literature highlights the value of trust in a business environment, such as a network. Further, Sako (2006) mentions that trust and advantageous business performance are linked. On the other hand, our findings indicate that trust in the participants is less important. Rather, the authors have learned that trust in a

BT relies on the quality of the product and service. This aspect is developed from the Nordic perspective where there is a high level of trust in the technology and in the counterparties, which can influence the trust in BT.

The analysis of this thesis highlights a distinction between our results and parts of the literature. According to our results, trust requires less dependence on the counterparties explained by organisations using BT have a high level of trust in the system. Trust is a result of BT, being certain that no manipulation or error of the information can arise. Therefore, the need to trust their counterparts is not equally important. The factor of trust complements the model's TAM & UTAUT it covers a wider area than the models themselves. It seems that trust is interconnected with the SI, the ability to include a higher number of participants influences the network and the acceptance as well as the use of BT. It is noteworthy that our findings partially confirm Nakamoto (2008) statement. From appendix 8, we interpret that the use of BT does not solely depend on trust in the counterpart. Therefore, our analysis reinforces this aspect mentioned by the inventor of BT's. The difference is explained by state-of-the-art technology, shifting where the aspect of trust is required. Somehow, the aspects do not conflict with the literature (Ryssel, Ritter & Gemünden, 2004). Meanwhile, it can be argued that trust is equally important as the literature states. In this instance, it appears a shift in trust's influencing technology instead of the counterpart. The Nordic region has established higher trust in the use of technology influencing the use of BT. Less developed technology-driven regions may require more trust before adoption. The findings could indicate that the wider use of BT can be influenced by the region's general level of trust in counterparties and technology.

6.3.2 Transparency

Previous research acknowledges that transparency from BT is an important factor. Transparency can increase cooperation within a network and is a highly valuable factor (Morris, Pham & Sidney, 2011). Our findings set forth that the interviewee considers transparency in a network as a factor influencing the acceptance and use. The use of private DLT allows the control of transparency's level required when businesses decide to implement BT. The need for control is explained by the importance of restricting the available information clustered in blocks. Additionally, the possibility to restrict access to information for specific parties is considered valuable. The interconnection with the PU and intention to use indicate that transparency could be viewed as a foundation when accepting and using BT. Other tools such as smart contracts rely on the ability that the information is secure and verifiable.

The results present that companies adopting BT have a focal point on the control of the information shared. The authors analyse that the PU factor requires the ability to control what information should be shared. Previous research highlights this aspect to a lesser extent. Therefore, the authors interpret that transparency, trust, PU and intention to use are factors that influence each other in the context of BT. Thus, it leads the writer to believe that the factor of transparency is influencing the acceptance and use of BT. The degree of transparency is proportional to PU, trust and intention to use. The higher the transparency of information, the

higher trust in the BT system and participants, in turn increasing the chance of adopting BT from Nordic firms.

6.3.3 Cost efficiency

According to the research by Efanov and Roschin (2018) as well as Witzig and Salomon (2018), the use of BT will decrease transaction costs and increase the efficiency of data handling and processing. Their findings show similar patterns with BT in the Nordic market. The use of BT reduces general administrative costs, such as employee and process costs; when less monitoring is required, and smart contracts are applied. The wide use of smart contracts also reduces the need for human interaction, the ability to automate actions are sought after properties according to the data. In addition, our findings indicate that BT will improve the quality of each task. Reducing costs and improving efficiency are fundamental results that companies pursue (Palmer & Torgerson, 1999). Meanwhile, the achievement of cost efficiency will demand the first initial investment in BT and the wide use in a network. Writers of this thesis argue that the high financial commitment is portrayed as a milestone for a company before adopting BT. Furthermore, we interpret that mature firms own a higher inducement to reduce costs per transaction, which further increases the willingness to invest in BT. Hence, the gathered data indicate that higher cost efficiency results in higher value creation for the company. In appendix 8, a summary of our analysis is presented.

6.3.4 Automation of decision making

From the result of our thesis, we observe that automated decisions affects the acceptance and use of BT. The literature states that a key driver is the ability to automate processes. Smart contracts will reduce the need for human interaction and require fewer resources per action (Angelis & Silva, 2019). Corresponding with this statement, the gathered data presents that smart contracts are an important and expected aspect when using BT. The authors of this work analyse that smart contracts can increase trust and cost efficacy. The data collection indicates the ability to have pre-programmed actions are well desired. Smart contracts introduced an agreed consensus that all parties are involved with, increasing the trust. Our outcomes demonstrate the existence of interconnection between the factors of trust, cost efficiency and automation. Our interpretation of the data indicates that the automation of decision making is an important factor when managers decide to accept and adopt BT. The use of automated decision-making is, therefore, connected to a wider adoption of BT and a high trust in the technology. This concept might be considered as a possibility in a well-developed region, however, the use of smart contracts in other regions could appear as a hindrance based on the different prerequisites.

6.3.5 Government regulation

Governmental regulation and compliance are factors enabling the acceptance of BT. According to previous literature by Yeoh (2017), governmental regulation plays a vital role due to the technology to comply with current laws and regulation. Furthermore, governmental regulation can act as a hurdle whether the relationship between compliance and BT is unbalanced (Hughes et al. 2019). Nevertheless, whether the government embodies BT is

additionally considered as a driver for further organisations to use BT. From our findings, we identify patterns that correspond with the literature seen in appendix 8.

Our findings show the necessity for monitoring, supporting BT's adoption and the lack of enforcement from the government resulting in some limitations. Nowadays, it seems that the lack of regulation is a concern influencing the acceptance in a network negatively. Nevertheless, whether governmental regulation embraces BT, it could become a key influencer for the acceptance and use in the Nordic countries. Hence, government regulation appears to be influenced by SI. The acceptance from government agencies operates as a legitimator and standard setters for BT which, according to the writers of this work, can facilitate the acceptance of BT. On the other side, a high degree of regulation can become problematic. We interpret a stake for a balance between regulations and applications to promote, meanwhile, not requiring the use of BT in this early stage.

Connecting with our first research question, as additional factors to TAM and UTAUT, these five factors highlighted appear to influence the acceptance and use of BT. Their influences differ on the importance the company will emphasise toward them.

6.4 Factors resulting in value creation

Moving on now to consider value creation in a business environment which highlights the transparency of the information as a benefit to share data in a network (Valtanen, Backman & Yrjola, 2019). The literature indicates that the ability to share and safely receive data can generate value creation. Further, the financial investment of using and accepting BT must create value for the stakeholder in the specific company (Valtanen, Backman & Yrjola, 2019). Sharing data enables trust between parties creating benefits from the use of BT.

According to our analysis summarised in appendix 9, value creation is considered essential for all participants in the network. The main benefit of BT's use is the ability to be integrated into a network. The interconnection with trust between stakeholders and transparency of the information generates value creation. Increasing trust reduces transaction costs between Nordic firms allowing for further partnerships with less known counterparties, hence, improving value creation. Transparency enhances value creation by enabling the network to decide the level of transparency required to fit the business need, resulting in more or less sharing of information. Additionally, the automation of decision making enhancing the speed of the processes would provide a rise of value creation. The use of automated decision makings in the form of smart contracts would increase cost efficiency, thus, raising value creation.

In the meantime, our findings present that value creation should include every stakeholder within the BT network. The writers of this thesis analyse a risk for some participants in the network to become obsolete when the need for the middleman is removed. Consequently, the potential obsolete participant can result in a structural resistance to remain relevant in the network. Fear of the unknown combined with the uncertainty of value creation from BT can result in stronger resistance. Therefore, all the participants expect value creation in order to

accept and use BT. We interpret that a higher potential for value creation will increase the adoption of BT within a Nordic organisation. Our findings from appendix 9 are aligned with the literature, it outlines the degree of factors value creation influences the acceptance and use of BT. Nevertheless, the findings seem to emphasise, to a higher degree, the importance of the value creation within the context of a network. Hence, it appears an interconnection between value creation and SI. Additionally, value creation appears to be influenced by the intention to use, a factor that depends on how BT is used. Finally, more interactive, compatible and efficient applications would generate a higher value creation. In connection with the second research question related to the factors allowing the value creation; SI, cost efficiency, trust, transparency, automation of decision affect this outcome and its enhancement within a company's performance.

7. Discussion of the interviews

7.1 Discussion of Technology Acceptance Model

The discussion of the interview allows a deeper understanding of the TAM model. TAM is a widely used and established framework to estimate and understand the acceptance of blockchain (Gao & Bai, 2014). Among the TAM factors, several interconnections have been identified to highlight the significance of understanding their influence between each other. In this instance, additional concepts of the theories lead us to notice that companies' size matters in the context of BT acceptance. Nordic corporations have a large number of resources, hence, having a higher PU and intention to use BT than the small and medium-size company having a restricted budget. Financial and technical resources result in having a strong impact on the factors PU and intention to use. Answering our first research question, we highlight that the higher the number of resources, the more PU and intention to use will be impacted positively. Transparency and trust of Nordic corporations fluctuate within each sector as audit, finance and industry; thus, PU is proportional to the benefit received from trust and the control of shareability emphasised. Arning & Ziefle, (2007) claims that TAM factors are exerting the acceptance and successful usage of blockchain technology. As a consequence, within the ATT factor, managers' attitudes in the Nordic market strongly impacts the acceptance of BT.

As the objective of TAM is to provide an understanding of the main factors of user acceptance and behaviour with new technology (Porter & Donthu, 2006 cited in Yang, 2019); manager's attitude is linked to their understanding of BT, hence, the higher the awareness of BT, the higher willingness of manager will be to understand BT adoption. Even though PEOU presents a high extent within Nordic corporations, BT adoption appears as a massive change due to high scalability driving them to stay out of the BT market use. On the other hand, a higher PEOU can result from certain Nordic firms' adopters as the changes required will be easier to tackle and monitor on a long-term perspective. As the acceptance of new technology should be a tailored solution (Porter & Donthu, 2006 cited in Yang, 2019), the statements of the interviewees highlight that the development of first adopters directly influences each other within their sectors. Thus, once a top company starts implementing BT, the other Nordic firms will mimic their strategy as a parallel trend to maintain their competitiveness. Non-adopters' companies have a different model strategy, therefore, attempting to either implement BT in a specific area offering service differentiation or reject the adoption of BT. These concepts are adding complementary understandings to our first research question. To partially answer it, PEOU and PU appear to be relevant for the Nordic's acceptance and use of BT. On the other side, ATT and intention to use are influencing externally and internally (through their own perception) the acceptance of Nordic companies.

7.2 Discussion of UTAUT model

The results appearing from the interviewees reinforce the factors' relevance of the UTAUT model. From an internal, external and inter-organisational perspective, the investigation key factors affecting the adoption of blockchain is essential for both research and

application (Arning & Ziefle, 2007); through SI we have discovered that BT is essentially useful within a common Nordic network. Non-adopters' firms could potentially use the network's influencers as a strength in their strategy clustering their resources. SI affects blockchain technologies evolving through a peer-to-peer network context (Christidis & Devetsikiotis, 2016; Queiroz & Fosso Wamba, 2019). As the intention to use BT and SI seems to be interconnected; the willingness and behaviour to use BT from large companies are affected by their business sectors and government regulations. In this instance, our findings support this concept aforementioned. As a consequence, adopters within the Nordic region are influenced by executives, stakeholders and business trend environments. Additional results have identified that non-adopters grant less emphasis to the SI factor focusing on PE as the main priority.

The theoretical background identified an interconnection between the PE and PU through relative advantage, extrinsic motivation and outcome expectations (Yu, 2012). Henceforth, PE is relying on the target setting from the operating and financial perspective of the BT adopters. The non-adopters are not considering BT as an improvement tool within their PE. As literature has highlighted a connection between PE and EE on Blockchain acceptance and use (Chong et al. 2015; Francisco & Swanson, 2018; Wong et al. 2020). The effort expected from top management relies on the ease of BT implementation, financial and managerial resources. The PE of Nordic adopter's corporate is in line with the changes required to adopt BT, thus, the higher the target setting, the higher EE will be. EE factors were insignificant in blockchain acceptance (Lai-Wan Wong et al. 2020). This statement is aligned with the literature from a non-adopter's perspective. Contradicting this theory, for adopters, the effort expected from executives and stakeholders has a strong influence on the degree of willingness to use BT. The higher the EE, the higher the time consumption and investment, the lower the chance for BT to be adopted in the Nordic market.

Lastly, PEOU and FC are two direct elements of adoption behaviour (Yu, 2012). For Nordic firm's adopters, the PEOU of BT is explained by the time saving between transactions and the simplification of the data sharing. For non-adopters, PEOU has a weak influence as BT would only allow a simplification of their business processes within the Nordic market, meanwhile requiring a strong digital modification. As FC has been proved to highly affect blockchain acceptance (Queiroz & Fosso Wamba, 2019); the analysis indicates that automation of decision making from smart contracts can be perceived as FC. In addition, we have learned that BT's adaptation flexibility is a part of FC factors. For adopters in the Nordic market, the flexibility of BT will affect FC in terms of time and cost savings. The higher the flexibility of BT, the higher PEOU, the more influenced the FC will be, the higher the potential of adopting BT will result. Finally, our results complement the TAM and UTAUT's literature by providing perspectives of adopters and non-adopters of BT within the Nordic market. In connection with our first research question, PE, SI are being relevant in the Nordic firms' acceptance due to their strong influence on them. On the other hand, for non-adopters, EE strongly restrains Nordic's acceptance while FC plays a lower influence on non-adopters.

7.3 Discussion of additional factors

The analysis of this thesis highlighted and evaluated the findings as well as the literature of each respective factor. The additional factors indicate a further perspective that is relevant when evaluating the acceptance and use of BT. Five factors are further developed from the TAM and UTAUT. The connections between the models and the additional factors suggest a broad spectrum that shall be used.

Trust is an important factor that affects the use and acceptance of BT. The results of this thesis indicate that trust is interconnected with multiple factors. Trust can be interconnected to the transparency of the information and automation of decision making. The authors of this thesis, therefore, discuss that trust influences the choice for adoption. The findings of this research suggest that trust exists in different degrees. The contrast between the literature and our findings highlights that trust can be applied in numerous ways. The aspect that our study focuses on is presented through large technology-intensive firms influencing to some extent the gathered answers. Niche organisations within technology have greater knowledge in technology which can increase the trust in BT. Hence, the decrease in trust to counterparties requires increased trust in the technology according to our analysis. For the adopters of BT, trust is important on the use of the system as well as participants of the network. Participant involvement in Nordic business context influences the acceptance of BT. Thus, trust has a direct role and should be taken into consideration when accepting and using BT. The increased knowledge in the importance of trust could further develop the insight from previous research. Managers and executives can with the use of BT initiate and start new beneficial relationships even when trust is lacking between the parties.

Transparency is according to the findings a noteworthy factor that can influence the acceptance and use of BT (Dong et al. 2017). Our findings are aligned with the concept presented in the literature and indicate that the Nordic market both demands and relies on transparency when using BT (Queiroz & Fosso Wamba, 2019). Transparency through TAM highlights the need for the factor in a network environment to improve performance in a network. In the context of BT, the literature states that one of the main characteristics is to raise transparency (Queiroz & Fosso Wamba, 2019). In the Nordic market, adopters of BT indicate that organisations demand transparency in order to enhance trustworthiness and credibility in the network. Our findings demonstrate that organisations are not always ready to share sensitive data in a transparent environment where the information is available to all members. Unwillingness to share sensitive information could indicate that trust in the counterparties is lacking. Managers and executives are in need to find the right balance between transparency and privacy in their implementation of BT.

Cost efficiency is a factor that derives from the main features that BT introduces (Efanov & Roschin, 2018; Witzig & Salomon, 2018). Our findings support the existing theory that cost efficiency is a major factor for adopters in the Nordic countries when accepting and using BT; hereinafter with the use of smart contracts as well as the increased efficiency and transparency. According to our analysis, the factor is often related to value creation as increased cost

efficiency affects the financial performance of BT. This result indicates that acceptance and use of new technology is limited to the enhancement of cost efficiency. Hence, the analysis indicated that managers having a lack of cost efficiency can restrain the acceptance and use of BT. The lack of improvement of financial performance could be a factor that results in non-adoption.

Our analysis highlights that the automation of decision making is a factor that greatly impacts the choice. Automation of decision making introduced the ability for a consensus in the network on what actions should be automated (Angelis & Silva, 2019). The result indicates that Nordic firms strive for automated decision when accepting new technologies, increasing the ability to have secure as well as efficient automation processes are significant. Nevertheless, the complexity and usability of smart contracts will probably constrain the usefulness as well as possible applications. Highlighting that our findings are aligned with previous researches, Angelis and Silvia (2019) indicate some limitations with the current use of smart contracts. The findings of this thesis identify that non-adopters encounter limitations with the current possibilities of use of smart contracts, presuming that the factors could be less prioritised when deciding for adoption.

Regulations highlight the regulatory compliance and the government adoption of BT that will either encourage or restrain the acceptance of BT (Hughes et al. 2019; Yeoh, 2017). The result of this thesis indicated that the need for adapted rules where BT is taken into consideration is important for Nordic firms. Furthermore, the adoption of BT within the government acts as an incentive for adopters. The authors of this thesis discuss that organisations seek guidance from each other as well as governments when accepting and using BT. Accepting a technology that complies with the law and is established between peers is essential. The importance of SI could increase when other stakeholders or governments chose for adoption, enhancing the willingness to use BT. However, the authors analyse that the government use of BT will probably occur when BT is more commonly adopted between Nordic firms. It is argued that the factor of compliance from government regulation is a pillar that is highly considered. Managers can show resistance in the acceptance and use of BT in case of uncertainty in the organisation to remain in compliance with laws and regulations. Henceforth, it indicates that the factor of government could result in non-adopters whether considered problematic, highlighting the need for a regulatory balance. Nevertheless, it seems that the early adopters are already existing in the Nordic region due to the remaining uncertainty from compliances and regulations.

Value creation, as an outcome of technology acceptance, underlines the ability to create additional value with the use of BT (Valtanen, Backman & Yrjola, 2019). Our findings suggest that value creation is essential when managers accept and adopt BT. This output results from the increase in profit as well as enchanting operations and processes. Financial performance and cost efficiency could be key drivers of value creation. From the analysis, we deduce that the factors influencing value creation are SI of the network, transparency as well as the trust of the information, cost efficiency and automation of decision making. Hence, value creation would result in the improvement of operational and financial performances. Long-term value

creation in terms of financial performance affects the acceptance of BT. The ability to gain the advantages of BT requires high initial investments. Therefore, the use of BT could be limited to companies and regions with higher economic conditions. This aspect was not identified in previous research, as there is a lack of research highlighting specific regions. As managers expect value creation, this concept appears to increase their willingness to adopt and accept the use of BT. Henceforth, results support that the enhancement of value creation is in combination with the application of BT influence factors that affect acceptance and use.

7.4 Implications of Blockchain within the Nordic region

The result of the TAM model supports the comprehension of the factors affecting BT adoption. In this instance, CEO, executives and managers aiming to implement BT in their firm can adapt their way to tackle this project from a behavioural perspective. The results of the UTAUT model portrayed it to be interconnected with the TAM model. Henceforth, this aspect delivers a greater extent to understand the implication of BT with a DLT. The additional factors appearing from these two frameworks implies internal impacts as cost efficiency, external impacts as government regulation as well as trust and transparency. As a result, top management is able to comprehend from several perspectives the stakes of BT adoption. Resulting from these factors, authors discovered that value creation appears as a consequence of cost efficiency, trust, transparency, automation of decision making and social influence. The emphasis that managers will have on the factors will generate a higher or lower value within their business performance. Depending on the firm stage of development and capabilities, managers willing to become adopters will be able to emphasise more or less the factors previously identified. High comprehension of these factors from executives will allow a tailored adoption of BT in DTL and an efficient monitoring resulting from the acceptance of the stakeholders of BT. Therefore, the ability to enhance BT acceptance and use will rely on the balance emphasised between factors that the manager will adopt.

7.5 Limitations of the study

This thesis experiences limitations regarding the methodology and our findings. The aspects regarding the methodology are covered in 4.3 Reflection of the design. Therefore, this section will focus on the limitations and restrictions of the study. The study neglects to assess the extent of each factor influencing acceptance and use. Moreover, the writers omit to quantify or measure each respective factor. Therefore, the limitation of the study is explained by a lack of separation between the factors as well as their degree of influence on acceptance and use of BT. Moreover, some factors in this study are difficult to quantify, instead, it relies on in-depth knowledge and perception.

The result of this study emphasis on the Nordic region and only highlights technology-intensive firms. The depth of the study could be considered as a restriction. The relevant factors could differ depending on the social, political and economic situation of a region or the prerequisites of the firms. Additionally, we acknowledge that further potential factors are influencing the acceptance and use of BT. As the application of the technology can be applied in multiple areas, networks within different conditions, the influence to use BT can be derived from different

factors. However, the writers of this thesis have yet not identified these factors. Furthermore, we identify limitations with the use of TAM and UTAUT. Both models explore the perceived factors that are influencing acceptance and use. Hence, the study only considers the perception of the contribution that the factors create instead of the proved contribution. The models introduce subjective elements resulting in inaccurate and unquantified results. The choice to further explore by including additional factors: trust, transparency, cost efficiency, automation of decision-making and governmental regulations indicates that the models individually lack width to explain the acceptance and use of BT.

8. Conclusion

In this thesis research, two questions are being answered. The first research question, writers of this thesis widen and deepen TAM and UTAUT by exploring new factors, as well as enlightening current factors in the model. This research is processed in a business context focusing on the Nordic market. As such, the TAM in connection with the UTAUT model are both selected as theoretical lenses to identify the factors influencing the acceptance and use of blockchain (Gao & Bai, 2014). This aspect leads to two research questions. Firstly, the factors that affect the acceptance and use of blockchain in the Nordic region, secondly the factors allowing value creation from BT acceptance in the Nordic region.

The analysis highlights interconnections between the TAM, UTAUT and additional factors. Within the TAM factors, PU and intention to use are deemed to affect each other in the adoption and use of blockchain (Yang, 2019). As a result, the company's resources are important in BT acceptance and use, the higher the number of resources, the more the PU and the intention to use BT will be positively impacted. The interconnection of the factors concludes that PU is proportional to the benefit received from trust and the control of sharing data. In the meantime, we identify that manager's attitude is strongly connected to their understanding of BT, hence, there is a linkage between their awareness and willingness to adopt BT. This study research outlines that BT acceptance might increase due to emerging digital needs that firms are attempting to fulfil. BT acceptance leads us to the conclusion that Nordic adopters' firms aim to maintain their competitiveness within their industry sector.

In the context of the UTAUT model, we apprehend that BT is essentially useful in network environments. More specifically, the intention to use BT and SI are interconnected; Nordic corporations' willingness to use BT is affected by their business sectors and government policies. As a consequence, adopters within the Nordic region are influenced by top management in Nordic firms, whereas non-adopters grant a prior emphasis to PE. The theoretical background identified an interconnection between PE and PU through advantages, extrinsic motivation and outcome expectations (Yu, 2012). From adopters' perspective, we deduce that PE is influenced by operating and financial targets, meanwhile, non-adopters do not consider BT as an improvement tool due to their financial constraints. EE factor is insignificant in blockchain acceptance (Lai-Wan Wong et al. 2020). Contradicting this concept, we identify that EE can have a strong relationship with PEOU. We conclude that the perceived effort from top managers has a strong influence on the degree of motivation to use BT. Hence, the higher the EE, the higher the reticence of BT adoption will be in the Nordic market. Besides, FC is recognised to highly affect BT acceptance; for adopters, greater flexibility of BT will considerably influence FC. As a result, the linkage between FC and PEOU would lead to a better acceptance of BT.

In the context of additional factors, interconnections are highlighted with TAM and UTAUT. For Nordic adopters, trust is significant in the use of the system as well as from the participants of the network. However, trust in the counterparties is not always required to accept BT as it additionally implies BT's reliability system. As transparency of information is an important

factor influencing the acceptance and use (Dong et al. 2017); we interpret that trust and transparency are strongly interconnected. Meanwhile, we comprehend that organisations are not always willing to share sensitive data in the Nordic network. Cost efficiency is one of the key roles within BT adoption (Efanov & Roschin, 2018; Witzig & Salomon, 2018); in line with our results, we argue that value creation leans on the financial performance of a Nordic firm. Thus, managers perceiving a lack of cost efficiency can reject the acceptance and use of BT resulting in non-adoption. Automation of decision making introduced the ability for a consensus in the network on what actions should be automated (Angelis & Silva, 2019). Nordic firms strive for automated decisions and aim to adopt new technologies, the ability to have secure as well as efficient automation processes are significant. The ability to use smart contracts in Nordic networks appears to enhance SI and trust. Regulation can either encourage or restrict the acceptance of BT from government and Nordic firms (Hughes et al. 2019; Yeoh, 2017). Having said that, regulations of BT's use might be established when it will be more commonly adopted within Nordic firms. Reinforcing this concept, managers can restrict the acceptance and use of BT in case of uncertainty within the organisation constantly aiming to comply with laws and regulations.

Finally, the second research question aims to identify the factors influencing value creation. Connected to Davis (1983) cited in Kesharwani & Bisht (2012), we outline that factors influencing value creation are trust between stakeholders, transparency of the information and automation of decision making. These factors have a strong connection with value creation explained by the increase of performance and operations' improvements due to the cost efficiency. Afterwards, depending on the firm stage of development and resources, managers will be able to emphasise to a greater or lesser extent, factors previously identified. In the end, a high comprehension of these factors from executives will allow a tailored adoption of BT in the Nordic region. Lastly, the ability to enhance BT acceptance and use will rely on the balance emphasised between factors grasped by managers.

Lastly, further research could substantiate the findings by using quantitative methods to assess the factors' influence resulting in testing the additional factors identified. Extending research could provide an extension of UTAUT and TAM frameworks building a new model. Studies could be pursued in the field of value creation and blockchain use attempting to measure the value creation generated and its impact in the Nordic region. Research investigating different markets in Europe, Asia, North America, South America and Africa could provide additional relevant aspects. Additionally, further research could investigate other samples of companies in more specific sectors to include areas with other conditions and prerequisites that differ from this study. As a result, it will allow the exploration of other aspects that are not included in the research of this thesis.

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Appendix

Appendix 1 - Summary of studies investigating technology acceptance adapted from Mosweu et al. (2016)

Researchers	Models	Study aims and objectives	Factors affecting technology acceptance
Foon and Fah (2011)	UTAUT	Exploration of factors and determinants of Internet banking adoption in Malaysia	PE, EE, SE, FC and trust-influenced Internet adoption
Venkatesh et al. (2003)	UTAUT	Summarising eight models to come with UTAUT	PE, EE, SE and social influences affected behaviour to integrate technology
Legris et al. (2003)	TAM	Review of literature to understand “why” people use and accept technology	TAM needs to be implemented into a broader model which includes human change processes and the acceptance of the innovation model
Davis et al. (1989)	TAM	Research developing and confirming new scales for PU and PEOU	PU directly affects technology acceptance, while PEOU is a causal antecedent to perceived usefulness
Mosweu et al. (2016)	UTAUT	Understand Action Officers’ perceptions adoption and/or usage of the document workflow management system (DWMS)	Negative attitudes to computers, the complexity of DWMS incompatibility to current working practices influence action and records Officers’ unwillingness to adopt and use new technology.
Grover et al. (2019)	TAM	Investigation on the acceptance drivers of Blockchain by extracting Twitter feeds to derive their collective intelligence using PU, PEOU, and ATT.	The reduction of transaction overhead cost; factors providing secure and higher speed transactions, security, privacy, transparency, trust and traceability.
Hernandez et al. (2008)	TAM	Expanding and investigating relationships in the model according to sectors to which companies belong if it exists a moderating effect of industry	Compatibility, PU and PEOU influence future use of business technologies. Specific IT facilitates the acceptance influence of TAM factors affecting the company behaviour with technology acceptance.
Cimperman, Brenčič and Trkman (2016)	UTAUT	Expanding UTAUT and empirically test it for predicting the factors affecting older users’ acceptance of Home Telehealth Services (HTS)	The level at which HTS is perceived as easy to use and manage is the leading acceptance predictor in older users’ HTS acceptance. PU and Perceived Security represent the key factors influencing older people’s HTS acceptance.
Belanche et al. (2012)	TAM	Integrating trust and personal values through the case of e-government services adoption	The role of trust in the TAM framework is confirmed by a rival model analysis. Citizens’ personal values alleviates the influence of the intention to use e-government services.

Gao, L. and Bai, X. (2014)	TAM	Develop and test factors influencing consumer acceptance of internet of things technology	Strong support for the influence of PU, PEOU, social influence. Trust owns an insignificant role in predicting the intention. PEOU and trust were found to affect PU.
Queiroz and Fosso Wamba (2019)	TAM & UTAUT	Developing TAM through UTAUT. Investigating the individual blockchain acceptance behaviour in the logistics and supply chain field	Existence of distinct acceptance behaviours between India-based and USA-based professionals.
Rempel and Mellinger (2015)	UTAUT	Exploration of how researchers choose a bibliographic management tool	Participants persist in using the tools because of ease-of-use experiences. Librarians influence the acceptance decisions but have less influence over researchers' decisions to continue using bibliographic management tools.
Wong et al. (2020)	UTAUT	Investigation of behavioural intention to adopt Blockchain for supply chain management (BCSCM)	FC, Technology readiness, Technology affinity have a positive influence on the intention to use BCSCM and regulatory support moderates the effect of FC.
Yang (2019)	TAM	Investigation of blockchain applications and future improvements, assessing its effects on intention to use.	Tailored clearance management, digitalizing, easing paperwork, standardization positively influence intention to use.

Appendix 2: Questions for the interviews

Transcripts are available upon request

Introduction of Blockchain

1. Could you define your position and your career path?
2. Could you define your understanding of BT and its usefulness in business context?
3. Are you using blockchain in your company, if yes, how and to what extent?

TAM framework

4. To what extent, does the attitude of managers influence the acceptance and use of BT?
5. Does transparency of information affect the acceptance of BT?
6. To what extent, does the perceived risk of using BT affect its acceptance?
7. Are you using or implementing smart contracts? If yes, does smart contracts encourage the acceptance of BT and to what extent?

UTAUT Framework

8. How can the acceptance and use of BT affect the financial performance of the company?
9. To what extent, internal and external compatibility affect the acceptance of BT?
10. What are the end objectives of using blockchain?

Additional factors

11. From your perspectives, which additional factors lead to the acceptance of blockchain?
12. How can trust in a network environment affect the acceptance of BT?
13. Does the decentralisation of the data in DLT context affect the acceptance of BT? To what extent?
14. Does the automation of decision making affect the acceptance of BT?
15. Does the influence of the government regulation affect the acceptance and usage of BT?
16. Which factors would restrain the acceptance of blockchain?

Appendix 3 – Results regarding factors influencing BT acceptance and use.

Factors influencing BT acceptance	Interview	Implications/explanations	Findings
Usefulness of blockchain	A, B, C, D, E, F	Through trust and transparency by having provenance of the data have valuable and control access of the information. It allows efficiency and effectiveness in BT use. The use of smart contracts with the automation of decision making influences PU.	PU influences the acceptance and use of BT through several factors as transparency, trust, cost efficiency and automation of decision making.
Ease of using blockchain	A, B, C, E	It appears through the use of smart contracts reducing the need for a middleman. Smart contract enables cost efficiency and time saving. PEOU is influenced to move from the centralisation of data to decentralisation by the use of BT.	Decentralisation and the reduction of middleman action affects the ease of using blockchain, thus, influences the acceptance and use of BT through the cost efficiency.
Motivation of using BT and perceived risk	C, D, F	Automation of decision making is a prerequisite for the whole intention to use BT. However, introducing a new risk within a network through the use of BT can be seen as a threat diminishing the motivation of adopting BT. In those conditions, the perceived risk might increase. The lack of early adopters that accept and use BT can influence the BT acceptance.	The automation of decision making and the network environment can influence the intention to use BT.
Behaviour toward BT	A, B, C, D, E, F	The agreement of managers and teams to use BT is essential. Whether there is a lack of confidence from the managers the acceptance will not occur.	Manager's attitude toward technology is significant. Hence, ATT has an influence on the acceptance and use of BT.
Performance expected	A, B, C, D, E	Performance expectancy has a strong connection with PU. Cost efficiency through the automation of documents and coordination of events between organisations, automating transactions, reduced human errors.	The improvement of the financial performance, thus, performance expected can influence BT acceptance and use.
Effort expected	A, B, C, E	It owns a strong relationship with PEOU and degree of willingness to use BT. For top management and stakeholders, the main effort to allow BT acceptance will be the comprehension of BT itself and its implementation. This effort will be considered in time spent and financial investment.	The effort expected from top management and stakeholders will influence the degree of willingness to use BT. Hence, effort expectancy has an influence on the acceptance and use of BT.
Network influence	A, B, C, D, F	BT on its own is useless, each company in the network has to accept and use BT to make it work. Industry acceptance, executives, stakeholder's involvement from organisations influence acceptance of BT.	The network influence within the Nordic environment has a key role in BT acceptance and use.
Enabling conditions	A, C	Smart contracts facilitate the automation of decision making between firms and the	Automation of decision making, speed enhancement through smart contracts as well

improvement of speed. The company's structure as flexibility in adoption are a feature of the
is established to support blockchain transactions. enabling condition influencing the
Nordic corporations will struggle to use BT acceptance and the use of BT.
without the acceptance of smart contracts.

Appendix 4 - Results regarding additional factors influencing BT acceptance and use.

Factors influencing BT acceptance	Interview	Implications/explanation	Findings
Trust	B, C, D, E, F	Trust between parties should be based upon an agreement and through BT use. Trust also depends on the product/service quality. Security ensured in the data accessibility is a part of trust within data sharing.	Trust might not always influence the acceptance and use of BT.
Transparency	B, E, F	Provides a view of the entire end-to-end process. A clear view of all transactions or events in the network. The level of transparency can be controlled through permission access.	Transparency affects the acceptance and use of BT as long as there is a control and consensus of the information shared.
Cost efficiency	B, C, F	Shared processes improve cost efficiency. The cost efficiency does not have a straight impact on operating cost as the front line, however, it has a strong impact on the financial cost drastically reducing your general administrative cost.	Cost efficiency has an influence on the acceptance and use of BT by reducing the general administrative cost for a company. Hence, the influence will be apparent from an internal perspective.
Government regulation /compliance	A, B, C, D, E, F	Compliance will require regulators like the government can encourage or restrain BT acceptance. The government will always be a core influencer in the BT acceptance, there is a need from regulators to support BT adoption this “product” is complex. Depending the extent of the regulations, trust from stakeholders can be affected.	Regulators as governments, firm industries and trust from stakeholders are playing a key role in influencing the acceptance and use of BT.
Automation of decision making	A, B, C, D, E	Saving money by automation of the processes. Business managers as end users need to receive value in a BT solution through user-based dashboards and other features such as workflow automation of the decision making.	Through the network concept, executive’s acceptance affects the automation of the decision making, thus, the acceptance of BT.
Decentralisation of the data through DLT	B, C, D, E, F	Decentralisation plays a key role as it is significant in public BT. A high security, traceability of the data would allow higher amount of data shared thanks to Trust. There is a perceived risk with decentralisation, currently, it is not apparent however it will be in the near future depending on how the risk of decentralising data is perceived. Through decentralisation stakeholders have the sensation of losing power of their information and controlling. It appears a lack of knowledge of what is the decentralisation of information with BT.	The power of controlling information, trust and the perceived risk by using BT influence the decentralisation of the data within the distributed ledger context.

Appendix 5 - Results regarding the outcome of value creation and the influence on BT acceptance and use

Outcome influencing BT	Interviews	Implications/explanation	Findings
Value creation	B, C, F	Every stakeholder needs to receive value from BT, otherwise, the acceptance will be weakened. All the participants will not invest their time if no equivalent value is received from BT. To be accepted, BT has to deliver value within a network otherwise the involved parties will reject the financial and time's investment in BT.	Value creation influences the acceptance and use of BT. Through the impact it will have on the stakeholders it will be either implemented to increase the benefits for each party, the opposite will lead to a disinterest in BT.

Appendix 6 - Analysis connecting the theoretical background and findings of the factors from TAM influencing BT acceptance and use.

Factors influencing BT acceptance	Interview	Literature and theory background	Analysis of the findings and connection with theories/literatures
Perceived usefulness	A, B, C, D, E, F	The perceived usefulness can increase based on the level of trust from a long-term perspective. Thus, the trustworthiness from the parties involved within the acceptance of new technology can influence the perceived usefulness (Gefen et al. 2003).	Usefulness of BT is connected with PU. Factors trust, transparency and automation of decision making are interconnected with PU. Hence, the PU of BT will depend on trust between stakeholders, trust in BT application and intention to use BT.
Perceived ease of use	A, B, C, E	The ease of use can increase due to the automation allowed through the use of smart contracts (Schmitz & Leoni, 2019).	Ease of use is connected with PEOU. Smart contracts support BT acceptance and use, without their use Nordic companies might not be able to develop the use of BT. Hence, network factors, FC and PU are interconnected with PEOU.
Intention to use	C, D, F	Standardisation and software development in a company can positively affect the intention to use and being a key driver to strengthen intentions to adopt and use BT (Yang, 2019). Blockchain transparency and trust of stakeholders are predictors of intention to use and expectation, therefore, influence blockchain acceptance (Queiroz & Fosso Wamba, 2019).	Trust and transparency within the agreement between Nordic firms allow automation of decision making through the use of smart contracts. Hence, smart contracts and the network environment can influence the intention to use and accept BT.
Attitude toward the technology	A, B, C, D, E, F	Managers and executives can be less open to new technologies showing a sceptical attitude about the advantages of blockchain technology (Yang 2019).	Managers' attitudes have a significant influence, the main aspects involve lack of knowledge and resistance of being an early adopter. Through the Nordic network context, ATT and social influence are interconnected. Therefore, increased awareness and adoption in the Nordic firms will encourage managers to accept and use BT.

Appendix 7 - Analysis connecting the theoretical background and findings of the factors of UTAUT influencing BT acceptance and use

Factors influencing BT acceptance	Interview	Literature and theory background	Analysis of the findings and connection with theories/literature
Perceived expectancy	A, B, C, D, E	PE factor is connected with the enhancement of expectancy in job activities that blockchain can provide in distributed ledger (Queiroz & Fosso Wamba, 2019).	PE and PU seem to be connected. The higher PE, the higher PU will be. The improvement of the financial performance must be significant by reaching the target fixed or even outperforming. The impacts will be indirectly noticeable (bottom line management). Combining BT with DLT can reduce cost and improve efficiency. Henceforth, the financial aspect affects the performance expectancy which influences BT acceptance and use.
Effort expectancy	A, B, C, E	EE factor were insignificant in blockchain acceptance (Lai-Wan Wong, Garry Wei-Han Tan, Voon-Hsien Lee, Keng-Boon Ooi & Amrik Sohal, 2020).	For executives and managers, the main effort to allow BT acceptance is affected by the comprehension of BT itself and its implementation. These efforts will be considered in time spent and financial investment. PE and EE are affecting each other. EE is interconnected with PEOU and intension to use BT. The higher PEOU, the higher the intension to use BT, the lower EE will be. Hence, EE has an influence on the acceptance and use of BT.
Social influence	A, B, C, D	Social influence affects blockchain technologies evolving through a peer-to-peer network model (Christidis and Devetsikiotis, 2016; Queiroz & Fosso Wamba, 2019). The social influence exerted an effect on co-workers, stakeholders to make them accept and use blockchain (Queiroz and Fosso Wamba, 2019).	To allow the most effective use of BT through a network context, every party must use BT as on its own it is inefficient. Government regulations, industries, executives and stakeholders as involved parties influence the acceptance and use of BT. Social influence affects the intention to use BT. Hence, Nordic firms have to be voluntarily committed to use BT.
Facilitating condition	A, C	Facilitating condition (FC) factors it has been proved that it highly affects blockchain acceptance (Queiroz & Fosso Wamba, 2019).	Automation of decision-making affects FC providing time saving influencing the acceptance and the use of BT. PEOU and FC appear to influence each other. PEOU and flexibility are proportionally affecting FC.

Appendix 8 - Analysis connecting the theoretical background and additional factors influencing BT acceptance and use

Factors	Interview	Literature and theory background	Conclusion with findings
Trust	B, C, D, E, F	Reid and Levy (2008) state that trust can have an effect on the acceptance of the technology. Hence, the trust factor has a crucial effect on the decision and intention to accept the use of the technology.	Trust is influenced by the Nordic network as a mean of SI. Meanwhile, trust also relies on the product & service quality. Companies will operate with less known parties if trust in the technology exists. Hence, trust does not always influence the acceptance and use of BT.
Transparency	B, E, F	Blockchain transparency can enhance the members' cooperation in a network environment, hence triggering significant transformation in the industry and in the society at large (Queiroz & Fosso Wamba, 2019).	Transparency within a network encourages BT adoption in the Nordic region. Trust within a network is connected with transparency. Further, it can be noticed that companies fear losing control of sensitive data when shared. Hence, transparency can influence intension to use BT and PU. It affects the acceptance and use of BT as long as there is a control of the information shared.
Cost efficiency	B, C, F	Cost efficiency is considered as one of the main drivers that can result in the acceptance and use of BT (Efanov & Roschin, 2018; Witzig & Salomon, 2018). The use of BT allows reduction in transaction costs as less monitoring is required with the more secure data transfer (Witzig & Salomon, 2018).	The automation of the decision making affects the cost efficiency by increasing the speed of the processes. Hence, cost efficiency influences the acceptance and use of BT by reducing costs and increasing efficiency. The higher the cost efficiency, the higher the acceptance of BT will result.
Automation of decision making	A, B, C, D, E, F	The use of smart contracts is impactful and can be identified as a key driver for the acceptance and use of BT (Angelis & Silva, 2019).	The use of smart contracts allows the automation of decision making affecting the acceptance of BT from executives. Pre-agreement from executives in the design of smart contract allow an improvement of trust between parties.
Government regulation /compliance	A, B, C, D, E, F	Yeoh (2017) mentions that current governmental rules can act as a hurdle when adopting new digital tools.	Governments have a core role as an influencer in the BT acceptance, there is a need for regulators to monitor and support BT adoption. It seems that more regulations are desirable from a Nordic perspective. Through SI, governments are identified as a key role in influencing the acceptance and use of BT.

Appendix 9 - Analysis of the factors allowing value creation

Factors	Interview	Literature and theory background	Conclusion with findings
Value creation	B, C	Value creation in a business environment highlights the transparency of the information as a benefit to share data in a network (Valtanen, Backman & Yrjola, 2019).	The interconnection with trust between stakeholders and transparency of the information generates value creation. To be accepted in the Nordics firms, BT has to deliver value for each user of the network (SI) otherwise the users will not spend their time to use it. To be accepted BT is required to deliver advantages for each stakeholder. Trust in a network can provide value creation for its stakeholders. An interconnection between high cost efficiency and high value creation is observed by us. The automation of decision makings in the form of smart contracts would increase cost efficiency, thus, raising value creation. All these five factors would result in value creation from the use and acceptance of BT.
