The Potential of Blockchain in Improving SMEs' Performance in Times of Crisis: The Case of Slovenia

Bachelor Thesis

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Submitted to Dr. Horst Treiblmaier

Žan Špan

1621041

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Affidavit

I hereby affirm that this Bachelor's Thesis represents my own written work and that I have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed.

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Abstract

Based on historical data, it is clear that small and medium-sized enterprises are the most affected group of firms in times of increased uncertainty and crisis. In general, this group suffers graver sale falls, shrinks of profits, barriers to financing, and difficulty in fulfilling their obligations towards the suppliers. Recovering from COVID-19 will be a similar challenge to many small and medium-sized corporations in our economic system.

After the 2008 financial crisis, multiple studies confirmed that not all companies experienced the same impacts from the economic slowdown. Some of them even managed to turn the situation around and utilized the new market conditions to further develop and grow. Successful companies that profited from the last crisis have one thing in common: They were much more proactive in the market, characterized by their strong focus on innovation.

The purpose of this thesis is to present how innovative technologies, more specifically blockchain, can improve business performance. In addition, this study investigates how blockchain can ease the effects of the economic slowdown and make the recovery process faster and more efficient. The suggested performance improvements and other potential benefits of this technology will be supported by empirical evidence collected in SMEs operating in the Slovenian market.

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List of Abbreviations

API - Application Programming Interface

COVID-19 - Corona Virus Disease 2019

ICO - Initial Coin Offering

IT - Information Technology

PPE - Personal Protective Equipment

SaaS - Software as a Service

SDK - Software Development Kit

WHO - World Health Organization

1. Introduction

The chapter intents to introduce readers with the importance of the research topic, as well as the main reasons why the author chose to conduct this study. Initially, the chapter describes what kind of crisis the COVID-19 is to the world and why we can't rely much on comparisons with past events. Then, the economic implications and their developments around the globe are considered.

This serves as an introduction to explain why constant innovation and searching for better, more resource-efficient business models is a crucial feature that firms must have in order to survive. The future is uncertain. Hence, other global crises are not completely impossible. New technologies are a must-have for firms, regardless of their area of activity.

1.1 Background

Since the risk of global epidemics has been continuously debated during the last decades, it leads us to believe that future similar occurrences are possible to happen. Hence, supply chain interruptions present a serious threat to the global economy. The high degree of globalization and interconnectivity that we are experiencing is unprecedented. Thus, this introduction also serves to inform the reader of the additional risks that come with globalization. It is important to notice that globalization is an essential part of innovation and growth. The purpose of this section is to describe how the global economy is changing and what business owners and managers should do in order to address such changes.

The end of the first chapter mentions some of the potentials and opportunities that blockchain technology enables. In particular, the possible benefits will be viewed in the context of addressing economic and financial concerns in times of crisis caused by global epidemics. In line with the selected topic, the focus is on potential benefits offered to small and medium-sized enterprises.

1.1.1 Facing a New Type of Challenge: Global Epidemics

The COVID-19 outbreak at the beginning of 2020 comprises a serious threat to the world, not only economically (Ivanov, 2020). This epidemic was highly severe so that the World Health Organization was bound to declare it a Public Health Emergency of International Concern (PHEIC) within a month form its cross-national outbreak. The spread of the virus caused a global economic shock with significant interruptions of many sectors such as supply chain, agriculture, insurance, tourism, and transport. This has pushed owners and governments to stop operations on a global scale (Chesbrough,

2020). The Organization for Economic Cooperation and Development estimates that 2020 will have the slowest growth rate after 2009.

Current and past literature does not offer a profound strand of studies on the impacts of global epidemics in the economy. Events like COVID-19 or SARS are so unique in their gravity and consequences that they have gained a special name, 'black swans' (Nicola et al., 2020).

As the number of newly infected people, during the time of writing this thesis, was still increasing in many areas of the world, many national authorities around the world issued drastic curfews and lockdowns, by calling for social distancing and home office work (Conlon & McGee, 2020). Conlon and McGee (2020) explain that such measures result in economic lockdown, with interrupted supply chains and feelings of protectionism.

In particular, service-oriented economies suffer more significant effects and have more jobs at risk. For example, countries like Spain, Greece, and Portugal will be more affected by this crisis as they are more reliant on tourism activities (Fernandes, 2020). Fernandes (2020) suggests that the degree and scale of the outbreak have generated spillover effects in almost every supply chain. Therefore, countries that strongly depend on foreign trade are affected even more negatively. A recent study suggests that each additional month of lockdown costs us from 2.5%, up to 3% of global GDP (Fernandes, 2020).

1.1.2 Blockchain and The Vulnerability of Global Supply Chains

The WHO and other health organizations are constantly working towards developing a vaccine and slowing the spread of the virus. Governments are equally struggling to bring their economies to the state they were before the crisis (Fernandes, 2020). Several experts in the global economy have argued that, if the Chinese economy does not get back to its previous state, it could significantly impact global supply chains when they are already experiencing many challenges and difficulties (Barua, 2020; Ivanov, 2020; Nicola et al., 2020; Rowan & Laffey, 2020). At the same time, many believe that bottlenecks and material shortages, especially regarding Personal Protective Equipment (PPEs), could even prolong the crisis (Rowan & Laffey, 2020).

In supply chains, one of the most important features that need to be shared by both the supply and the demand side is trust (Sahay, 2003). In the current environment, characterized by a great deal of uncertainty, the whole globe wants to purchase the PPEs that manufacturers have to offer. At the same time, the manufacturers are more than eager to increase production and fulfill the demand. Considering that such manufacturers are not present in every country means that large deals have to be negotiated in a matter of hours. Otherwise, the failure to find an agreement could slow down the

response to the virus and delay the recovery of the economy (Wang et al., 2020). Conveniently, some applications of blockchain technology are uniquely suited to the challenges and needs of this moment. Blockchain provides platforms that establish trust and transparency in supply chains and contractual obligations (Berg et al., 2017). Participants and users in a blockchain network have real-time visibility throughout the supply chain. Therefore, they can pay close attention to factors like performance benchmarks, quality control, or worker standards (Saberi et al., 2019). In times of increased uncertainty, knowing exactly when and where problems arise prevents a bad situation from deteriorating.

That is even more so the case for the people who have to be in the front lines against COVID-19 and make sure that the required medical, sanitary, and other sensitive products are available (Ranney et al., 2020). The implementation of blockchain in a supply chain provides a permanent record trail in each link it passes through in the supply chain. Therefore, buyers could not only monitor the location but also verify the provenance of the gadgets used in the medical equipment as well as ingredients that compose pharmaceuticals (Golan et al., 2020).

The same feature could be beneficial also to firms and businesses whose activities are far outside the scope of the pandemic response. Due to the improved transparency, firms could better control their resources in a way that minimizes the environmental footprint or select suppliers that abide to fair labor practices (Saberi et al., 2019). There are many programs and platforms that use blockchain in fighting the effects of the pandemic (Nguyen et al., 2020).

1.2 Aim and Research Questions

Looking at the severity of the current situation attracts curiosity to the author regarding the implications that such crises have on the economy, and how to manage their effects. After briefly screening the available literature, it became clear that the use of blockchain can significantly improve the response to crisis situations, as well as the every-day performance of firms and organizations.

In particular, this study investigates the impact of blockchain on small and medium-sized enterprises. The choice to focus on this group of companies was made due to their importance, considering that SMEs are often referred to as the backbone of the worldwide economy (Day, 2000). Additionally, upon concluding his studies, the author aims to become a successful entrepreneur in innovative local startups. They are the main drivers of growth, innovation, and job creation. Thus, equipping these entities with the necessary technologies and tools that enable better management, especially during times of financial crisis, it is extremely valuable as it significantly improves their chances of survival.

Several researchers suggest that digital transformation and the adoption of new technologies should be the next step for most companies after the COVID-19 epidemic (Casalino et al., 2019; Ting et al., 2020). Casalino et al. (2019) argue that SMEs, in particular, are more at risk during times of economic impediments because they have typically higher payroll costs and smaller margins than large enterprises. Hence, even though implementing a new technology requires effort and resources, owners and managers of SMEs should not be discouraged by the initial cost of restructuring their systems and implementing blockchain.

Learning about the benefits that proactivity and innovation have in improving performance during times characterized by prolonged activity interruptions and high uncertainty led the author to consider the potential of blockchain technologies in crisis and recovery management. Hence, this thesis investigates the current and future development of blockchain technologies in SMEs in Slovenia. In addition, implications arising from situations of increased uncertainty and disruptions are considered.

This will be the first study of its kind that connects the theoretical concepts and models, as suggested by field experts, with evidence collected from market participants. There are many papers that discuss the potential benefits of using blockchain technologies connected to the Coronavirus crisis, but they only focus on the health sector and lack the business perspective (Chesbrough, 2020; Johnstone, 2020; Ting et al., 2020).

None of the previous articles discusses the benefits of commercializing blockchain technologies and their potential role in management in harsh market conditions from a business perspective. That is why this thesis will investigate whether such technologies are present in SMEs in Slovenia and how they influence a firm's performance. Subsequently, the performance during the current crisis of companies that have adopted blockchain technologies will be compared to the performance of companies who have not done so. For that purpose, the following research questions were constructed:

How can blockchain technologies and service providers help SMEs to better manage their operations, reach higher levels of efficiency, and build comparative advantages, especially in times of economic crises?

When applicable, do the stakeholders understand the capabilities and benefits of blockchain?

There are no restrictions regarding industry or business model in selecting the study participants, based on the fact that blockchain is still a novel technology, and not many companies have chosen to embrace the potential presented by it. The primary target group of the study will be business owners

and managers, as they have the most knowledge regarding the overall performance of the company and their strategy regarding innovation.

The thesis will provide new insights over the benefits of blockchain technologies in times of economic disruptions and uncertainty, especially for small and medium-sized enterprises. The results will prove valuable to small business owners as it can provide them with critical information required for the survival of their business. The findings could also be used to identify a market benchmark in order to find successful solutions.

1.3 Outline of the Thesis

The thesis will have the following structure:

Chapter 1: The first chapter introduces the reader with the background of this research and the motivation of the author. Additionally, the chapter presents the research questions which guide the author throughout the study.

Chapter 2: The second chapter will present the state of the art upon which the study is constructed. Initially, it will describe and provide a definition for blockchain technologies. Afterward, it will discuss the main potential of such technologies in improving business performance. In doing so, the main implications of blockchain are presented based on a business model framework.

Chapter 3: The third chapter will present the research design of the study. All the methods and tools implemented for data collection and analysis will be carefully described.

Chapter 4: The fourth chapter will state the analysis and the results of the study. The results are carefully explained, supported by various illustrations and other visual tools that represent the main discoveries.

Chapter 5: The last section will summarize the main findings of the paper. Then, the implications of the findings will be discussed, and future research avenues will be presented.

2 Literature Review

This chapter includes the theoretical foundations upon which this study is constructed. In order to accommodate the purposes of the thesis, the literature review is divided into three main subchapters. The first one describes blockchain, its history, and how it functions, while the second presents the most popular uses (or potential uses) of blockchain technologies by SMEs. To conclude, the last subsection focuses on the COVID-19 pandemic, and on the effect that such events have on SMEs.

2.1 Blockchain

Blockchain and distributed ledgers[1] have attracted massive attention and triggered several projects in multiple industries in the past decade. Hitherto, the financial industry remains the main user of the blockchain concept (Chang et al., 2020). This is not only based on the fact that the most popular use case of blockchain is Bitcoin but also because of considerable process inefficiencies and an enormous cost base that characterize this industry. Additionally, the financial crisis highlighted that also in financial services, in some cases, it is almost impossible to identify the correct owner of an asset (Nofer et al., 2017). The challenge is even greater in tracing the ownership of financial assets over a long chain of different buyers and sellers. For example, Nofer et al. (2017) explain that when Bear Sterns went bankrupt in 2008 and was acquired by JP Morgan Chase, the number of shares on the market was larger than the number of shares outstanding in the balance sheet of Bear Stearns. Due to the limited availability of information, it was not possible to solve the accounting errors, and JP Morgan Chase had to bear the costs of excess digital assets, in this case, digital shares.

While the issue of tracing the previous ownerships in long supply/transaction chains is already an important topic in financial markets, it can also be critical for physical goods, like 'blood' diamonds or green lettuce. The U.S. giant retailer Wal-Mart, which serves to more than 250 million customers per week, has launched a pilot blockchain project to track its goods in real-time in order to precisely identify the batches of vegetables that, for example, are infected by bacteria (Morkunas et al., 2019).

In today's economy, intermediation remains the dominant solution when it comes to verifying transaction processing and ownership of assets. Intermediaries are tasked with verifying the credibility and authenticity of each party along the transaction chain. This method is not only outdated, costly,

[1] A distributed ledger is a type of database that is shared, replicated, and synchronized among the members of a decentralized network. The distributed ledger records the transactions, such as the exchange of assets or data, among the participants in the network.

and time-consuming but also holds credit risk in case the intermediary fails (Nofer et al., 2017). Blockchain technologies can revolutionize such processes and overcome these critical challenges simply by shifting the trust in people to trust in mathematics (Berg et al., 2017), as human tasks are substituted by automatic processes.

2.1.1 Blockchain Architecture

The most popular visual representation of a blockchain, found in the majority of academic articles is the one presented below.

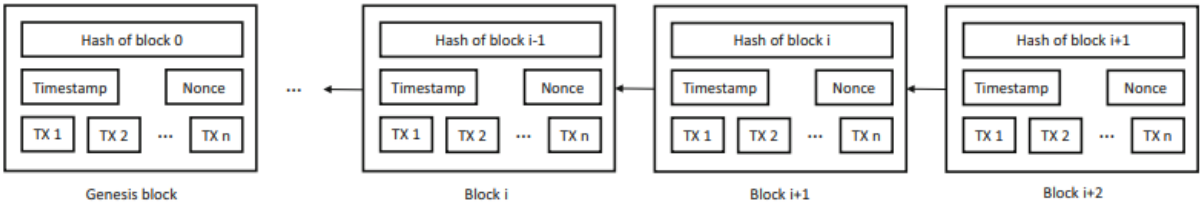

Figure 1 Example of Blockchain Architecture (Source: Nofer et al., 2017, pg. 184)

A blockchain is composed of data packages, referred to as 'blocks,' each of which contains multiple transactions (TX 1; TX 2; etc.) (Nofer et al., 2017). The blockchain expands with the addition of each subsequent block, resulting in the establishment of a complete ledger of the history of transaction activity. The blocks are validated by the network by using cryptographic means, without the need of a third-party intermediary (Nofer et al., 2017; Swan, 2015).

Nofer et al. (2017) mention that besides the transaction data, a block includes a timestamp, the hash value of the parent block, and a nonce [2]. This structure of the blockchain ensures the integrity of the entire ledger, starting from the first block, referred to as 'genesis block.' Hash values are unique and almost impossible to duplicate, making fraud impossible since changes in a block are connected to immediate changes in the respective hash values. Swan (2015) explains that a block is added to the chain only if the majority of the nodes participating in the network agree on the validity of the transactions, thus the validity of the block itself. She further adds that the agreement is achieved through a consensus mechanism. A consensus mechanism refers to the process by which a majority of network validators come to an agreement regarding the state of the ledger (Swan, 2015). In other

[2] Random number used to generate the hash value.

words, it is a set of procedures and rules that enables the storage of coherent data between multiple participating nodes.

Hence, new transactions are not added to the ledger automatically. Instead, the consensus practices store these transactions in a block for some time before being recorded in the ledger. Once added to the ledger, the information in the block can no longer be modified. In the case of most cryptocurrencies, blocks are generated by so-called miners who are rewarded in crypto coins for validating blocks. Therefore, cryptography could help people all around the globe to trust each other and exchange different kinds of assets directly over the internet, and not only money.

The distributed ledger system explained above has many benefits. Contrary to centralized systems, the network continues to operate even if one or more nodes break down. Hence, people could trust the system and disregard the trustworthiness of intermediaries or other participants in the network. Swan (2015) argues that the absence of intermediaries improves data security since involvement with third parties holding personal data increases the risk of security breaches.

2.1.2 Blockchain and Smart Contracts

The concept of smart contracts was first coined by Szabo (1997), who described a process that combines computer protocols with user interfaces in order to execute the terms of a contract. Supported by the fast growth of blockchain technologies, smart contracts are gaining a lot of attention since they can be utilized more efficiently and effectively compared to the technology 20 years ago (Nofer et al., 2017). Using this new approach reduces the need for banks or lawyers that are traditionally involved in asset deals with pre-defined aspects (Peters & Panayi, 2016). A smart contract could also be used to control the ownership of assets, be them tangible or intangible. Ethereum is the best example of a blockchain system that utilizes smart contracts (Nofer et al., 2017). Ethereum is often described as an extension of the blockchain technology used by Bitcoin in order to support a wider range of applications. Blockchain has the potential to entirely disrupt transaction processes by enabling the automatic execution of contracts in a secure, transparent, and cost-effective way (Peters & Panayi, 2016).

2.2 Blockchain Applications in Business

The origin of the popularity of blockchain goes back to a white paper published under the name of Satoshi Nakamoto (Nakamoto, 2008). Nakamoto presented a peer-to-peer electronic currency called bitcoin, which allowed online transactions to be conducted directly through the parties, without the

need for centralized financial intermediaries. In the white paper, Nakamoto developed a ledger, which he referred to as 'a chain of blocks' (Nakamoto, 2008, pg. 7). This chain of blocks, which later became known as 'blockchain,' is one of the essential features that provides the technical foundation for all cryptocurrencies (Swan, 2015). Many new blockchain applications have been developed since the first introduction of bitcoin (Morkunas et al., 2019).

Blockchain comprises a decentralized digital record-keeping platform for transactions, also referred to as a distributed ledger. The main characteristic is that there is a network of computers that maintain and update this ledger. Such a platform allows for the exchange of digitally represented assets in an immutable peer-to-peer network without the need for any intermediaries (Swan, 2015). Morkunas et al. (2019) provide a simple description of the steps required for the completion of a transaction using blockchain technology. This description is provided below.

The first step of any blockchain transaction is the conversion of the transaction proposal into a hashed file, which is stored as a potential entry in the ledger. The hashed file contains basic information such as sender, receiver, date/time, quantity, and asset type. The proposed transaction is then labeled with a unique cryptographic signature in order to ensure the authenticity and integrity of the record.

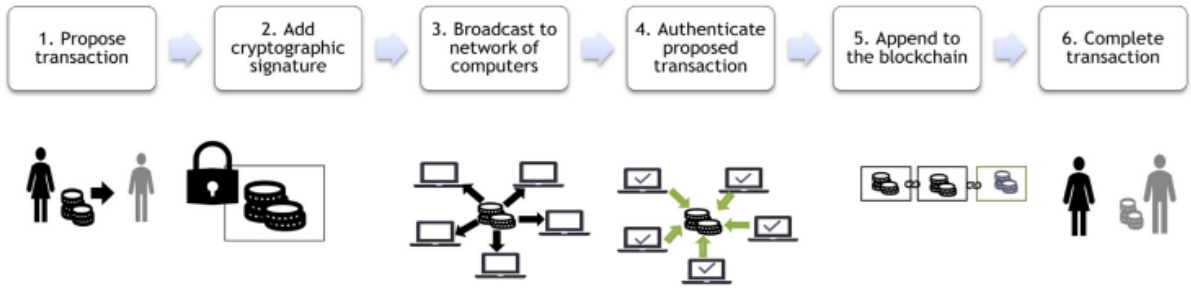

Figure 2 The Six Steps of A Blockchain Transaction (Source: Morkunas et al., 2019, pg. 296)

In the next step, the labeled hashed transaction proposal is broadcasted to a system of distributed computers for authentication and processing. After the transaction is processed and validated by the network, it is added to the public ledger. At this moment, the transaction between the two parties is completed. Every new transaction is connected to the past ones in such a way that it provides a complete, verifiable, and irreversible history of all transactions regarding the asset in question (Morkunas et al., 2019).

In its generic form, blockchain technology is a system that enables a decentralized store of information, similar to an information system database that is distributed to all participants for

validated record-keeping (Swan, 2015). As mentioned before, network validators authenticate each transaction before it is recorded to the general ledger. There are two main types of blockchain technologies in regard to the access granted to the user of the network, private, and public (Morkunas et al., 2019).

2.2.1 Public Blockchain

Public blockchain technologies, also known as open systems, allow all members to interact with other transacting parties (Pongnumkul et al., 2017). However, the parties involved in a transaction in such a network are pseudonymous or even anonymous to each other (Olleros & Zhegu, 2016). At the same time, an open blockchain system offers almost no privacy for transactions as all participants can freely review all the transactions. Olleros and Zhegu (2016) add that such a system requires a considerable amount of computational power that is needed to maintain the distributed lager on such a large scale. In other words, in order for the system to achieve consensus, in most public blockchains, each network participant has to solve a resource-intense, complex mathematical problem, referred to as proof of work. This is done to ensure that all the participants are in sync (Morkunas et al., 2019).

The most common examples of open blockchains are cryptocurrencies like Bitcoin, Litecoin, or Ether (Morkunas et al., 2019). Mohan (2019) explains that Ethereum is different from Bitcoin since it introduced a way for blockchain to manage any kind of asset, both physical and purely digital, with the use of Smart Contracts.

2.2.2 Private Blockchain

On the other side, a private, or closed blockchain allows only prevalidated parties to have access to the ledger, in order to view and enter data (Olleros & Zhegu, 2016). In these kinds of networks, each participant knows the identity of the counterparty prior to transacting. One of the versions of private blockchain technologies is the consortium or federated model, where the network operates under the governance of a group (Kang et al., 2020). Ollerso and Zhegu (2016) explain that this private network allows only the validated participants to have access and maintain the shared records of transactions. There are multiple ways through which these types of blockchain technologies grant permission to new entrants. In most cases, the decision is up to the existing members, a regulating authority can issue new user licenses, or a consortium can decide to whom is granted the permission (Mohan, 2019).

Compared to public blockchains, a private one offers increased transaction privacy, which is essential for transactions that involve sensitive information (Olleros & Zhegu, 2016). Kang et al. (2020) explain that in particular cases, the right to read the blockchain might be open to the public, and not only to the participating members, but the last ones would still be the only parties permitted to modify or add data. Additional features of closed blockchains include the easiness to scale up, lower costs, added security, reliability, and trust since only pre-verified parties are allowed to create new nodes in the blockchain (Mohan, 2019).

The most popular examples of private blockchains include the Linux-based Hyperledger and R3. Hyperledger aims to provide an environment for the collaborative development of blockchain tools in finance, banking, IoT, technology, and supply chain (Lee, 2019). On the other hand, R3 is a blockchain technology company that is composed of a consortium of more than 200 organizations. The main goal of R3 is to develop applications of commerce and finance on its blockchain platform (Lee, 2019).

2.3 Blockchain Transforming Business Models

Blockchain technologies not only offer many opportunities to develop entirely new businesses, but they also pose a direct threat to some traditional economic incumbents. For example, organizations using conventional business models with the purpose of serving as intermediaries between two transaction parties need to carefully consider how blockchain could impact their value proposition, how they operate, and how they compete (Lee, 2019). There are already many blockchain projects underway in various industries. The most general uses until now include enabling customers to send and receive funds from abroad with no delays or high exchange fees; allowing for real-time tracking of the transportation of goods inside of industrial supply chains; and enabling less costly, faster, and more secure transactions in real estate with the use of smart contracts (Morkunas et al., 2019). All firms therefore need to evaluate their business model and consider the implications that might arise based on the fast-expanding blockchain applications.

In order to provide a clear picture of the potential impacts of blockchain on business models, this thesis uses the business model framework presented by Osterwalder et al. (2010), who explain business models as the ways through which firms create, deliver, and capture value. The framework, as seen in the figure below, consists of nine building blocks that cover the main areas of business: the customers, the financial viability, the offer, and the infrastructure. Osterwalder et al. (2010) refer to the visual representation offered in their book as the “Business Model Canvas.”

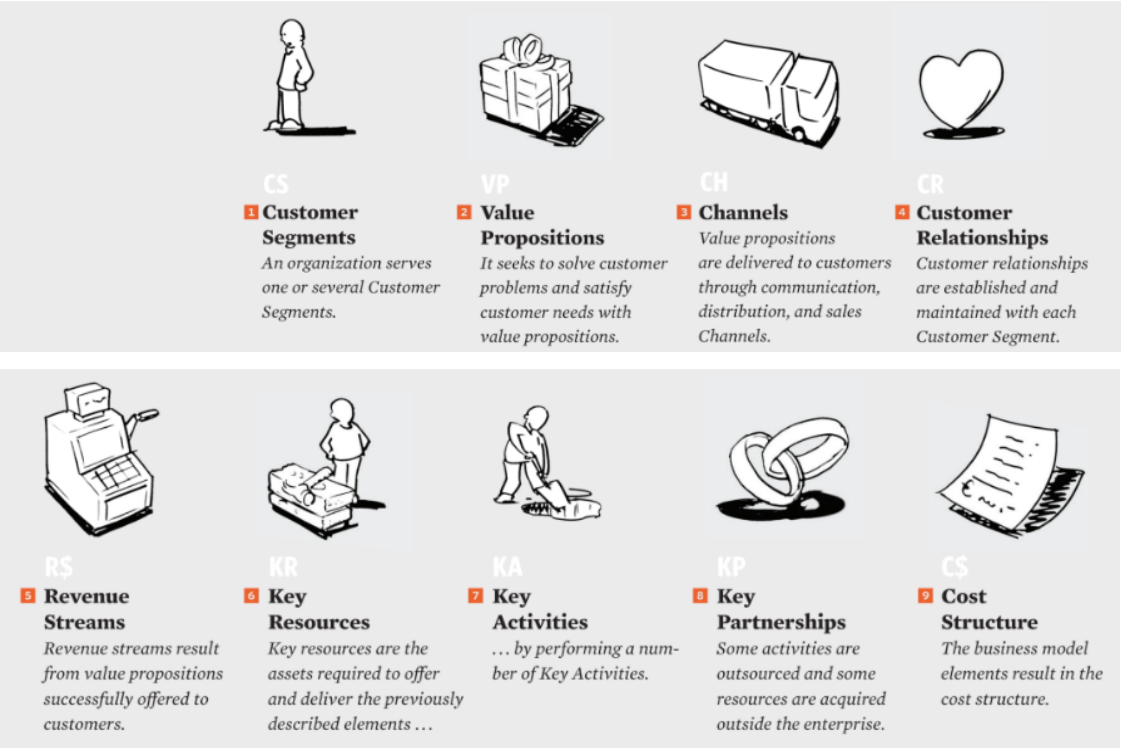

Figure 3 The Business Model Canvas (Source: Osterwalder et al. 2010, pg. 16-17)

Based on the nine essential elements of the canvas, the following subchapters provide an informed prediction on how blockchain could affect each of them. In addition, the proposed impacts are followed by examples of real-world applications from blockchain development startups around the world.

2.3.1 Customer Segments

Customer segments are defined as the different groups of individuals or organizations that a firm aims to serve or reach (Osterwalder et al., 2010). There are many organizations that use blockchain to address customer segments that already exist in the market. For example, people who want to buy or sell real estate in Sweden can do so via a blockchain technology project developed by ChromaWay (Pankratov et al., 2020). Hence, the market segments served by blockchain technology can be similar to the customer groups that are served by typical organizations, which include mass markets, niche markets, and diversified markets.

Nevertheless, blockchain could provide firms with facilitated access to target markets that were previously unreachable (Larios-Hernández, 2017). Thus, it has the potential to provide businesses with new customer segments. An example of a company following this strategy is Everest (Thomason et

al., 2019). This firm operates in Asia, Africa, and South America, aiming at reaching over two billion people that have limited or no access to financial services. Thomason et al., (2019) state that Everest is a private and permissioned decentralized distributed ledger technology with multiple features that include a multicurrency wallet, a payment solution, and a biometric identity system.

2.3.2 Value Proposition

The value proposition refers to all of the activities of the firm that create value for the customer (Osterwalder et al., 2010). Researchers argue that customers do not buy products per se; they rather buy solutions that get important jobs done (Morkunas et al., 2019). Hence, the value derived by the customer is directly proportional to the importance of the job, the availability of other solutions, the costs, and the level of satisfaction of the current options.

Blockchain can increase customer value by offering access to services or products that were previously unavailable or could be generated only by using a large amount of resources and time. Such an example is the Swedish company Safello, which provides a transparent platform to exchange bitcoin with fiat currencies (Deng et al., 2019). Thus, by utilizing an open blockchain protocol, this company provides resources that would be otherwise unavailable or only accessible at additional expense.

Centbee, another firm that operates in the South African market, enables customers to exchange bitcoins between them (Larios-Hernández, 2017). Users of this platform can send and receive funds cheaply and simply across borders in order to support their friends and family without having to pay exorbitant exchange fees. In other words, both Safello and Centbee reduce or even remove the need for a centralized bank for transactions.

At the same time, blockchain technology has the ability to provide cheaper and faster transactions as compared to those completed through traditional channels. For instance, the value proposition of certified notaries in real estate is based on facilitating the transfer of ownership from the seller to the buyer by verifying the authenticity of the documentation presented by the respective parties (Pankratov et al., 2020). Employing the services of a notary for buying or selling a home is often expensive and requires time. In these cases, blockchain technologies, more specifically smart contracts, can be used to reduce transaction costs and time. Such an example is the Swedish company mentioned before, called ChromaWay (Pankratov et al., 2020).

2.3.3 Channels

The channels block of the business canvas constitutes the methods and tools throughout which a company communicates and reaches its customer segments in order to deliver its value proposition (Osterwalder et al., 2010). These channels include the company's website, physical stores, its sales force, and stores of wholesalers and partners. Here, blockchain's main feature is its ability to simplify how business is done (Morkunas et al., 2019). Various intermediates and middle parties are no longer needed.

As an illustration, in the case of the real estate transactions conducted via blockchain smart contracts, the need for personnel or time required to complete a value check or a transaction is removed. In addition, with blockchain, new channels could be introduced between various actors in the supply chain or within an organization (Montecchi et al., 2019; Saberi et al., 2019).

2.3.4 Customer Relationship

Osterwalder et al. (2010) define a customer relationship as the different types of relationships that a firm establishes with its customer segments. These relationships are usually aimed at acquiring new customers, retaining customers, or boosting sales. Typical examples of such relationships include personal assistance, self-service, creation of communities, co-creation of new content, or automated services (Morkunas et al., 2019).

Referring to ChromaWay again, the workflow handled digitally significantly facilitates the job of the Swedish official land-registry authority (Pankratov et al., 2020). The decentralized ledger records every step of a real estate transaction, including the property title. This allows real estate agents as well as bank representatives to access up-to-date secure information with ease. Even though the governmental authorities are still involved, they are present throughout the whole process, thus, fulfilling its objective of enhancing confidence and transparency in its operations (Pankratov et al., 2020).

2.3.5 Revenue Streams

The revenue streams refer to the cash that companies generate from their customer segments (Osterwalder et al., 2010). Osterwalder et al. (2010) explain that there are two types of revenue streams. The first are one-time payments, while the second includes recurring revenues from ongoing payments.

Morkunas et al. (2019) suggest that by 2023, blockchain projects will generate more than $ 10 billion in revenues, primarily from the sale of software and services. Companies that provide professional services related to blockchain have, in general, three categories of revenue streams, which are fees for transactions, service level agreements, and platform charges for SaaS contracts. However, up to now, the most significant revenues from blockchain have resulted from crypto-crowdfunding via initial coin offerings (ICOs).

ICOs are forms of fundraising, based on cryptocurrencies and blockchain trading, that provide an alternative to traditional debt/capital funding offered by banks, venture capital, and private equity (Lee, 2019). Investors in ICOs receive tokens instead of shares to represent their ownership. These tokens can be easily traded after in the market, and all transactions are verifiable on a blockchain (Lee, 2019). Until June 2018, more than a quarter-billion of U.S. dollars had been invested in cryptocurrency markets, from which a considerable share was acquired via ICOs (Hashemi Joo et al., 2019).

2.3.6 Key Resources and Activities

The key resources of the business model canvas refer to the most essential and critical properties required to make the business model work (Osterwalder et al., 2010). These are the assets that create the value proposition, find and reach customer segments, maintain relationships, and generate revenues. These resources can be financial, physical, human, or intellectual. On the other side, the term ‘key activities’ encompasses all the required activities that a firm performs in order to deliver value (Osterwalder et al., 2010). Even though they are two different building blocks of the business model canvas, for the purposes of this study, they are discussed jointly because of being tightly linked in regard to blockchain implications.

The emergence of blockchain has made firms to reevaluate the key resources that constitute their business models. There are two main ways of how blockchain influences the resources and activities of a company. First, blockchain has the potential to make the assets and resources more fluid in such a way that it removes the costs of traditional ownership and allowing access to the resources only when required (Morkunas et al., 2019). This is especially pertinent in public blockchains where anyone can transact with all the parties in a peer-to-peer network. Moreover, in some cases, firms are exempt from investments in developing and maintaining IT infrastructure since, in public blockchains, the network provides the resources and processes needed (Mohan, 2019). In addition, Mohan (2019) explains that both private and public blockchain technologies enable companies to automate

processes that were previously conducted 'manually,' like documentation, audit reporting, and verification, allowing for human capital to focus on other, more important activities.

The second way that blockchain influences a company's key resources and activities is related to cases when the users provide most of the key resources and utilize blockchain to exchange these resources (Morkunas et al., 2019). An adequate example is smart contracts in real estate transactions. In such cases, the users provide both the physical capital (assets) and human capital (skills, knowledge, experience), while the blockchain platform simply facilitates the exchange of these resources (Pankratov et al., 2020).

2.3.7 Key Partnerships

Key partnerships is the term used to represent the networks of partners and suppliers that are required for the business model to work (Osterwalder et al., 2010). They can be in the form of joint ventures, buyer-supplier agreements, or strategic alliances aimed at ensuring a reliable flow of supplies. While, in most cases, the application of blockchain entails the disintermediation of traditional institutions like notaries, banks, and currency exchanges, it could also enable the acquisition of new partnerships. New partners can be technology companies that offer software development kits (SDKs) and application programming interfaces (APIs) that improve processes and cut costs (Morkunas et al., 2019).

The South African company Centbee has established a merchant payment ecosystem that enables retailers to easily and quickly accept bitcoin at a point of sale (POS) without the need for special terminal hardware (Larios-Hernández, 2017). At the same time, the increased transparency offered by the peer-to-peer network facilities partnerships between firms; thus, it extends and strengthens supply chains.

2.3.8 Cost Structures

The last item on the business model canvas refers to all the costs incurred by a company to operate its business (Osterwalder et al., 2010). Blockchain has the potential to reduce or even completely remove many of the costs that belong to this category (Chang et al., 2020). Chang et al. (2020) explain that these savings come as a result of cost reductions in IT infrastructure and the elimination of traditional processes that do not provide much value to the firm.

The implementation of blockchain technology for financial transactions allow for quicker processing as compared to credit card and bank payments, in which funds could be held for several days waiting for authorization (Morkunas et al., 2019). Based on the characteristics of blockchain, in the case of public ones, these holds can be reduced to mere minutes. On private blockchains they can be reduced even to microseconds (Shalaby et al., 2020).

Processes handled by blockchain technologies require less human labor in aggregating, adjusting, and sharing data or providing audit documents and regulatory reporting (Pankratov et al., 2020). Therefore, employees can focus on other activities that generate higher revenues, whereas customers save money and time. For example, users of the Swedish real estate blockchain company mentioned before have no longer a need to deal with previously required third parties, like notaries, resulting in saved costs during the transaction.

2.3.9 Summary of Blockchain Impact on the Business Model Canvas

In order to summarize the main impacts that blockchain technologies present to businesses, the author constructed the following table. The opportunities that blockchain technologies introduce to businesses are presented based on the nine building blocks of the business model canvas framework proposed by Osterwalder et al. (2010).

Building Block	Blockchain Potential
Customer Segments	Find new customers Develop new customer segment
Value Proposition	Quicker & cheaper transactions Fewer intermediaries, due to smart contracts Verifiability Access to new services and products
Channels	Additional Channels New SDKs and APIs
Customer Relationship	Automation Self-service More transparency No middleman
Revenue Streams	Crowdfunding Recurring revenues Transaction revenues Services revenues
Key Resources	Verification Documentation

	Audits
Key Activities	Peer-to-peer networks Transformation of business processes
Key Partnerships	Tighter relationship inside the supply chain Improved data integrity Payments facilitation Shared networks Reduction of lengthy processes
Cost Structure	Reduced search expenses Reduced IT costs Reduced transaction costs Reduced negotiation costs Increased costs of software & development personnel

Figure 4 Summary of Blockchain Impact on Business Models (Source: Morkunas et al. pg. 300)

3 Methodology

This chapter presents the methods and tools that were utilized to conduct this study. Initially, it provides a brief description of the general categories of research methods. Subsequently, the chapter focuses on the exact strategies used in this bachelor thesis. To conclude, the chapter describes how the data gathering, processing, and presenting are conducted.

3.1 Research Methods and Design

Typically, there are three main research designs that a researcher could use based on the characteristics of their studies (Creswell, 2014). They are quantitative, qualitative, and mixed research methods. Creswell (2014) explains that quantitative research is usually conducted in the form of experiments or surveys, whereas qualitative research is conducted in the form of narrative theory, case studies, or ethnographies. The data collection techniques also vary significantly between different methods. Hence, quantitative designs use standardized practices in order to assure credible outcomes, while qualitative ones use open questions in order to gain in-depth knowledge and avoid predetermined answers (Bernard, 2013). As for mixed methods, they are a combination of qualitative and quantitative designs (Creswell, 2014). Bernard (2013) explains that quantitative methods are used to investigate causal relationships and numerical data. On the other side, qualitative methods care less about the cause and are more focused on the particular features and details of the situation.

Both Creswell (2014) and Bernard (2013) argue that in order to select the adequate research method, a researcher needs to carefully consider the research topic, his/her personal experiences as a researcher, and the target group of the study. In the cases when a researcher aims to verify an explanation or theory, he/she should employ quantitative methods. In comparison, qualitative designs are more suitable for situations where the researcher does not have enough information regarding the variables being examined (Creswell, 2014). On the other hand, mixed-methods prove useful when the aims of the researcher are both to generalize the results over a whole population, as well as to gain a proper description of the phenomena (Bernard, 2013).

For the purposes of this study, the survey was chosen as the correct tool for gathering the primary data, since, as Creswell (2014) explains, surveys designs provide quantitative or numeric descriptions of attitudes, opinions, or trends of a population, based on the results from a sample of that population.

Survey studies are widely used in measuring public opinion over a political or social issue or conducting market research in order to identify customers' preferences (Bernard, 2013).

3.2 Survey Study

Surveys are defined as the process using questions for collecting information from a sample of individuals. Survey studies can be used for data collection in all three methods of research: qualitative, quantitative, and mixed (Marsden & Wright, 2010). In qualitative research designs, as Marsden and Wright (2010) explain, surveys are generally in the form of interviews with open-ended questions, while in quantitative research designs, they are most commonly via questionnaires with pre-defined answers, which are rated numerically. However, different varieties and mixtures of open-ended questions and questionnaires with pre-defined answers can be used simultaneously based on the specific requirements of the research topic (Creswell, 2014).

Surveys have served as the primary tool to gather information from individuals of groups for many centuries (Marsden & Wright, 2010). Hence, they can significantly vary in size and scope. There are basic surveys that investigate a single behavior or attribute by using only a few carefully chosen questions. Whereas, more complex studies that aim to gain deep knowledge regarding a certain issue make use of several reliable and solid instruments (Marsden & Wright, 2010). Hence, survey studies can be conducted in many various ways in order to gather information (Creswell, 2014). However, since the type of survey used in this thesis is a questionnaire, this tool is described in detail.

3.3 Questionnaires

Researchers suggest that questionnaires are often considered as the most affordable tool in acquiring quantitative data (Bernard, 2013; Creswell, 2014; Marsden & Wright, 2010). This is even more so the case for self-administered questionnaires, which Marden and Wright (2010) describe as an effective and cost-efficient instrument to collect significant amounts of data, in a relatively short time, from a large sample of individuals. Web-based questionnaires, a form of self-administered ones enabled by technology, are presented to the respondents via e-mail or on a webpage, with little to no cost at all. While being the most inexpensive instrument, in addition, questionnaires present a practical method of data gathering. Questionnaire studies can target precisely the group of people that the researcher has an interest in, and since the questions and the format are pre-defined, they allow for gathering vast amounts of data on any subject (Marsden & Wright, 2010). Web- or mobile-based questionnaires

enable the researcher to acquire insight very quickly, based on the desired reach and scale of the study.

Another benefit of using questionnaires in order to acquire the primary data for a study is that is produces quantified data, which makes the comparison and analysis much easier. Questionnaires that are administered regularly on a time basis become more and more valuable with time. Being quantitative in nature allows for easier analysis and presentation of the results, even for researchers with no statistical background. Moreover, there are many software and applications, like PSPP and SPSS, that introduce inexpensive, quick, and effective ways to interpret results and support them with various tables, charts, and other visual tools (Tomas et al., 2019).

At the same time, questionnaire studies do have some disadvantages (Bernard, 2013). For example, there is no guarantee that the respondent provided their honest answers. Or, they could choose to ignore part of the study and leave the corresponding questions unanswered. In addition, when the questions are not administered face-to-face, there is a risk that each respondent interprets them in a different way, leading to skewed and subjective findings (Creswell, 2014; Marsden & Wright, 2010). Bernard (2013) suggests that even when using a large number of open-ended questions, there are issues since doing so gives the researcher a flood of information that requires effort and time to analyze.

In order to prevent obstacles and produce valuable data to reach correct results, researchers have to carefully consider the types of questions employed. The questions should be evaluated multiple times to identify if they can acquire the knowledge that the study is focused on. If the questions are not stated properly or are too difficult and confusing to answer, the data gathered could be incomplete or even meaningless (Marsden & Wright, 2010).

3.4 Survey Development

The questionnaire used in this bachelor thesis consists of three main parts. The first part includes general questions about the companies, like the size, industry, etc. In addition, the first part includes an item aimed at investigating the presence of blockchain solutions in the organization.

The second part of the questionnaire is divided into nine items based on the building blocks of the business model canvas. This part aims to acquire the level of understanding that these companies have in regards to the benefits that blockchain technologies offer to organizations. Each of the nine

items is composed of a number of statements that correspond to the benefits identified in the literature review.

The third part is concerned with the implications arising from crisis situations. This section is based on the information gathered over the COVID-19 epidemic and its impact on the global economy. The second and third part of the questionnaire utilize statements where the respondent is required to express their level of agreement on a 5-point Likert scale. In doing so, the respondents need less time and effort to complete the questionnaire. In addition, the statements use a vocabulary that is easy to comprehend for respondents of different backgrounds in order to avoid confusion and unanswered items. Furthermore, at the beginning of the survey, a small note is included with two main purposes: presenting the participants with the aim of the study and providing instructions on how to complete the questionnaire. A copy of the developed questionnaire is presented in Appendix A.

3.4.1 Data Collection Process

The developed questionnaires were distributed mostly via e-mail, and partially physically to 200 small and medium-sized companies that operate in the Slovenian market. The list of organizations was taken from the Pozanimaj online portal[3]. This portal was selected as it serves as a platform that offers visibility to Slovenian SMEs for clients as well as partners. The portal includes companies from all industries in all territories of Slovenia. The author contacted all the firms on the list. A large share was reached personally in their physical locations, while the other participants that were located in considerable distances were initially approached via phone-calls. After contacting most of the companies, the survey managed to gather 127 responses, which produced 118 adequate entries for the analysis, as nine of the questionnaires received included missing fields. The survey study lasted for three weeks because many companies took a lot of time to answer, and many others required several follow-ups in order to fill in all the required fields.

[3] Can be found under https://www.pozanimaj.se/

4 Results

During the period of 3 weeks, I gathered 118 valid responses from Slovenian SMEs. Figure 5 provides a visual representation of the industry sector to which the participants belonged. The majority of the firms participating in the study operated in the Production and Manufacturing sector. The second dominating group, as seen in the figure below, was Transportation and Logistics, with 27 % of the respondents. Followed by Financial Services, from which the study gathered 11 valid responses. Then, 4% of the respondents belonged to Commerce, while there were no valid responses from the other industry sectors.

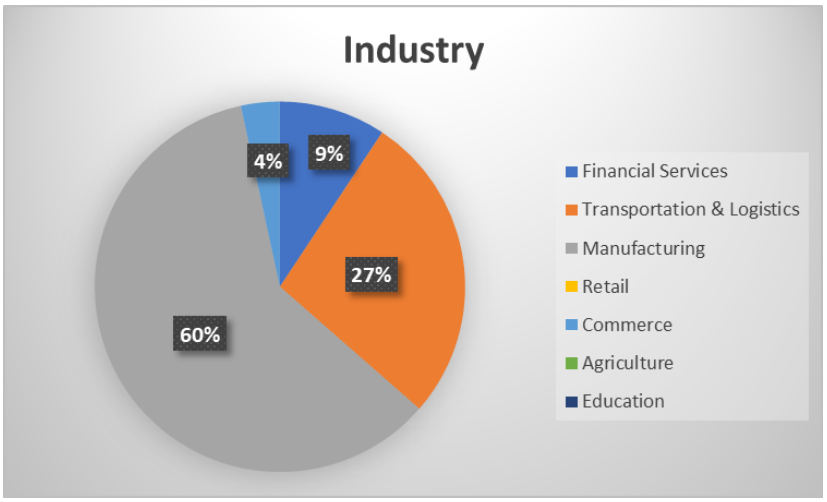

Figure 5 Industry Distribution of Respondents (Source: Own creation)

As for the size, as displayed in Figure 6, the majority of the respondents were micro-sized businesses, with less than ten employees, amounting to 85% of the total respondents. From the micro-business, 37 had up to five employees, while 62 had from six to ten employees. There were 12 companies with staff numbers from 11 to 50, two with numbers from 51 to 100, and four companies with more than 100 employees.

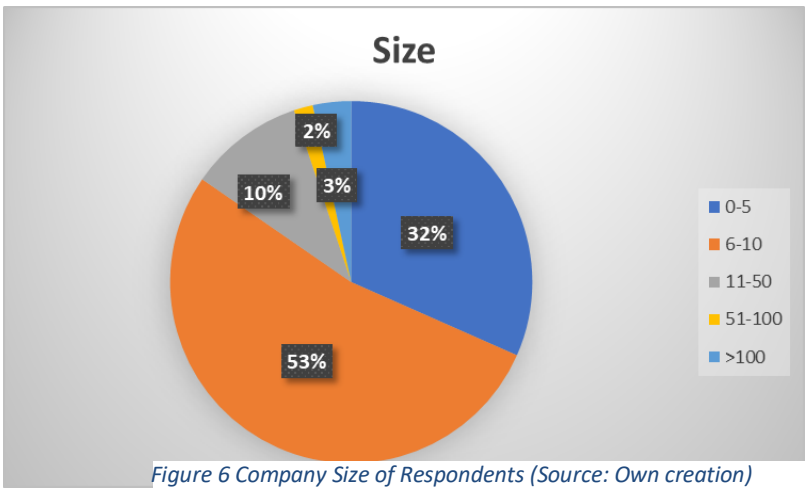

Figure 6 Company Size of Respondents (Source: Own creation)

What was rather surprising is that a significant number of SMEs have already implemented blockchain solutions in their business models in Slovenia. Out of the 118 companies that participated in the study, 19 of them already have systems in place that utilize the decentralized ledger offered by blockchain.

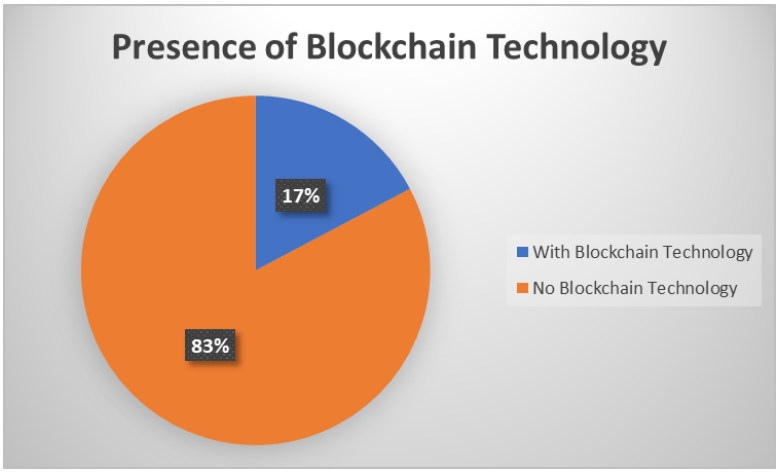

Figure 7 Presence of Blockchain Solutions (Source: Own Creation)

These companies operate in various fields. However, as seen in Figure 8, the majority of them were concerned with the payment industry and other financial services. The second biggest group included the tracing of trades in the supply chain, followed by use cases in Real Estate, and last, there are two uses in facilitating payments. Two of the firms that have implemented (or plan to) blockchain do not operate in the following categories.

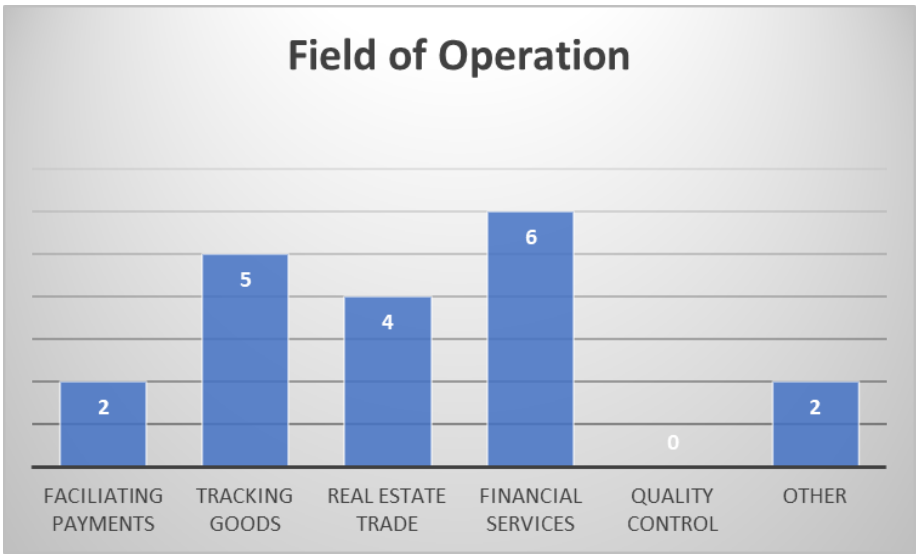

Figure 8 Field of Operation (Source: Own Creation)

4.1 Blockchain and the Business Model Canvas

This part of the Results chapter presents the main findings from the second part of the questionnaire. The findings are presented in nine sections corresponding to the nine building blocks of the business canvas.

4.1.1 Customer Segments

P1: Blockchain enables firms to enter new existing customer segments.

P2: Blockchain enables firms to create entirely new customer segments.

The results of both statements regarding the Customer Segments block are positive, with 64% of the respondents believing that blockchain technologies do have the potential to find new customer segments, and 54% of them believe that it could develop entirely new customer segments. 28 respondents in the first statement and 32 in the second did not have a clear idea if blockchain could influence their customer segments, as they selected the option "Neither." However, a small share of the respondents refused the statements by selecting "Disagree," in 11% of the cases for the first statement and 18% for the second.

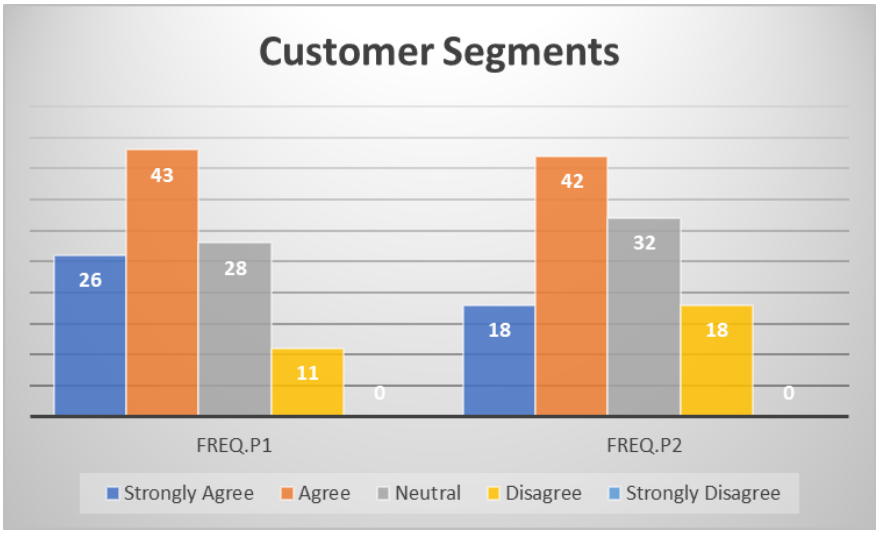

Figure 9 Statements Frequencies of Customer Segments (Source: Own creation)

The findings of the first building block of the business model canvas shows that the majority of Slovenian SMEs recognize the potentials that blockchain technology for transforming their customer segment. With a relatively small difference, more of the respondents believed that blockchain could present them new existing segments, rather than developing completely new ones. Nevertheless, a significant share of the respondents did not agree with the statements.

4.1.2 Value Proposition

P3: Blockchain enables quicker and cheaper transactions.

P4: Smart Contracts reduce the need of intermediaries.

P5: Blockchain allows for enhanced verifiability.

P6: Blockchain presents new products and services to organizations.

When it comes to the value proposition, all the study participants believed that blockchain will lead to lower transaction costs, with 83% of the respondents selecting "Strongly Agree," and 17% just "Agree." The case is similar in the fourth statement, which discusses the role of smart contracts and intermediaries. Here, 89% of the Slovenian SMEs believed that blockchain technologies could eliminate the need for third parties. However, 13 respondents selected the "Neither" option. As for the increased verifiability, all the participants agreed with the statement. In contrast, the results of the sixth statement are a bit different. Even though the majority of the respondents still agree with the statement, 36% of them are undecided.

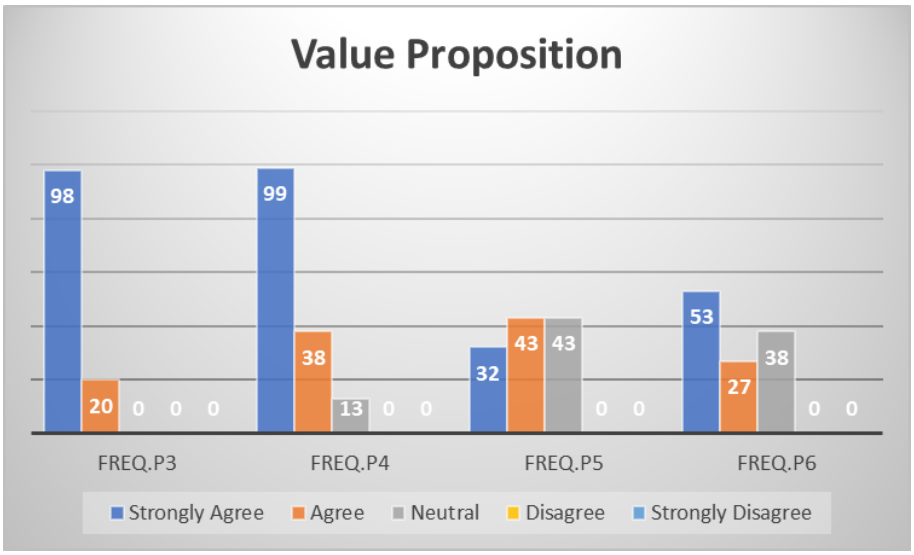

Figure 10 Statement Frequencies of Value Proposition (Source: Own creation)

As the Figure 10 shows, Slovenian SMEs see the potential of blockchain in transforming their value proposition. All the respondents agree with the statement that blockchain lowers the cost of transactions and enhances the verifiability of transactions. Regarding the need for intermediaries, most of the SMEs participating in the study agreed, but 11% of them were undecided. And lastly, regarding blockchain's ability to provide access to new products and services, even though there were no disagreements, 36% of the respondents selected the option "Neither."

4.1.3 Channels

P7: Blockchain establishes new channels of communication.

P8: Blockchain enables the developments of new APIs and SDKs.

Value Label	Value	Freq.P7	% P7	Freq.P8	% P8
Strongly Agree	1	98	83%	35	30%
Agree	2	18	15%	49	42%
Neutral	3	2	2%	34	29%
Disagree	4	0	0%	0	0%
Strongly Disagree	5	0	0%	0	0%

Figure 11 Result of Channels (Source: Own creation)

The results of the third building block of the canvas are in the high percentiles. Only 2% of the respondents were undecided with the seventh statement, while the rest agreed, with 83% selecting "Strongly Agree" and 15% selecting "Agree." In the eighth statement, there are results similar to statement six, where even though the majority agrees with the statement, a considerable share, in this case, 36% of the participants are undecided.

Therefore, the study participants mostly agree that blockchain technologies offer them new channels of communication. However, 29% of the respondents selected the option "Neither" in regards to the development of new APIs and SDKs.

4.1.4 Customer Relationship

P9: Blockchain allows for the automation of multiple processes in CRM.

P10: Blockchain introduces self-service options for many tasks in CRM.

P11: Blockchain enables enhanced transparency to the customers.

P12: Blockchain reduces the need for third-party service providers.

The results of the Customer Relationship block do show a certain level of disagreement. For the ninth statement, the share of the respondents that strongly support the statement and the share of those who feel neutral towards it is the same, 30%. Five of the companies that participated in the study did not agree with this statement. When it comes to statement 10, the majority of the respondents do not necessarily agree, with 39% feeling neutral and 15% disagreeing with it. The numbers are quite similar, with small variations regarding the next two statements.

Value Lable	Value	Freq.P9	% P9	Freq.P10	% P10	Freq.P11	% P11	Freq.P12	% P12
Strongly Agree	1	37	31%	9	8%	37	31%	26	22%
Agree	2	42	36%	45	38%	45	38%	42	36%
Neutral	3	34	29%	46	39%	29	25%	32	27%
Disagree	4	5	4%	18	15%	7	6%	18	15%
Strongly Disagree	5	0	0%	0	0%	0	0%	0	0%

Figure 12 Results of Customer Relationship (Source: Own creation)

It appears as though SMEs in Slovenia do not perceive the potential of blockchain for transforming their customer relationships as compared with the other blocks of the canvas. The share of the study participants that agreed with the statement is almost half. The results show even a notable share of the respondents disagreeing with the statements. However, this might be a result of the lack of information that some firms have in regards to the benefits that blockchain technology introduces to organizations.

4.1.5 Revenue Stream

P13: Blockchain introduces new options for crowdfunding.

P14: Blockchain increases recurring revenues via license agreements and subscriptions.

P15: Blockchain increases transaction revenues by eliminating the need for intermediaries.

P16: Blockchain can enable service revenues.

The results regarding the revenue stream block are quite diverse. In both statement thirteen and statement fourteen, less than the majority of the respondents agree with the statements, respectively 45% and 38%. On the other hand, the results of statement fifteen are interesting as all the participants agree with the statement. For the last statement of the revenue streams, 75% of the participants agree with the statement, 21% feel neutral, and only 3% are against it.

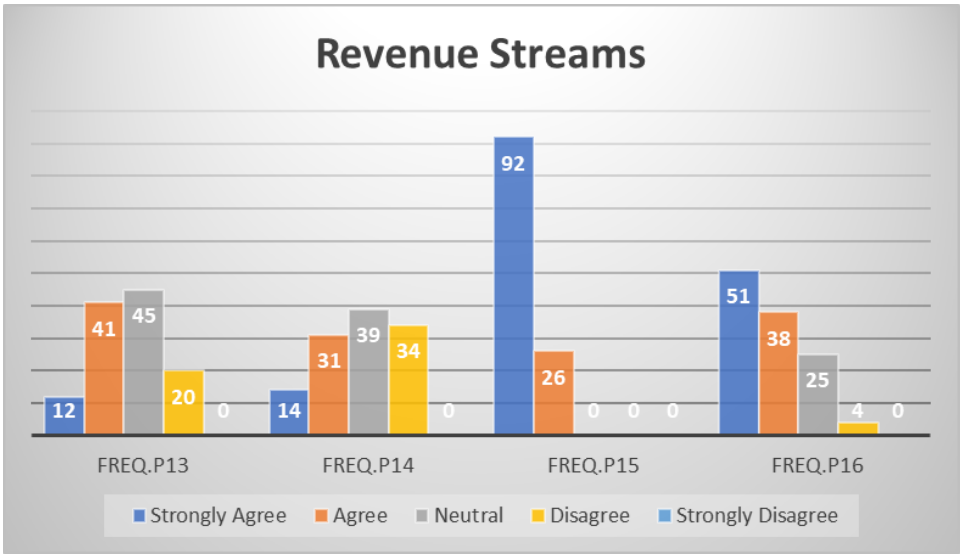

Figure 13 Statement Frequencies of Revenue Streams (Source: Own creation)

It seems that only a small share of the Slovenian SMEs see the potential of blockchain technologies in transforming a company's revenue streams. Even though all the study participants clearly understand the potential of blockchain to enable cheaper transactions, they do not appear to recognize the other revenue-boosting alternatives that this technology presents. As the results of the first two statements shows, less than half of the study participant believe that blockchain could provide new means of finance and recurring revenues.

Hence, it appears as Slovenian SMEs only know a fraction of the revenue enhancement opportunities that blockchain introduces. All of the companies recognized the increase in transaction revenues due to the elimination of intermediaries. Nevertheless, other sources of revenue are not very well established in their understanding of the technology.

4.1.6 Key Resources

P17: Blockchain enhances and facilitates the process of verification.

P18: Blockchain offers enhanced documentation practices.

P19: Blockchain significantly supports and makes audit easier.

Value Lable	Value	Freq.P17	% P17	Freq.P18	% P18	Freq.P19	% P19
Strongly Agree	1	26	22%	17	14%	23	19%
Agree	2	35	30%	61	52%	49	42%
Neutral	3	44	37%	22	19%	31	26%
Disagree	4	13	11%	18	15%	15	13%
Strongly Disagree	5	0	0%	0	0%	0	0%

Figure 14 Results of Key Resources (Source: Own creation)

As Figure 18 shows, the majority of the respondent agree with the three statements, and only a small share of them disagree. Statement eighteen and statement nineteen show a better acceptance compared to statement seventeen. In this block too, on average, 13% of the respondents did not agree with the statements. Thus, SMEs operating in the Slovenian market, in general, do agree with the fact that blockchain technologies facilitate the handling of documentation and reporting.

4.1.7 Key Activities

P20: Blockchain enables the establishment of peer-to-peer networks.

P21: Blockchain implementation is followed by a transformation of business processes.

Value Lable	Value	Freq.P20	% P20	Freq.P21	% P21
Strongly Agree	1	118	100%	102	86%
Agree	2	0	0%	16	14%
Neutral	3	0	0%	0	0%
Disagree	4	0	0%	0	0%
Strongly Disagree	5	0	0%	0	0%

Figure 15 Results of Key Activities (Source: Own creation)

The results of the Key Activities block are also very revealing. Regarding statement twenty, all the respondents strongly agree with the statement, with all participants selecting the option "Strongly Agree." Similarly, for statement twenty-one, all the respondents agree, but in comparison to the other statement, the respondents were divided 86% with the option "Strongly Agree," and 14% of them with "Agree."

As expected, all the companies participating in the study recognize the basic foundation of blockchain: providing peer-to-peer networks. At the same time, it appears that Slovenian SMEs do recognize the fact that blockchain technologies will transform business processes.

4.1.8 Key Partnerships

P22: Blockchain establishes tighter relationships within the supply chain.

P23: Blockchain provides improved data integrity.

P24: Blockchain facilitates payments within the supply chain.

P25: Blockchain can serve as shared network of communication in the supply chain.

P26: Blockchain reduces the time needed to conduct lengthy processes.

Even in the Key Partnerships block, the majority of the study participants agree with the five statements included in this section. However, there is a small fraction of the respondents that selected

the option “Disagree,” and in the last statement, nine respondents selected for the first time “Strongly Disagree.” Again at the last statement, there is a considerable share of the participants that selected the option “Neither.” Statement twenty-four is the most acceptable statement in this section, with 61% selecting “Strongly Agree,” 31% with “Agree,” and only 8% with “Neither.”

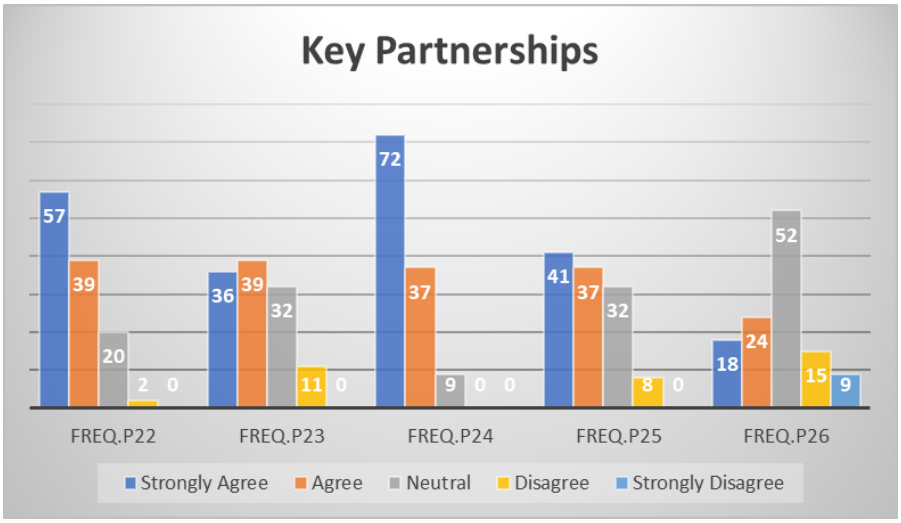

Figure 16 Frequencies of Key Partnerships (Source: Own creation)

As mentioned above, statement twenty-four holds the strongest agreement levels among the statements of this block of the canvas. While the other three statements show a pleasing level of agreement, in statement twenty-six, it appears that almost most of the participants are undecided. The firms participating in the study understand that the implementation of blockchain solutions establishes tighter relationships between the actors in a supply chain, by allowing for faster and cheaper transactions, new channels of communication between partners, and enhanced data integrity.

4.1.9 Cost Structure

P27: Blockchain reduces the costs of searching for resources.

P28: Blockchain reduces the cost of IT.

P29: Blockchain reduces transaction costs.

P30: Blockchain reduces negotiation costs.

P31: Blockchain increases the cost of software and personnel development.

The results of the last block vary significantly. Statement twenty-seven shows a level of agreement of 54%, statement twenty-eight shows only 8%, statement twenty-nine shows full 100%, statement

thirty has 68%, and statement thirty-one shows 86%. However, in contrast to what was expected, statement twenty-eight shows 71% of the respondents disagreeing with the idea that blockchain reduces the costs of IT. However, this might be a result of the high initial costs that are required in order to develop and implement a blockchain system.

Value Label	Value	Freq.P27	% P27	Freq.P28	% P28	Freq.P29	% P29	Freq.P30	% P30	Freq.P31	% P31
Strongly Agree	1	29	25%	2	2%	118	100%	53	45%	78	66%
Agree	2	34	29%	7	6%	0	0%	27	23%	24	20%
Neutral	3	42	36%	26	22%	0	0%	38	32%	16	14%
Disagree	4	13	11%	34	29%	0	0%	0	0%	0	0%
Strongly Disagree	5	0	0%	49	42%	0	0%	0	0%	0	0%

Figure 17 Results of Cost Structure (Source: Own creation)

As Figure 23 shows, Slovenian SMEs do recognize the cost savings enabled by blockchain in transaction and negotiation processes. However, they do not seem to understand the cost reductions that this technology presents to IT, since when such a system is in place, less human labor is required. On the other hand, they do understand that blockchain technology comes with additional costs in software development and personnel training.

4.2 Impacts of COVID-19 Inflicted Crisis

P32: Due to COVID-19, the company has suffered significant revenue cuts.

P33: Due to COVID-19, it has been harder to find access to financial services.

P34: Due to COVID-19, there have been many delays and interruptions in the supply chain.

P35: Due to COVID-19, it has been harder to find trustworthy partners and suppliers.

Value Label	Value	Freq.P32	% P32	Freq.P33	% P33	Freq.P34	% P34	Freq.P35	% P35
Strongly Agree	1	103	87%	28	24%	89	75%	76	64%
Agree	2	15	13%	42	36%	29	25%	29	25%
Neutral	3	0	0%	17	14%	0	0%	8	7%
Disagree	4	0	0%	31	26%	0	0%	5	4%
Strongly Disagree	5	0	0%	0	0%	0	0%	0	0%

Figure 18 Results of Crisis Effects (Source: Own creation)

The results of the third part of the questionnaire study are, in general satisfactory. Two of the statements have only “Strongly Agree” and “Agree” answers, while the other two have low levels of disagreement. Statement thirty-three appears to be the statement with the most unclear opinions and the larges level of disagreement.

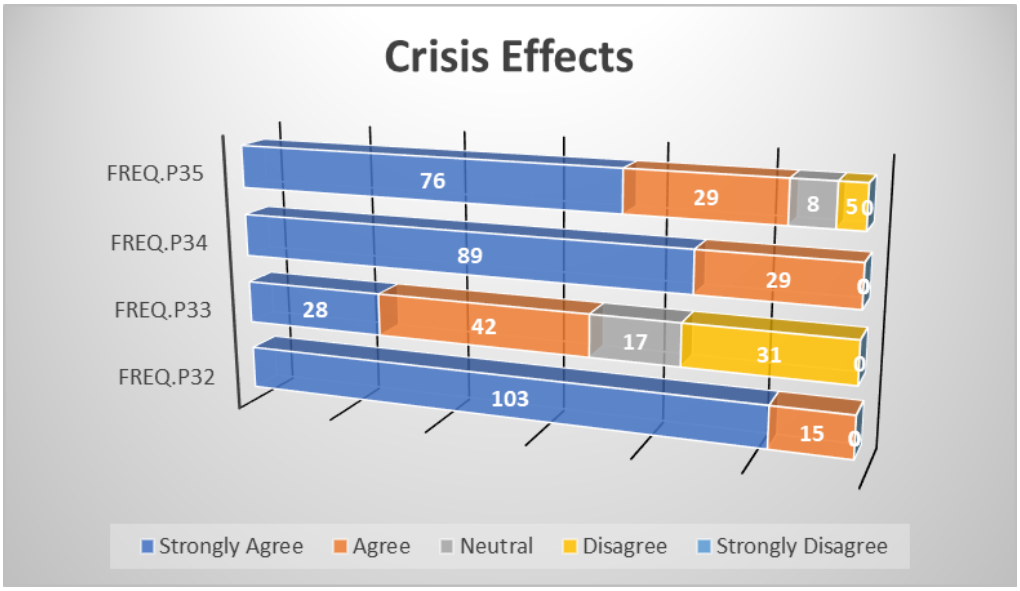

Figure 19 Frequencies of Crisis Effects (Source: Own creation)

Hence, Slovenian firms unanimously agree that due to the COVID-19 pandemic, they incurred significant revenue reductions. At the same time, for the majority of them, it was harder to find access to financial services during this period. Again, all companies stated that during the crisis, there are many delays and interruptions in supply chains. In addition, the results show that firms have it harder to find trustworthy partners and suppliers.

4.3 Firms with Blockchain Technologies

In order to provide additional insights into the differences of how companies that have or plan to implement blockchain in the near future perceive the benefits of blockchain compared to other companies, a Chi-square test was conducted. In order for the analysis to produced valuable results, the variables were transformed from five categories to only three categories. In other words, "Strongly Agree" and "Agree" were added together into one category, "Agree," and "Strongly Disagree" and "Disagree" were added together into "Disagree." By doing so, the new data file contains variables with only three categories "Agree," "Neither," and "Disagree." The full results of the analysis can be found in Appendix B.

This analysis showed that there is a clear relationship between blockchain implementation and the level of agreement with most of the statements. The p-values of the relevant statements (the p-value could not be calculated in the cases when all respondents selected the same responses), as seen in Figure 20, range from .000 to .532. However, the majority of the values are significant at $\alpha < 0.05$, indicating different perceptions between companies that use blockchain and those who do not.

Proposition	p-value
P1	.001
P2	.000
P3	n/a
P4	.094
P5	n/a
P6	.010
P7	.532
P8	.002
P9	.004
P10	.001
P11	.007
P12	.000
P13	.000
P14	.000
P15	n/a
P16	.025
P17	.000
P18	.003
P19	.001
P20	n/a
P21	n/a
P22	.075
P23	.002
P24	.171
P25	.003
P26	.000
P27	.000
P28	.000
P29	n/a
P30	.001
P31	.059

Figure 20 Chi-Square Test (Source: Own Creation)

The significance level of the Chi-square test does not provide any information in regards to the level of dependence between the two variables. It rather indicates if there is a significant difference between them or not. Hence in almost all statements, there is a relationship with whether the company has implemented (or plans to do so in the near future) blockchain and the understanding of the potential and benefits of this technology. As previously mentioned, for **P3**, **P5**, **P15**, **P20**, **P21**, and **P29,** no Chi-test could be conducted as all respondents selected the same answers.

The propositions to which all respondents agreed unanimously are:

P3: Blockchain enables quicker and cheaper transactions.
P5: Blockchain allows for enhanced verifiability.
P15: Blockchain increases transaction revenues by eliminating the need for intermediaries.
P20: Blockchain enables the establishment of peer-to-peer networks.
P21: Blockchain implementation is followed by a transformation of business processes.
P29: Blockchain reduces transaction costs.

In other words, it seems that the knowledge over blockchain that most firms hold is focused only on blockchains potential to create peer-to-peer networks for allowing transactions within a specific group of participants.

The statements that showed no significant difference between the groups are:

P4: Smart Contracts reduce the need of intermediaries.
P7: Blockchain establishes new channels of communication.
P22: Blockchain establishes tighter relationships within the supply chain.

P24: Blockchain facilitates payments within the supply chain.
P31: Blockchain increases the cost of software and personnel development.

In regards to these propositions, a significance value higher than .05 means that there is no significant relationship between firms that have implemented blockchain (or plans to do so) and those who have not. This can mean that both groups of respondents have the same understanding regarding these features of the technology. For **P4**, the p-value is .094 because most of the respondents agreed with the statement, and only 13 of them selected the option "Neither."[4] That is also the case for **P7**, with a p-value .532, where all respondents agreed, and only 2 of them selected the option "Neither."[5]

For **P22**, the p-value shows .075, which is close to .05, but not significant at this level. In this case, all the respondents with blockchain selected "Agree," while the other group of respondents was divided between the three options, with 77 selecting agreeing with the statement, 20 selecting "Neither," and 2 of them disagreeing. For **P24**, with p-value .171, it appears to be the same case as with **P4** and **P7**, where the majority of respondents from both groups selected the same option. That is also the case for **P31,** where all respondents agreed with the proposition, and only 16 of them selected the option "Neither."

Hence, except for the above-mentioned statements, it is clear that the companies that have implemented blockchain technologies or plan to do so in the near future have a better and more comprehensive understanding of blockchain. Their knowledge goes beyond the general understanding and belief of blockchain usage in financial services. To a certain extent, these firms are starting to properly understand the technology and its potential benefits, not only in regard to payments.

[4] Refer to the Value Proposition section of Appendix B
[5] Refer to the Channels section of Appendix B

5 Conclusions

It is clear that the critical mass adoption of blockchain technology has yet to be reached. Only a couple of the blockchain projects mentioned in this bachelor thesis have already moved from the pilot phase to full implementation. As the results show, in Slovenia, the majority of the firms seem to comprehend the vast opportunities that blockchain brings to organizations. At the same time, only 17% of the companies have adopted or are planning to adopt blockchain in their systems in the near future. The main purposes of these implementations are financial services, payments, asset trade (i.e., real estate), and goods tracking.

The firms did perceive the benefits of blockchain technologies in all the building blocks of the business model canvas. On average, they agree with the fact that the implementation of such technologies requires a complete transformation of an organization's business model and its processes. Therefore, this thesis argues that the business environment in Slovenia is ready to accept blockchain technologies. Nevertheless, there are several obstacles that could limit the mainstream adoption of blockchain technologies in the country.

For example, as the results of the Customer Segment show, not all firms believe that blockchain technologies could help them expand their customer base by acquiring and developing new customer segments. The same is true for the ability of blockchain to provide new products and services to the firms, seen on the Value Proposition section of the Results. In addition, companies mostly negate that blockchain has the potential to improve transparency for customers.

Another significant obstacle to the wide adoption of the technology is the belief that blockchains economic value is its ability to reduce or even eliminate transaction costs. The majority of the market participants seem to not understand the full potential and the many other revenue streams that blockchain has to offer. That is also the case in regards to the cost structure of an organization. Most Slovenian firms believe that transaction costs are the only cost reductions enabled by such technologies, forgetting to account for all the cuts in personnel, market research, and negotiation costs.

Finally, this thesis aimed at providing an estimated impact of blockchain technologies on organizations in times of economic slowdown and crisis. Therefore, the third part of the questionnaire was developed. The results of this section show that the main issues that companies face in such market environments are part of the solutions enabled by blockchain. This new technology paves the way to

finding solutions to all these issues, including an opportunity to save supply chains from COVID-19, with real-time tracking, smart contracts, etc.

5.1 Limitations and Outlook on Future Research

Even though the study managed to achieve a large number of respondents and provide valuable information regarding the blockchain perceptions of Slovenian SMEs, it serves only as the first step in constructing a clear image of the usage of this new technology. At the same time, judging from many of the responses of the companies that have not yet thought about implementing blockchain, many of such firms do not understand the potential that this technology could offer to their business.

In addition, since blockchain can be used for many different purposes, the beliefs about the technology could be shaped only by the particular uses that the respondents are familiar with. This was proved by the statements regarding the need for financial intermediaries and the reductions in transaction costs. Hence, a study where only the firms that have implemented blockchain or plan to do so in the future cloud provide significant value to the field. Furthermore, the firms could be grouped in categories depending on their field of operation and the purpose of blockchain usage. Such a study would provide clear and specific information.

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Appendix A

The Potential of Blockchain in Improving SMEs Performance & Implications in Times of Crisis

Introductory note

This survey serves as the primary research for my bachelor thesis at Modul University Vienna. The main purpose of the study is to investigate the state of blockchain technologies in the Slovenian market. In addition, it aims at identifying practices that support small and medium-sized firms in times of economic turbulence.

To complete the questionnaire, it does not take more than 20 minutes, as all the questions have predefined answers. Participation is voluntary, and the information collected is to be held responsibly and anonymous.

Thank you for participating

Part 1: General Information about your Company

Industry:

Financial Services
Transportation & Logistics
Commerce
Agriculture
Manufacturing
Retail
Education
Other

Size (number of staff):

0-5
6-10
11-50
51 – 100
>100

Has or does the company plan to implement blockchain technologies in the near future:

Yes
No

If yes, which of the following describes best the use of this technology in your company:

Facilitating Payments
Tracking Goods
Real Estate Acquisitions
Accessing Financial Services
Quality Control
Other

Part 2: Benefits of Blockchain Technologies in Transforming Business Models

*Blockchain technology is expected to significantly change the traditional ways of conducting business. Here are some of the main opportunities identified in various academic sources that supposedly this innovative technology offers to organizations.

(The questions of this section were developed based on the finding of Morkunas et al.,2019)

Instructions: Please indicate your level of agreement with the following statements.

Customer Segments

Blockchain enables companies to find new customer segments.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain allows companies to develop entirely new customer segments.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Value Proposition

Blockchain technology enables quicker and cheaper transactions.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

With the use of Smart Contract, organizations have less need for third parties serving as intermediaries.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain technologies offer enhanced verifiability.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

By implementing blockchain, organizations could benefit from access to new services and products.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Channels

Implementing blockchain technologies establishes new channels of communication.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain allows the development of new APIs and SDKs.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Customer Relationship

Blockchain allows for the automation of multiple processes in customer relationship management.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain introduces self-service options for many tasks that previously required human labor in CRM.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

In offers more transparency to the customer.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain reduces the need for third-party service providers.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Revenue Streams

Blockchain introduces new options for crowdfunding.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain enables or increases recurring revenues via license agreements and system subscriptions

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain improves transaction revenues as it eliminates the need for intermediaries.

Blockchain has the potential to increase service revenues.

Key Resource

Blockchain enhances and facilitates the process of verification.

Blockchain offers enhanced documentation practices.

Blockchain significantly helps and make audits easier.

Key Activities

Blockchain enables the establishment of peer-to-peer networks.

Blockchain implementation is followed by a transformation of business processes.

Key Partnerships

Blockchain creates tighter relationship within the supply chain

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain presents improved data integrity.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain facilitates payments to suppliers and partners.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain can serve as a shared network of communications between actors in the supply chain.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain reduces the time needed to conduct lengthy processes.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Cost Structure

Blockchain reduces the expenses of searching for resources.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain reduces Information Technology costs.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain reduces transaction costs.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain reduces negotiation costs.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Blockchain increased the costs of software and development personnel.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Part 3: Blockchain in Times of Economic Turmoil

Instructions: Please indicate your level of agreement with the following statements.

During the crisis inflicted by the COVID-19 pandemic, my company has suffered significant revenue cuts.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

During the crisis inflicted by the COVID-19 pandemic, it has been harder to find access to financial services.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

During the crisis inflicted by the COVID-19 pandemic, there were many delays and interruption in the supply chain.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

During the crisis inflicted by the COVID-19 pandemic, it proved harder to find trustworthy suppliers and partners.

1	2	3	4	5
Strongly Agree	Agree	Neither	Disagree	Strongly Disagree

Appendix B

1. Customer Segments

P1: Blockchain enables companies to find new customer segments.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	55	30	14	99
Total	74	30	14	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	13.47	2	.001	
N of Valid Cases	118			

P2: Blockchain enables firms to create entirely new customer segments.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	45	32	22	99
Total	64	32	22	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	19.11	2	.000	
N of Valid Cases	118			

2. Value Proposition

P3: Blockchain enables quicker and cheaper transactions.

Presence of Blockchain	Agree	Total	
Yes	19	19	
No	99	99	
Total	118	118	
Chi-square tests.			
Statistic	Value	Df	Asymp. Sig.
N of Valid Cases	118		

P4: Smart Contracts reduce the need of intermediaries.

Presence of Blockchain	Agree	Neither	Total
Yes	19	0	19
No	86	13	99
Total	105	13	118

Chi-square tests.			
Statistic	Value	df	Asymp. Sig.
Pearson Chi-Square	2.80	1	.094
N of Valid Cases	118		

P5: Blockchain allows for enhanced verifiability.

Presence of Blockchain	Agree	Total	
Yes	19	19	
No	99	99	
Total	118	118	
Chi-square tests.			
Statistic	Value	Df	Asymp. Sig.
N of Valid Cases	118		

P6: Blockchain presents new products and services to organizations.

Presence of Blockchain	Agree	Neither	Total
Yes	17	2	19
No	58	41	99
Total	75	43	118
Chi-square tests.			
Statistic	Value	df	Asymp. Sig.
Pearson Chi-Square	6.57	1	.010
N of Valid Cases	118		

3. Channels

P7: Blockchain establishes new channels of communication.

Presence of Blockchain	Agree	Neither	Total
Yes	19	0	19
No	97	2	99
Total	116	2	118
Chi-square tests.			
Statistic	Value	df	Asymp. Sig.
Pearson Chi-Square	.39	1	.532
N of Valid Cases	118		

P8: Blockchain enables the developments of new APIs and SDKs.

Presence of Blockchain	Agree	Neither	Total
Yes	19	0	19
No	65	34	99

Total	84	34	118
Chi-square tests.			
Statistic	Value	df	Asymp. Sig.
Pearson Chi-Square	9.17	1	.002
N of Valid Cases	118		

4. Customer Relationship

P9: Blockchain allows for the automation of multiple processes in CRM.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	60	34	5	99
Total	79	34	5	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	11.18	2	.004	
N of Valid Cases	118			

P10: Blockchain introduces self-service options for many tasks in CRM.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	16	3	0	19
No	38	43	18	99
Total	54	46	18	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	13.89	2	.001	
N of Valid Cases	118			

P11: Blockchain enables enhanced transparency to the customers.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	63	29	7	99
Total	82	29	7	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	9.94	2	.007	
N of Valid Cases	118			

P12: Blockchain reduces the need for third-party service providers.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	49	32	18	99
Total	68	32	18	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	16.65	2	.000	
N of Valid Cases	118			

5. Revenue Stream

P13: Blockchain introduces new options for crowdfunding.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	18	1	0	19
No	35	44	20	99
Total	53	45	20	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	22.77	2	.000	
N of Valid Cases	118			

P14: Blockchain increases recurring revenues via license agreements and subscriptions.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	26	39	34	99
Total	45	39	34	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	36.74	2	.000	
N of Valid Cases	118			

P15: Blockchain increases transaction revenues by eliminating the need for intermediaries.

Presence of Blockchain	Agree	Total
Yes	19	19
No	99	99
Total	118	118
Chi-square tests.		

Statistic	Value	Df	Asymp. Sig.
N of Valid Cases	118		

P16: Blockchain can enable service revenues.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	70	25	4	99
Total	89	25	4	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	7.38	2	.025	
N of Valid Cases	118			

6. Key Resources

P17: Blockchain enhances and facilitates the process of verification.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	42	44	13	99
Total	61	44	13	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	21.16	2	.000	
N of Valid Cases	118			

P18: Blockchain offers enhanced documentation practices.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	59	22	18	99
Total	78	22	18	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	11.61	2	.003	
N of Valid Cases	118			

P19: Blockchain significantly supports and makes audit easier.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	53	31	15	99

Total	72	31	15	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	14.47	2	.001	
N of Valid Cases	118			

7. Key Activities

P20: Blockchain enables the establishment of peer-to-peer networks.

Presence of Blockchain	Agree	Total	
Yes	19	19	
No	99	99	
Total	118	118	
Chi-square tests.			
Statistic	Value	Df	Asymp. Sig.
N of Valid Cases	118		

P21: Blockchain implementation is followed by a transformation of business processes.

Presence of Blockchain	Agree	Total	
Yes	19	19	
No	99	99	
Total	118	118	
Chi-square tests.			
Statistic	Value	Df	Asymp. Sig.
N of Valid Cases	118		

8. Key Partnerships

P22: Blockchain establishes tighter relationships within the supply chain.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	77	20	2	99
Total	96	20	2	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	5.19	2	.075	
N of Valid Cases	118			

P23: Blockchain provides improved data integrity.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	56	32	11	99
Total	75	32	11	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	12.98	2	.002	
N of Valid Cases	118			

P24: Blockchain facilitates payments within the supply chain.

Presence of Blockchain	Agree	Neither	Total
Yes	19	0	19
No	90	9	99
Total	109	9	118
Chi-square tests.			
Statistic	Value	df	Asymp. Sig.
Pearson Chi-Square	1.87	1	.171
N of Valid Cases	118		

P25: Blockchain can serve as shared network of communication in the supply chain.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	59	32	8	99
Total	78	32	8	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	11.61	2	.003	
N of Valid Cases	118			

P26: Blockchain reduces the time needed to conduct lengthy processes.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	23	52	24	99
Total	42	52	24	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	40.98	2	.000	
N of Valid Cases	118			

9. Cost Structure

P27: Blockchain reduces the costs of searching for resources.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	19	0	0	19
No	44	42	13	99
Total	63	42	13	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	19.77	2	.000	
N of Valid Cases	118			

P28: Blockchain reduces the cost of IT.

Presence of Blockchain	Agree	Neither	Disagree	Total
Yes	9	3	7	19
No	0	23	76	99
Total	9	26	83	118
Chi-square tests.				
Statistic	Value	df	Asymp. Sig.	
Pearson Chi-Square	50.91	2	.000	
N of Valid Cases	118			

P29: Blockchain reduces transaction costs.

Presence of Blockchain	Agree	Total	
Yes	19	19	
No	99	99	
Total	118	118	
Chi-square tests.			
Statistic	Value	Df	Asymp. Sig.
N of Valid Cases	118		

P30: Blockchain reduces negotiation costs.

Presence of Blockchain	Agree	Neither	Total
Yes	19	0	19
No	61	38	99
Total	80	38	118
Chi-square tests.			
Statistic	Value	df	Asymp. Sig.
Pearson Chi-Square	10.76	1	.001
N of Valid Cases	118		

P31: Blockchain increases the cost of software and personnel development.

Presence of Blockchain	Agree	Neither	Total
Yes	19	0	19
No	83	16	99
Total	102	16	118
Chi-square tests.			
Statistic	Value	df	Asymp. Sig.
Pearson Chi-Square	3.55	1	.059
N of Valid Cases	118		