UNIVERSITY OF TURKU

ABSTRACT

	Bachelor's thesis
X	Master's thesis
	Licentiate's thesis
	Doctoral dissertation

Subject	Futures Studies	Date	2.11.2023
Author	Enrico Sciurca	Number of pages	82+appendices
Title	Scanning the impacts of cryptocurrencies on the future of the Finnish banking sector		
Supervisors	Prof. Petri Tapio, Prof. Matti Mäntymäki		

Abstract

Cryptocurrencies popularity have increased during the last few years. This thesis aims in scanning the possible impacts of cryptocurrencies in the future of the Finnish banking sector during the next ten years by producing future scenarios.

A two rounded disaggregative policy Delphi study was conducted to gather experts' opinions on the topic. The first round of the Delphi process consisted of a survey that included qualitative and quantitative questions. The qualitative questions were open ended questions, and the quantitative questions asked the panellists their views on probable and preferred futures states on a numerical scale. The survey was made with literature regarding the topics of Finnish banking and cryptocurrencies. In addition, literature on the case of the European Central Bank launching its own virtual currency in the future was used in producing the survey. The results of the first survey were studied with a cluster analysis. The results of the cluster analysis were used to produce four images of the future that were commented by the experts in the second round of the Delphi process.

The results of the conducted Delphi study were used to produce three scenarios, the scenarios were created using the method of the futures table. The three final scenarios are "Business as usual", "Technological innovation" and "Decentralized movement".

Key words	Cluster analysis, cryptocurrencies, Delphi study, disaggregative Delphi, Finnish banking sector, futures studies, futures table, images of the future, scenarios.

TURUN YLIOPISTO

TIIVISTELMÄ

	Kandidaatintutkielma
X	Pro gradu -tutkielma
	Lisensiaatintutkielma
	Väitöskirja

Oppiaine	Tulevaisuudentutkimus	Päivämäärä	2.11.2023
Tekijä	Enrico Sciurca	Sivumäärä	82+liitteet
Otsikko	Selvitys kryptovaluuttojen vaikutuksista suomalaisen pankkisektorin tulevaisuuteen		
Ohjaajat	Prof. Petri Tapio, Prof. Matti Mäntymäki		

Tiivistelmä

Kryptovaluuttojen suosio on kasvanut viimeisten vuosien aikana. Tämän tutkielman tarkoitus on selvittää kryptovaluuttojen vaikutukset suomalaisen pankkisektorin tulevaisuuteen seuraavan kymmenen vuoden aikana.

Kaksiosainen erittelevää Delfoi-menetelmää käyttävä paneeli suoritettiin asiantuntijoiden näkemyksien keräystä varten. Ensimmäinen Delfoi-paneeli oli kysely, joka sisälsi kvalitatiivisia ja kvantitatiivisia kysymyksiä. Kvalitatiiviset kysymykset olivat rajaamattomia avoimia kysymyksiä. Kvantitatiiviset kysymykset esittivät panelisteille heidän näkemyksensä todennäköisestä ja toivotusta tulevaisuudesta numeerisilla asteikoilla. Kysely luotiin Suomen pankkisektorista ja kryptovaluutoista käsittelevän kirjallisuuden avulla. Lisäksi hyödynnettiin kirjallisuutta, joka käsitteli Euroopan keskuspankin mahdollisuutta lanseerata oma virtuaalivaluutta tulevaisuudessa. Ensimmäisen Delfoi-paneelin vastaukset analysoitiin klusterianalyysillä. Klusterianalyysin tulokset käytettiin neljän tulevaisuuskuvan luomiseen. Asiantuntijat kommentoivat tulevaisuuskuvia Delfoi-paneelin toisessa osassa.

Tulokset, jotka saatiin suoritetusta Delfoi-paneelista, toimivat pohjana kolmelle skenaariolle. Skenaariot luotiin tulevaisuustaulukkomenetelmällä. Luodut kolme skenaariota nimettiin seuraavasti: ”Normaalia liiketoimintaa”, ”Teknologista innovaatiota” ja ”Hajautettu liike”.

Avainsanat	Delfoi-paneeli, erittelevä Delfoi, klusterianalyysi, kryptovaluutat, Suomen pankkisektori, skenaariot, tulevaisuuskuvat, tulevaisuustaulukko, tulevaisuudentutkimus.

UNIVERSITY OF TURKU
Turku School of Economics

SCANNING THE IMPACTS OF CRYPTOCURRENCIES ON THE FUTURE OF THE FINNISH BANKING SECTOR

Three scenarios

Master's Thesis
in Futures Studies

Author:
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2.11.2023
Turku

The originality of this thesis has been checked in accordance with the University of Turku quality assurance system using the Turnitin OriginalityCheck service.

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1 INTRODUCTION

1.1 Significance of the research

The aim of this dissertation is to scan the possible impacts of cryptocurrencies in the future of the Finnish banking sector during the next ten years by producing future scenarios. This topic was chosen to be researched since cryptocurrencies popularity have increased during the last few years and because Finnish banks currently do not implement cryptocurrencies in their products portfolios.

Mäntymäki et al. (2020) discussed that the topic of cryptocurrencies and its possible future impacts on the economy have been widely discussed between scholars. In addition, cryptocurrencies have already started to challenge the position of central banks and could be seen as a disruptive alternative.

This thesis will describe how the novel information regarding the possible impacts of cryptocurrencies on the future of the Finnish banking industry was developed with the data gather by a two rounded disaggregative policy Delphi study (Tapio 2003). The Delphi process was used to gather experts' opinions on the researched topic. The conducted Delphi study will be described in detail in this paper.

The following sections of this chapter will introduce the reader to the significances of this research. In addition, the two research questions that this dissertation will try to answer will be described in detail. Finally, the structure of the thesis will be shortly illustrated.

Futures studies can help people and organisations to tackle a changing world and to achieve their mutual benefit (Masini 2006). As described in the section before this topic was chosen because the increasing interest of the public in cryptocurrencies and because cryptocurrencies and its technology are still a novel topic in the Finnish financial industry.

The objective of this dissertation is to scan the possible impacts of cryptocurrencies in the future of the Finnish banking sector with the productions of scenarios. The scenarios were produced with the conduction of a disaggregative policy Delphi and other futures studies methods. The different methods will be described in detail in this dissertation. It was decided to use multiple methods since it could be beneficial when producing scenarios and when conducting a Delph study. (Tapio et al. 2011)

When this thesis was written the author of this paper did not find any publication with the same topic and methods used. For this reason, this dissertation will provide novel knowledge regarding the topic studied.

1.2 Research questions

As discussed before in the introduction part of this chapter the aim of this research is to study the impact of cryptocurrencies in the future of the Finnish banking sector in a period of approximately ten years. This study uses the method of exploratory research that aims to produce new information (Swedberg 2020, 17). In this study the new material produced will be images of the future and scenarios. The research questions of this study are exploratory questions. Two research questions were developed to guide the study. The two research questions are:

- What will be the payment methods and currencies of the euro zone in the year 2035?
- What impacts cryptocurrencies will have on the Finnish banking industry by the year 2035?

The research questions will be answered with the production of three future scenarios. The scenarios were produced with the results of a two rounded disaggregative policy Delphi study.

1.3 Structure of the dissertation

This thesis follows a general structure of a master's level academic dissertation. The first chapter that was described in the sections before functioned as the introductions of this thesis explaining the objective of the research conducted and explaining in detail the research questions. The following chapter, chapter 2, briefly describes the theoretical context of the Finnish banking sector, cryptocurrencies, and analyses papers on a possible regulated virtual currency launched by the European Central Bank (ECB).

Chapter 3 illustrates the methods used in this research. Since this research uses many methods, it was crucial to describe every method used in detail. Chapter 4 describes how the data for this research was collected. The chapter describes as much in detail as possible the conducted two rounded Delphi process from how the experts for the panel were selected to the analysis of results of the second Delphi round. Chapter 5 describes how the final three future scenarios were produced in detail.

Finally, the last part of this thesis, chapter 6, provides the answers to the research questions, describes any limitation in this study and possible recommendations for future research.

2 RESEARCH BACKGROUND

In this chapter of this dissertation, the reader could find short literature reviews on the Finnish banking sector and cryptocurrencies. In addition, the reader could find a short description on the state of a possible ECB issued virtual currency.

This theoretical framework was written after making an environmental scanning of articles and books related to the three topics discussed above (Gordon & Glenn 2009).

The findings made from the environmental scanning process and the findings made while writing this chapter was used to make the first survey for the Delphi study (Appendix 3).

2.1 The Finnish banking sector

Finnish banks are under the jurisdiction of the Bank of Finland. The Bank of Finland acts as the central bank in Finland, and it is part of the ECB. The ECB oversees the monetary policy of the countries in the euro zone, and it manages the second major currency in the world, the Euro (EUR). (Bank of Finland 2023a) The Euro is a type of fiat money used in the euro zone. Friedman (2001) defines that fiat money are governmental issued currencies that are not backed by physical goods, such as gold. Their value is in accordance with the supply and demand in the market and on the public trust on the issuing government.

The Finnish banking sector is a significant industry and in January 2023 the deposit in Finnish financial institutions amounted to 115,11 billion EUR (Euro Area Statistics 2023a) and Finnish households and companies have taken loans to a total of 145,34 billion EUR (Euro Area Statistics 2023b).

Banks in Finland must perform according to the rules and laws produced by the ECB and the institution that is responsible to supervise Finnish banking performances is the Financial Supervisory Authority (Financial Supervisory Authority 2023). The banking market in Finland is characterized by having few major players in it. For example, the following banks “OP Ryhmä” and “Nordea” manage more than 50% of the banking market together (Bank of Finland 2023b).

DeVries (2016) argues that current financial institutions are constructed with technologies that do not support cryptocurrencies and are built for current type of fiat money. This means that for example in the Finnish financial systems for cryptocurrencies to be used for regular payments, the virtual coins need to be changed to fiat money to be used.

Stulz (2019) claims that unlike regular banks, Fintech companies have advantages when it comes to adopting new technology. This could be a competitive advantage for Fintech companies to enter the Finnish financial market if consumers will start to adopt cryptocurrencies in a larger scale.

2.2 Cryptocurrencies

"Growing attention has been paid to cryptocurrencies in the academic literature, discussing whether they are supposed to disrupt the economy or are a speculative bubble which could crash and burn or favor money laundering and criminals. In support of the first view, it is often argued they meet a market need for a faster and more secure payment and transaction system, disintermediating monopolies, banks and credit cards. Critics, on the other hand, point out that the unstable value of cryptocurrencies make them more a purely speculative asset than a new type of money." (Giudici et al. 2020)

Mahajan and Sharma (2021, 1) provide a definition on what are cryptocurrencies: "A cryptocurrency, cryptocurrency, or crypto is a binary data designed to work as a medium of exchange wherein individual coin ownership records are stored in a ledger existing in a form of a computerized database using strong cryptography to secure transaction records, to control the creation of additional coins, and to verify the transfer of coin ownership.".

Jiang et al. (2021) describe that cryptocurrencies have benefits compared to fiat currencies, such as decentralized transactions, auditability, and anonymity.

Cryptocurrencies have three characteristics:

- Morton (2020, 129-130) argues that cryptocurrencies are decentralized, cryptocurrencies transitions go through a peer-to-peer network in opposition to regular fiat currencies transitions that go through a central authority, such as banks.
- The fact that cryptocurrencies are decentralized provide the currency with its second characteristic of being unregulated.
- In contrast to fiat currencies that can be digital and physical, cryptocurrencies occur only on digital form.

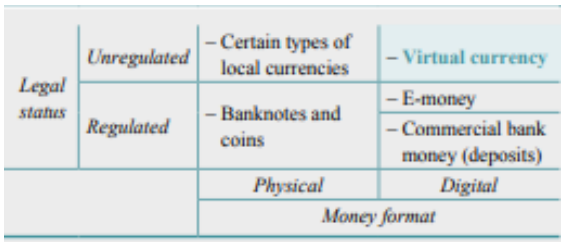

Figure 1 Money matrix (adapted from European Central Bank 2012, 11)

The fact that cryptocurrencies are unregulated and decentralized has created some debate on the fact that cryptocurrencies could be use by criminals. Neel Kashkari, the president of the US Federal Reserve Bank of Minneapolis said, "Cryptocurrency is 95% fraud, hype, noise and confusion" (DeCambre 2021). In addition, Brenig and Müller (2015) argues that individual criminals could benefit from cryptocurrencies as a money-laundering tool.

In addition to the three characters of cryptocurrencies explained above, one undesirable characteristics of cryptocurrencies is high price volatility (Saleh 2018). From Figure 2 the reader could see the price volatility of Bitcoin (Statista 2023a). The reader could clearly see that the "boom" happened during 2021, during that year the price of Bitcoin reached its peak. In addition, the first survey was made during March 2022 and during that period Bitcoin price was around 47 000 $. When the second survey of the Delphi process was performed, in November 2022, the price of Bitcoin was as low as 16 000 $. During the year 2023 the value of Bitcoin has again gone up and have been under 30 000 $.

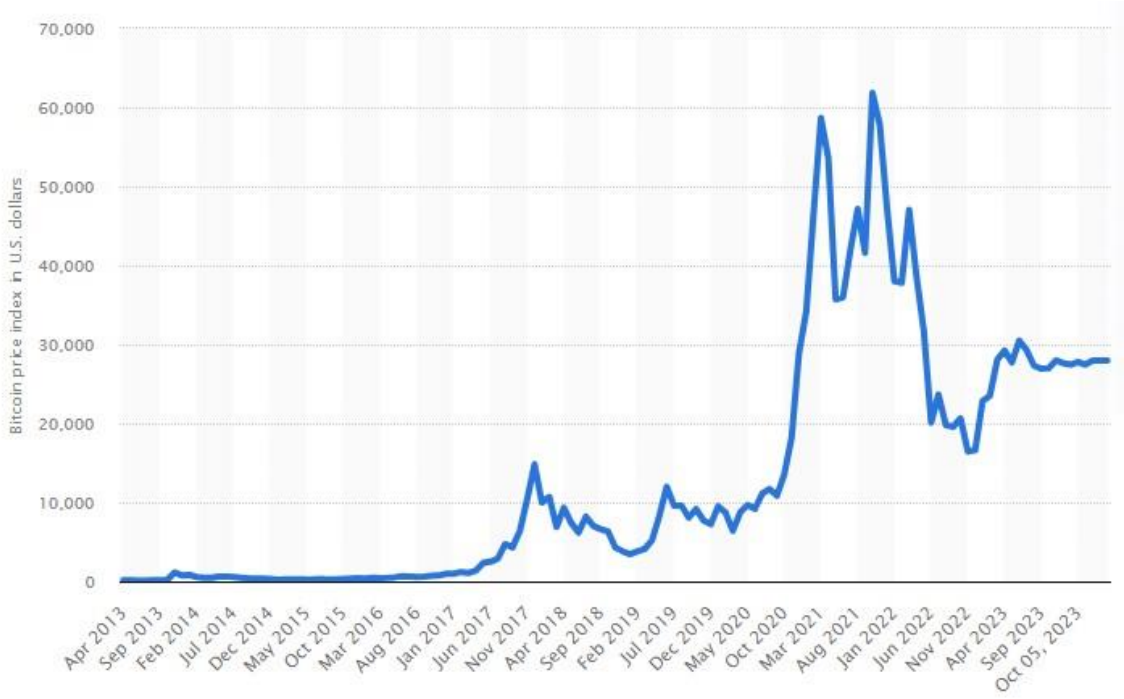

Figure 2 Bitcoin (BTC) price from April 2013 to October 2023 (adapted from Statista 2023a)

From Figure 3 the reader could see the price volatility of Ethereum (Statista 2023b). Similarly, to the price chart of Bitcoin before, Ethereum prices' level high was reached during fall of 2021. In addition, during the first round of the Delphi process that was performed in March 2022 Ethereum price was around 3 300 $. When the second round of the Delphi process was performed, in November 2022, the price of Ethereum was around 1 200 $. During the year 2023 Ethereum price has gone up to almost 2 000 $.

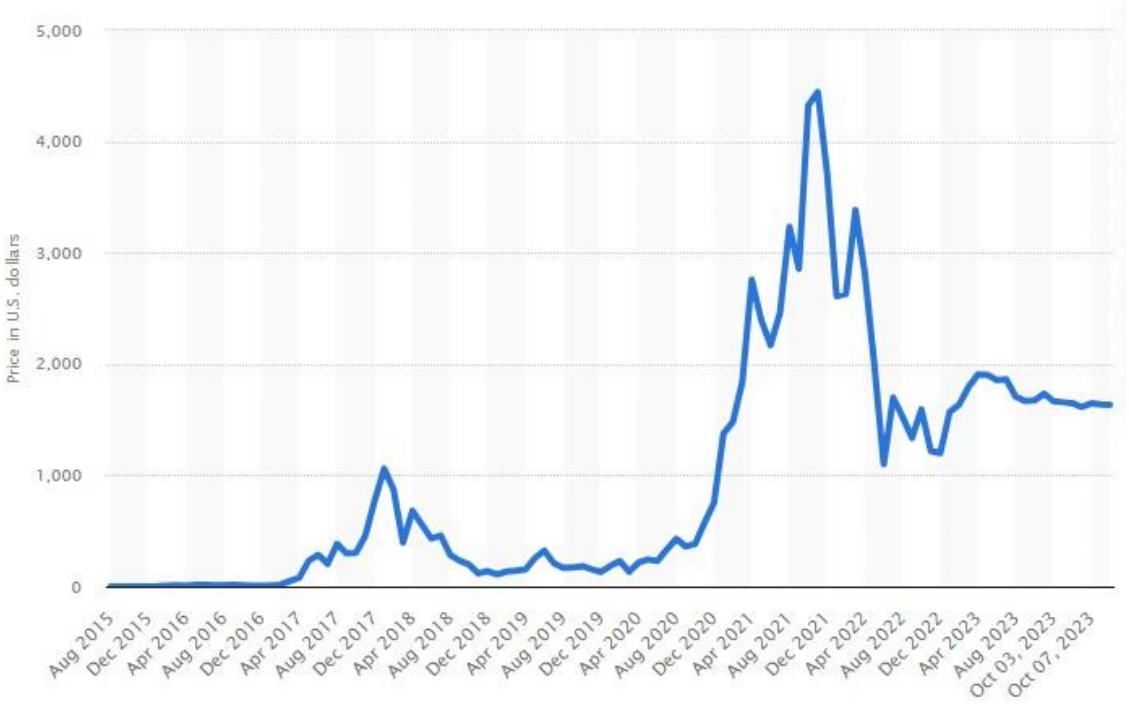

Figure 3 Ethereum (ETH) price from August 2015 to October 2023 (adapted from Statista 2023b)

From Figure 4 the reader can find the Euro to Dollar exchange rate from the last 24 years. As the reader can see also this figure shows volatility.

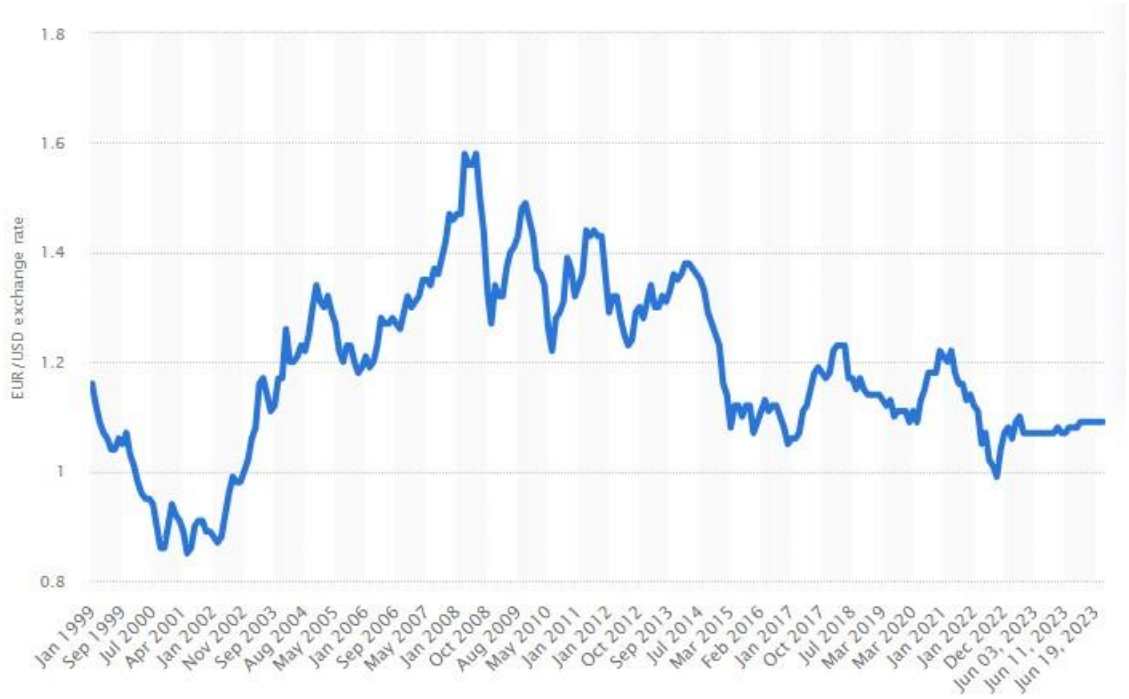

Figure 4 Euro (EUR) to U.S. dollar (USD) exchange rate from January 1999 to June 2023 (adapted from Statista 2023c)

Regular fiat currencies' data are listed in banks' servers and databases. Cryptocurrencies use blockchain. A blockchain is practically a list of blocks, in which the first block contains the information on the cryptocurrency's coin. For example, who has bought the coin, the previous owner of the coin, the current number of coins on the market, how many new coins have been listed and who holds them. The second block will have the same information of the first one plus new information on the newly listed coins. The third block will have the same information of the previous one and the information on the new coins and so on. In addition, the digital information on blockchains is not stored on a single site. For these reasons the information is simple to be verified. (Suciu et al. 2018)

Cryptocurrencies use proof-of-work and proof-of-stake mechanisms to securely validate its coins. The proof-of-work process necessitates validators (miners) to consume a certain amount of computing power to validate transactions. For example, Bitcoin uses the proof-of-work mechanism. The proof-of-stake process do not require validators to operate based on the amount of computing energy they use. Instead, validators are chosen in based of their share on a specific cryptocurrency. The proof-of-stake is less energy consuming and used for example from Cardano. (Schinckus 2021). In addition, Ethereum is currently shifting from proof-of-work to proof-of-stake (Kapengut & Mizrach 2022).

The environmental impact caused by the method of proof-of-work used by cryptocurrencies have been debated in media and between scholars. Badea and Mungiu-Pupăzan (2021) argues that the impact that Bitcoin mining have had on the environment have caused the European Commission to start monitor their energy consumption. In addition, Badea and Mungiu-Pupăzan (2021) states that "Bitcoin transactions are worrying not only from the perspective of electricity consumption, but also from the perspective of greenhouse gas emissions. There are rumors that all cryptocurrencies would "pose a serious threat to the global commitment to mitigate greenhouse gas emissions under the Paris Agreement".

Claeys et aneed018) argues that for cryptocurrencies to replace fiat currencies three challenges needs to be overcome. The supply of cryptocurrencies would need to benefit the economy. In addition, the number of cryptocurrencies would need to respond to possible banking reserve crises to protect financial stability. Moreover, cryptocurrencies holders and issuers should be made accountable, and this is in contrast with current cryptocurrency systems that rely on anonymity. DeVries (2016) believe cryptocurrencies will not replace fiat currencies, but they will change the way global markets will interact and they will start a change on how exchange rates and fiat currencies work. Furthermore,

cryptocurrencies and the blockchain technology could increase transaction volumes worldwide, lower its costs and increase the quality of global financial services (Giudici et al. 2020).

If the public will vastly adopt cryptocurrencies, even if their nature is to be decentralized, central banks and financial institutions will need to try to adopt them in the future. This will be necessary if significant figures will be invested by the public and companies in cryptocurrencies. (Dorofeyer et al. 2018)

Finally, cryptocurrencies could be seen as a threat for central banks around the world, because cryptocurrencies' technology and its wider use in the future could lower the supremacy of central financial institutions, such as the European Central Bank, in the economy (Mäntymäki et al. 2020)

2.3 European Central Bank issued virtual currency

A variety of questions should be answered by scholars and policy makers when addressing the issue of a central bank issued virtual currency. First, should financial laws and regulations be modified to address the cryptocurrencies' technology? Second, why some governments are interested in entering the cryptocurrencies market? Third, what are the advantages and disadvantages of having a central bank issued digital currency? Will a central bank issued regulated virtual currency bring stability to the economy or will it endanger the current financial system? Finally, is it necessary to the ECB to issue its own virtual currency? (Ferrari 2020)

Umar and Gubareva (2020) argues that during time of crises, such as the Covid 19 pandemic, all type of currencies are impacted by it and policy makers and governments need to develop strong solutions to handle such crises.

One solution to stabilize the economy and protect the public is to have a regulated and central bank issued virtual currency. The ECB is considering launching its own digital currency and its slogan for it is "A digital euro would provide an anchor of stability for our money in the digital age.". (European Central bank 2023)

Other countries and central banks are investigating the possibility of issuing a central bank digital currency. For example, the Swedish central bank (Sveriges Riksbank) is exploring the possibility of having a digital e-krona (Sveriges Riksbank 2023).

Kiff et al. (2020) argues that having a regulated central bank issued virtual currency could pose potential risks, such as obstructing monetary policies and competing with fiat money bank deposits. Kow et al. (2017) in the other hand argues that digital money could

support the economy by easing transactions and giving more users the ability to pay electronically.

Finally, Srokosz and Kopciaski (2015) discusses that cryptocurrencies, and especially their nature of being decentralized and distant from the control of central banks, are gaining support. For these reasons central banks should at lists start to investigate their options on issuing a centralized virtual currency.

3 RESEARCH METHODS

Popper (2008, 45-51) defines the foresight procedure of having five phases, these phases are "pre-foresight", "recruitment", "generation", "action", and "renewal". This study uses four futures studies methods: the Delphi method, futures table, images of the future and the scenario method. The different methods will be explained in detail in this chapter.

Futures studies methods can be described as using "expertise", "creativity", "interaction" and "evidence" to produce finding. In addition, different methods use quantitative, qualitative, and mixed approach to gather information. (Poli 2018, 5)

From Figure 5 the reader could find where the methods used in this dissertation allocate in the "Foresight Diamond".

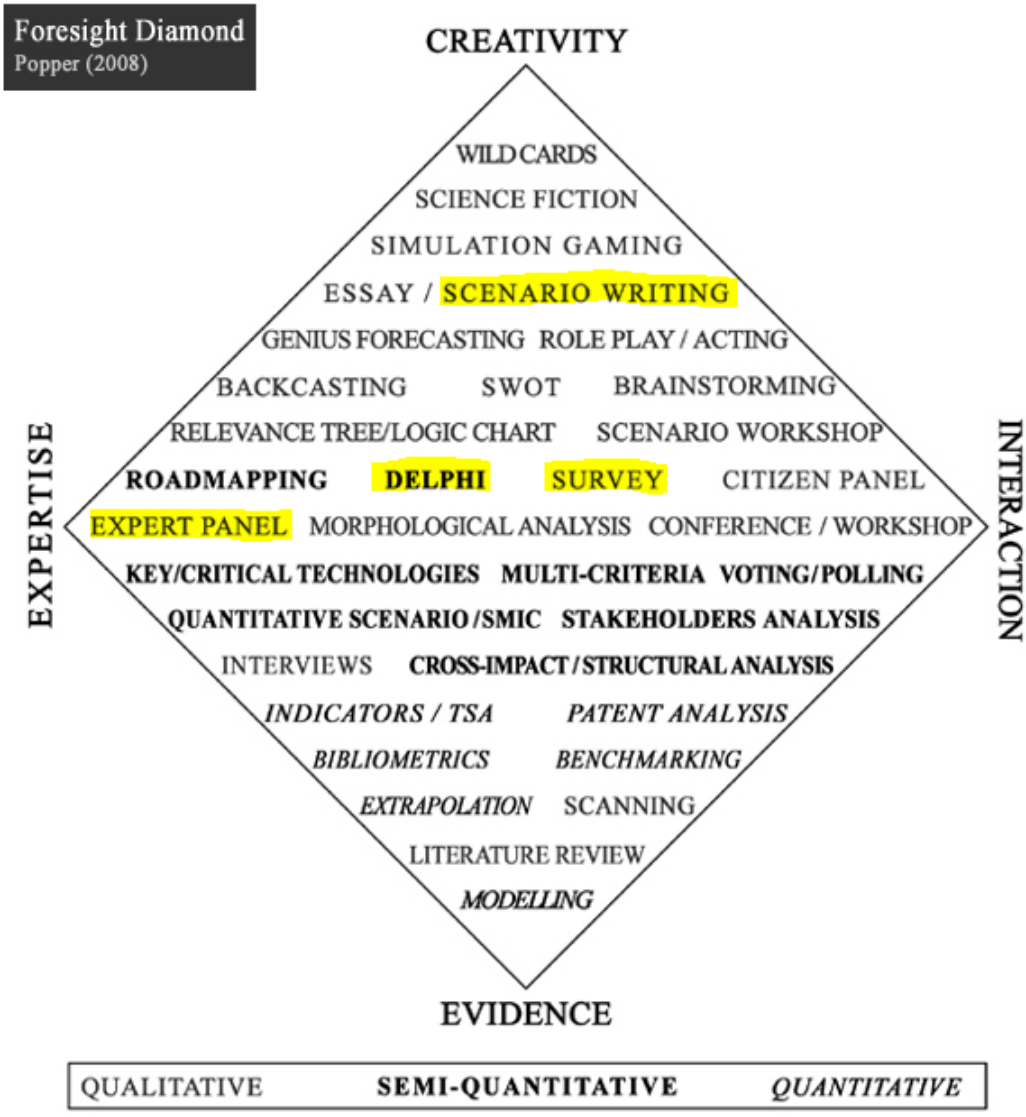

Figure 5 Foresight Diamond (modified from Poli 2018, 5)

3.1 Delphi method

“For, if anything is "true" about Delphi today, it is that in its design and use Delphi is more of an art than a science.” (Linstone & Turoff 2002, 3).

This section will describe the history and characteristics of the Delphi method. In addition, some critics regarding the subject will be covered. In the next section the disaggregative policy Delphi will be explained and how it differs from the traditional Delphi method.

Tapio et al. (2011) describe that a variety of methods could be used to produce images of the future or scenarios. One of these methods is the Delphi method. The Delphi method has been used in many public and private research, since the 1950s when the method was created by Olaf Helmer, Ted Gordon, Norman Dalkey, and professionals in the United States Air Force (Linstone & Turoff 2011). The traditional Delphi method consists in gathering a group of experts to discuss and reach consensus on a certain future’s topic. The experts, usually called panellists, are kept anonymous during a study. The anonymity of the experts for the entire research process is of the key elements of a Delphi process. In addition, usually the topic is discussed in multiple rounds of an experts panel. Furthermore, for a Delphi study to work properly and to produce successful results the selection of experts needs to be carefully planned. (Gordon 1994; Linstone & Turoff 2002)

In many research papers where the Delphi method was used, it was used in combinations with other foresight techniques. Rowe and Wright (2011) argue that a researcher will benefit the most form the Delphi method when it is used in combination with other foresight techniques.

One recent example on how the Delphi method have been used in a financial topic is the “Preventing the money laundering and terrorist financing risks of emerging technologies: An international policy Delphi study” from Akatura et al. (2022). The paper and especially the process and steps of making the Delphi study shows a great example on how the method could be used. Figure 6 shows how the Delphi process was conducted in that specific study.

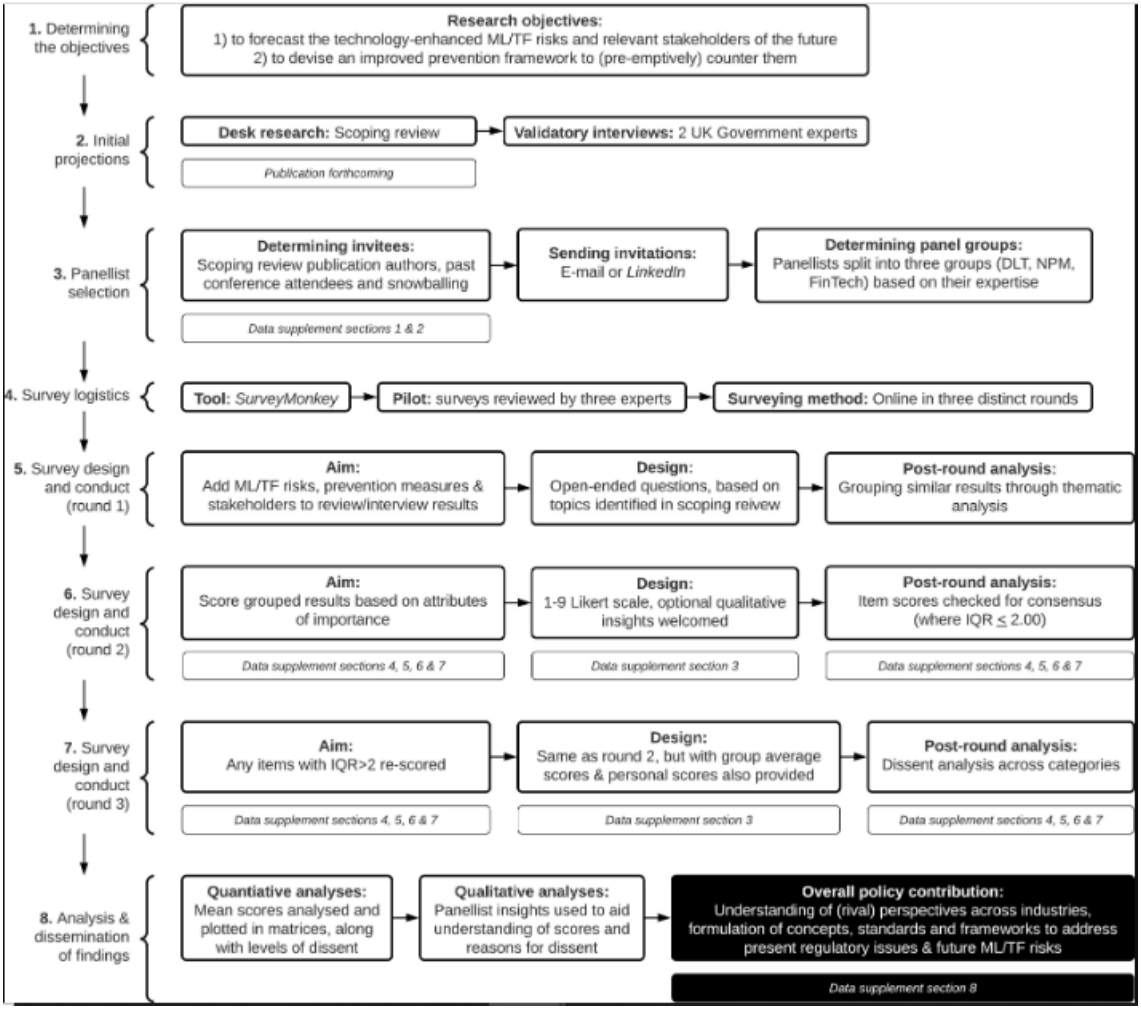

Figure 6 Example of a flowchart showing a Delphi process (adapted from Akartuna et al. 2022)

The Delphi method was used in this study because it is a foresight method that gives freedom of operation to the researcher (Linstone & Turoff 2002). At the beginning of the research process the structure of the first round of the Delphi study was clear. The first survey consisted of quantitative and qualitative questions asking the experts on their opinion on probable and preferred futures states of different financial topics. After the first survey was conducted the second survey included four images of the future, that were produced while analysing the first panel's answers, that the experts could comment. In addition, there is no fixed number of experts required to conduct a Delphi study (Linstone & Turoff 2002). However, a Delphi process should have at least two rounds (Linstone & Turoff 2002). The results of the Delphi study will be analysed further in this report and three scenarios were developed. The use of the scenario method with a Delphi process is advised from scholars, such as Nowack et al. (2011).

One critique to the Delphi method is that often the selection of the experts is made poorly and by selecting experts too connected professionally between each other (Tapio 2003). In this study this issue was tackled by producing an expertise matrix in selecting the experts. In addition, the experts were selected from different backgrounds. More about the panellist that contributed to this study can be found in chapter 4.1.

Another critique to the Delphi technique is inadequately produced questionnaire. Tapio (2003) argue that history of the Delphi method is full of examples of poor questionnaires. This aspect was avoided by studying literature of the topic of this dissertation to produce the questionnaires. In addition, the questionnaire was tested with the supervisors of this thesis before it was sent to the experts to be answered.

Finally, a critique to the Delphi method is that it is time consuming. An expert should plan carefully in advance every step before undertaking a Delphi study (Gordon 1994).

3.2 Disaggregative policy Delphi

The material used in this study were gathered and analysed using the disaggregative policy Delphi. This method will be described in this section of the paper.

Where traditional Delphi aims to reach consensus between the experts in a panel using multiple rounds of questionnaires and/or interviews (Linstone & Turoff 2002), the disaggregative policy Delphi does not aim to reach consensus. This method as can be visualised from Figure 7 accepts that experts will have different opinions and with the use of cluster analysis a researcher could group experts' similar views on a certain topic together. Withing different groups of panellists with similar ideas a researcher can then produce for example different scenarios or images of the future. (Rikkonen & Tapio 2009)

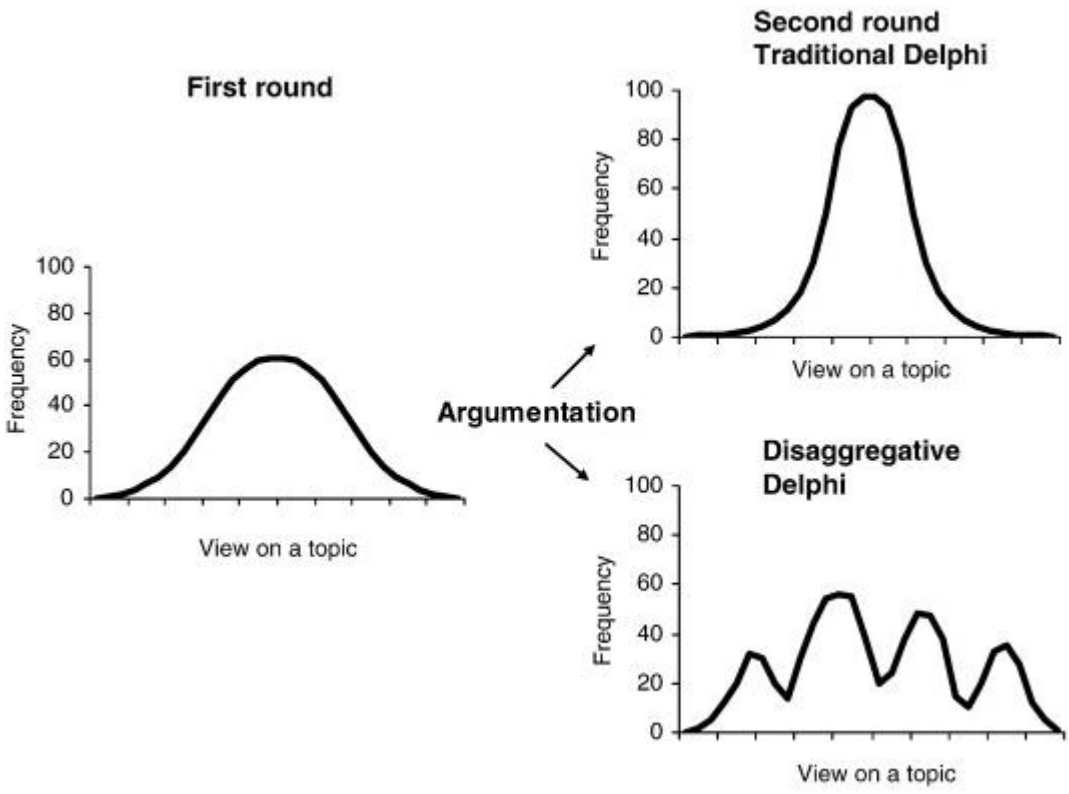

Figure 7 Traditional Delphi method compared to the Disaggregative policy Delphi method (adapted from Rikkonen & Tapio 2009)

Tapio (2003) describes this method and the word "disaggregative" in the following way: "'Disaggregative' here means that the goal of consensus is not adopted but the responses are grouped to several clusters by using cluster analysis as a systematic tool for grouping the core quantitative variables.". The cluster analysis process groups the quantitative data gathered from a Delphi process. The qualitative answers will be connected to the clusters in which they belong, and the qualitative data will help a researcher in creating images of the future or scenarios. (Tapio 2003)

A critical issue in the disaggregative policy Delphi method is determining how many clusters will be used (Varho & Tapio 2005). However, Tapio et al. (2007) argue that when analysing data with cluster analysis the final number of clusters selected is not as important as the process in which the cluster analysis was done. The clusters analysis will be covered in the next chapter of this dissertation.

Tapio et al (2011) argue that opposed to traditional views in which qualitative and quantitative analysis should not be combined, a combination of cluster analysis of the quantitative data and qualitative analysis could benefit researchers when producing

images of the future or scenarios. Moreover, Tapio et al. (2011) describes that qualitative and quantitative approaches have been used in both "formal" and "heuristic" studies.

3.3 Futures table

The futures table (in Finnish: tulevaisuustaulukko) was developed by Yrjö Seppälä in the 1980s as a method to produce images of the future (Sormunen & Seppälä 1985).

The futures table is a practical tool that helps researchers in producing scenarios or images of the future. An example of a futures table can be viewed in Figure 8. In a futures table on the left column different variables or drivers are written, this phase is the first one made by a researcher and will drive the futures table process. For each variable or driver different futures states are added. Futures states are usually gathered during a futures workshop, a Delphi study, interviews, or surveys. After the table have been produced the researcher will connect different futures states, one per row, with similar values. At the end scenarios or images of the future will be produced combining the similar future states. (Lauttamäki 2014)

When deciding the variables or drivers of a futures table PESTLE categories (Political, Economic, Social, Technological, Legal and Environmental) could be used (Cheverton 2004, 72; Tapio et al. 2013). In addition, one way of gathering information to a futures table is from experts' views on the field that is studied (Mansikkamäki 2006). The lines made in a future table to create images of the future or scenarios are called "future paths" (Sääskilahti et al. 2005).

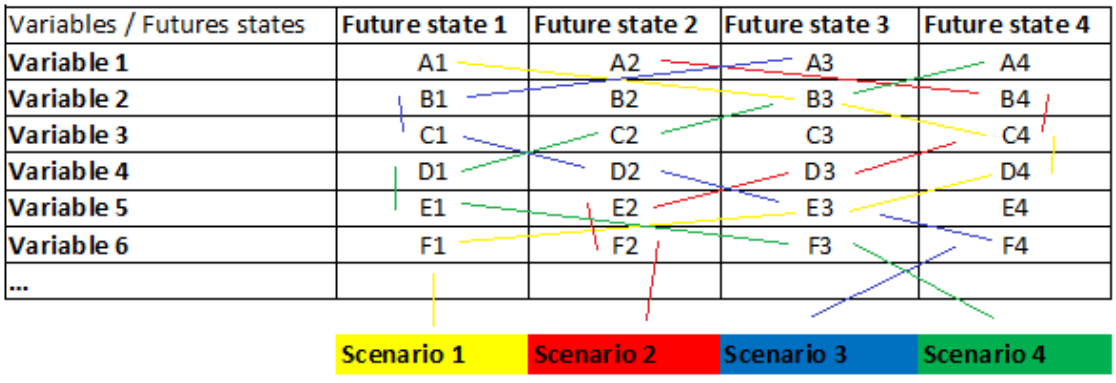

Figure 8 Example of a Futures table (modified from Lauttamäki 2014, 8)

In the example above the different scenarios are produced by combining the different future states of the different variables in the following way:

- Scenario 1: A1+B3+C4+D4+E3+F1.
- Scenario 2: A2+B4+C4+D3+E2+F2.
- Scenario 3: A3+B1+C1+D2+E3+F4.
- Scenario 4: A4+B3+C2+D1+E1+F3.

3.4 Images of the future

Images of the future were used in this study during the second round of the Delphi process. From the panellists' answers to the first survey four images of the future were produced. Rubin and Linturi (2001, 269) gives the following description of what images of the future are: "The images of the future are mental tools that deal with possible future states. They are composed of a mixture of conceptions, beliefs and desires and they affect human choices and steer decision-making and actions."
Images of the future are personal views of future states of an issue. The concept of images of the future was first introduced by Fredrick Polak to understand the rise and fall of civilisation and to describe future utopias (Morgan 2002). Images of the future is seen from scholars as being a method that do not require a direction and is not highly technical. In addition, when writing images of the future less structure and logic is required in comparison to the Scenario method. (Kaboli 2021; Tapio 2021)

The use of imagination from a researcher and creativity are the main attribute of the method of images of the future as described in the introduction of this chapter when discussion the foresight diamond (Poli 2018, 5). However, in this study images of the future were produced using quantitative and qualitative data that was gathered from the first survey of the Delphi process. Furthermore, in this study images of the future were produced based on experts' opinions and not the imagination of one single researcher. In addition, images of the future are usually rather personal images of personal future and in this study the four images of the future express the opinion of the 20 panellists that participated to the Delphi study. Rubin and Linturi (2001) argues that individuals are influenced by three different characteristics when imagining the future, these are: their personal identities, their general knowledge, and their social knowledge.

The fact that images of the future are strongly influenced by personal views could be seen as a negative issue. This is because in my opinion every time a view on a subject is influenced by people personal views the outcome is not always rational and aspect like culture, political views, religion, and wealth could influence the images of the future produced.

Rubin (2013) argues that individuals tend to view the future as a continuation of the present. One way to tackle this issue is on how to start the process of producing the images of the future. Nilsen (1999) argued that a way is to start the mental process of producing images of the future by thinking about the aspirations, hopes and ideas of an individual or a group. By making a kind of positive mental work on a specific issue one could create alternative preferred images of the future.

3.5 Scenarios

The scenario method was used in this dissertation in combination to the foresight methods explained in the previous chapters. This method was the last one used in this study, and it was used to summarize the findings of the conducted Delphi study.

The scenario method could be divided in three categories (Höjer et al. 2011, 820):

- Predictive scenarios in which an organisation will investigate the probable futures.
- Exploratory scenarios meant to examine the possible futures.
- Normative scenarios used to explore the steps that an organisation needs to take to achieve a future goal.

This dissertation used the "explorative" method to produce scenarios on possible futures based on experts' opinions.

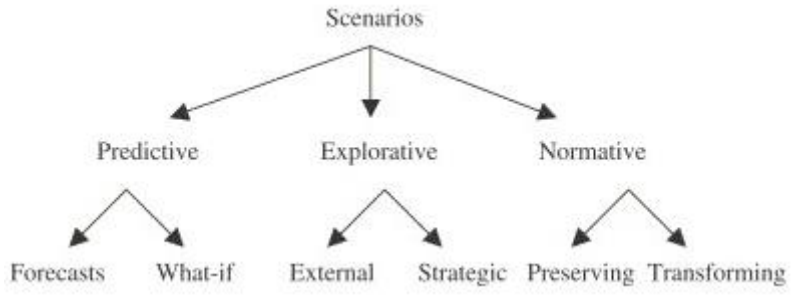

Figure 9 Scenario Typology (adapted from Börjeson et al. 2006)

Miller (2007) argues that the scenarios method is just a way to tell a complex story. In the other hand, Amer et al. (2013) describe the scenario method as a "methodological chaos". However, Amer et al. (2013) argues that the scenario method is useful for companies and organisations because it encourages the thinking process of what will happen in the future and how to prepare for possible events. In addition, by creating different possible scenarios an organisation can develop innovations and think outside the box. Moreover, Godet (1986) argues that the scenario method is crucial for an organisation to

understand what needs to be done today to achieve a future goal. When an organisation or an individual thinks about the future and plans, one of the most important things is to act today. Several techniques could be used when producing scenarios and almost every organisation could gain benefits from using this method (Gordon et al. 2005). There are many examples in history of companies and countries that did not prepare for the future when being the leaders of their time and failing drastically because of it. Moreover, Wilkinson (2009) claims that scenario planning is not only used for projecting the most probable future, but it is used to produce a variety of the plausible futures. Wright and Goodwin (2009) argued that scenarios should be used when organisations are affected by low anticipated futures. Organisations benefit the most from the scenario method when handling issues that are difficult to predict and at the same time will have large scale effects on an organisation's future (Gordon et al. 2005).

In the scenario method a fact that have had a lot of discussion and views is the question of "how many scenarios a researcher should produce?". Amer et al. (2013) argues that the optimal number of scenarios is three to five. The number of scenarios produced for this research was three. However, even a lower number of scenarios could be relevant (Amer et al. 2013).

The scenarios technique used for scanning the future impacts of cryptocurrencies in the Finnish banking industry was the intuitive logic approach This approach does not require mathematical algorithms and is flexible. (Amer et al. 2013)

An important aspect of the scenario planning is scenario validation. When validating the produced scenarios, a researcher can use different criteria to check the validity of the produced scenarios. Five different conditions can be used to validate scenarios. These five criteria are: plausibility, consistency, relevance, novelty, and differentiation. Plausibility means that the produced scenarios must be able of happening. Consistency implies that the different scenarios produced should be produced using logic and there should be no conflict or contradictions in the scenarios. The third criteria that be used to validate a scenario is relevance, the scenarios produced should provide detailed insights of a futures topic that could help organisations and decision makers. In addition, novelty implies that the created scenarios should produce new information and try to challenge existing ideas regarding the future. The last validation condition is differentiation, this intends that scenarios should be produced in various structures and should not be only simple variations of a topic. (Amer et al 2013, 36)

The working process of building scenarios is an ongoing project that works back and forth. After an organisation have produced scenarios, it should develop a plan. In the short term an organisation should produce a list of actions to be taken. In addition, an organisation should have a strategy on how to achieve a preferred future state. In the long term a vision should be defined. All these aspects are linked together and if one aspect changes also the other should be revaluated. (Gaziulusoy et al. 2013)

In addition, when organisations produce scenarios environmental and societal aspects should be taken into consideration (Cairns et al. 2010). Cairns et al. (2013) described in their paper that scenarios could be produced with the help of workshops. The use of the workshop technique was taken into consideration at the beginning of this study, but the Delphi method was selected instead.

4 THE DELPHI PROCESS

In the previous chapter the methodologies used in this study were explained. The materials for this study were gathered with the run of an expert Delphi study using the disaggregative policy method. The Delphi process was conducted during March – November 2022 with the use of the survey's software Webropol (www.webropol.com).

In this chapter of the dissertation the conducted Delphi study will be explained in detail. First, ethical issues regarding how the Delphi process materials were collected will be analysed. Second, it will be described how the experts for the panel were selected and contacted. In addition, it will be explained how the two surveys were created and how the experts answered the surveys. Furthermore, the cluster analysis of the first survey of the Delphi study will be described in detail. At the end of this chapter the qualitative data gathered from the Delphi process will be analysed.

After this chapter, this paper will provide a futures table that was created from the results of the cluster analysis and the analysis of the qualitative data of the Delphi process. In addition, scenarios were produced from the futures table.

4.1 Ethical consideration of the Delphi study

In every academic work ethical concern must be taken into consideration. In this study all participants participated voluntary and had the possibility of refuse to participate. In addition, participants were kept anonymous for the entire study. Moreover, at any point of the research process participants of the Delphi study had the possibility to withdraw their consent to participate to the study. Additionally, participants were informed on how personal data was processed. Furthermore, participants were also informed on the scope of the panel in which they participated and the subject of the research in which they took part. (Finnish National Board on Research Integrity 2019)

Before joining the Delphi study, experts were contacted and asked if they wanted to participate in this Delphi process. The email that was used to contact the experts can be found from Appendix 1. After answers of acceptance to participate to the Delphi study were received the experts received the invitation letter and the link to the first survey. The link to the second survey was sent to all experts that received the link to the first survey and can be found in Appendix 2.

At the beginning of the first and the second survey the participants had the possibility to familiarize themselves with the "Privacy Notice", the notice was produced in

accordance with the guidelines of the University of Turku (2021) regarding "data protection guidelines for thesis research". The participants had to give their consent by clicking the following sentence "I confirm that I understand what the survey is about and I agree that anonymised quotations may be used in the thesis publication" before they could answer the surveys. The "Privacy Notice" could be found from Appendix 3 and Appendix 4.

4.2 The panellists

To identify who could participate as an expert in the two rounded Delphi process conducted for gather research material for this dissertation, I started by making a PESTLE analysis of the organisations and professions that could belong to the different areas of the PESTLE. For each category of the PESTLE, I provided skills that expert should have. In addition, I tried to figure out which possible position the expert could have in private or public companies. Moreover, I added possible industries or companies in which the expert could possibly work. The PESTLE analysis could be found below:

Political:

- Finnish Financial Supervisory (in Finnish: Finanssivalvonta).
- European Central Bank (ECB).
- Bank of Finland (in Finnish: Suomen Pankki).
- Ministry of Economic Affairs and Employment of Finland (in Finnish: Työ ja elinkeinoministeriö).

Economic:

- Managers and senior managers in Finnish banks.
- Managers in investment companies.
- Investment experts.
- Managers in consulting companies.

Social:

- Researchers of the field of consumer finance.
- Professional cryptocurrencies investors.
- Cryptocurrencies influencers.
- Investment influencers.
- Futurists.
- Authors included in the literature review.

Technological:

- Data mining experts.
- Companies offering payment terminal services.
- Cash services providers.
- Companies providing cryptocurrencies exchange services.

Legal:

- Lawyers.
- Finnish Competition and Consumer Authority (in Finnish: Kilpailu- ja kuluttajavirasto).
- Experts of privacy issues, GDPR, cyber security and/or KYC.
- Management from anti-money laundering Police department.

Environmental:

- Guarantee fund (in Finnish: Takuusäätiö).
- Experts on responsible investing.

Varho and Tapio (2013) argue that for guarantee that a Delphi study will get responses from a variety of experts an expertise matrix could be produced. For this reason, I produced an expertise matrix, that was part of the background questions on the first Delphi survey, that the experts will fill during their responses process of the first survey with their self-reflected expertise categories. Table 1 shows the self-reported expertise area of each expert.

Table 1 Expertise matrix

	EXP1	EXP2	EXP3	EXP4	EXP5	EXP6	EXP7	EXP8	EXP9	EXP10	EXP11	EXP12	EXP13	EXP14	EXP15	EXP16	EXP17	EXP18	EXP19	EXP20	TOTAL
Regulations, policy, govermental matters and/or law				X			X							X	X						4
Banking, finance and/or consumer finance							X	X	X		X	X	X		X	X	X		X	X	11
Crypto currencies and/or data mining	X	X	X		X																4
Investment management and/or responsible investing													X		X					X	3
Management consultinf and/or foresight						X				X				X	X			X			5
Payment ecosystem															X		X				2
Privacy, cyber security and/or GDPR						X						X		X	X						4
Anti-money laundering regulations and/or KYC															X				X	X	3
Additional profinciensis (IT, Data Science, Economics)	X																				1
Additional profinciensis (Financial fraud)												X									1

After producing the PESTLE analysis, I started to search for possible experts by using direct emails and LinkedIn. Many potential experts were found, including people from

Finland and abroad that could be reached for participating to this study. I contacted the possible experts with an email, that could be found at the end of this dissertation as Appendix 1. I received the acceptance to participate to the Delphi study from 30 experts. The 23.3.2022 the 30 experts that accepted to participate to the Delphi study received the link to the Webropol survey. The first survey received 20 responses. All the experts that participated to the first survey responded anonymously.

The 16.11.2022 the 30 experts that accepted to participate to the Delphi study and received the first link to the Webropol survey were contacted to participate to the second survey. I contacted all the 30 panellists because I did not know who of them answered the first survey. I contacted the experts via email and the letter could be found at the end of this thesis as Appendix 2. The second survey received 11 responses. As well in the second survey all the experts that participated responded anonymously. Since the experts remained anonymous for the entire study, the experts that answered for the first survey will be referred in the following chapters as Expert 1, 2, 3…20. Since it is not possible to connect the answers of the first survey to the second, the experts that answered to the second survey will be referred to as Expert A, B, C…K.

At the end of the first Webropol survey the experts were asked to answer five background questions. The background questions were produced to validate the selection of the panellists in accordance with the expertise matrix.

The Figure 10 shows the age distribution of the experts. More than half of the panellists were under 40 years old. However, four panellists out of 20 were over 40 years old.

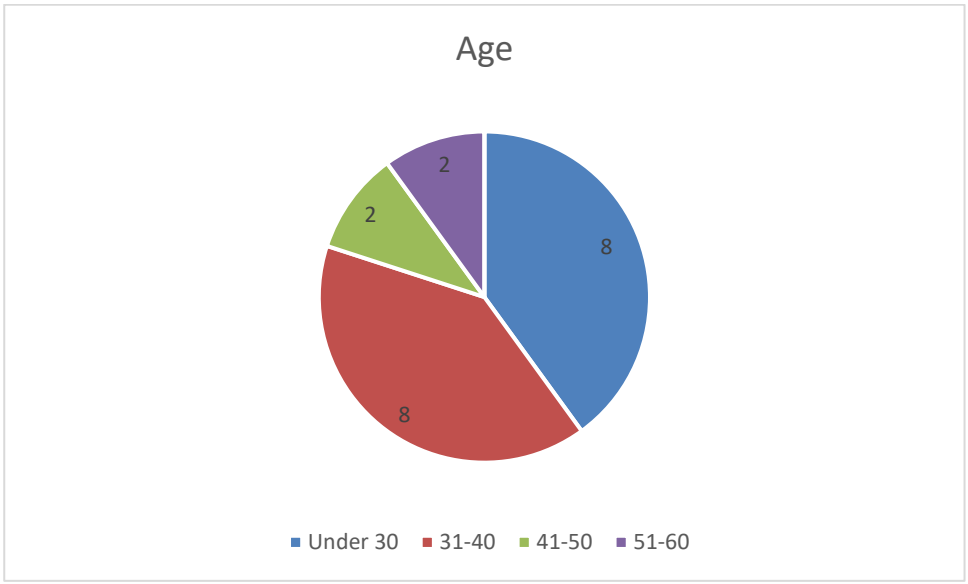

Figure 10 Age of the expertise

When reviewing the educational background of the experts we can say that almost everyone that answered the first survey have at least a bachelor's degree. The Figure 11 points out that 65% of the experts have a master's degree or equivalent.

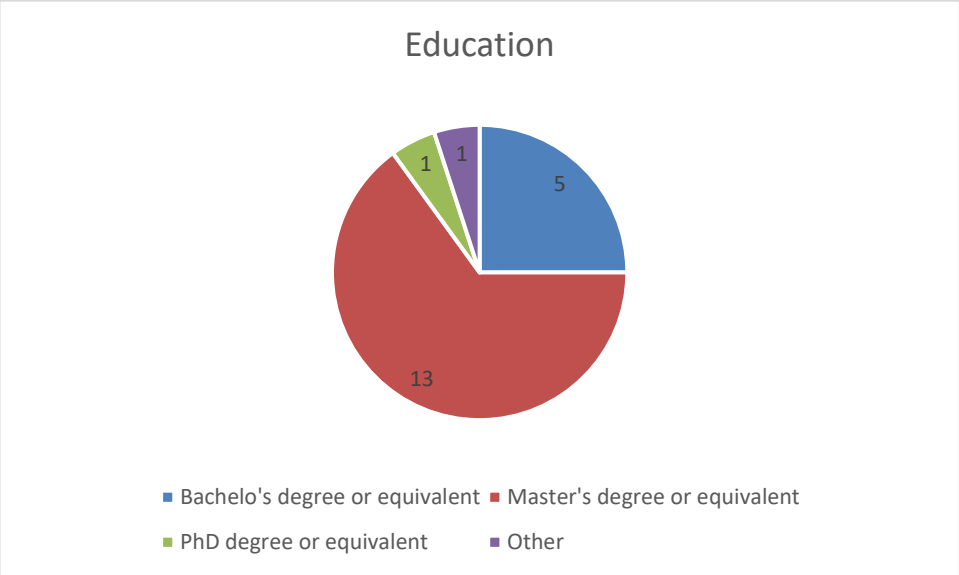

Figure 11 Education of the expertise

While searching for experts I tried to find panellist that work in different fields. The Figure 12 emphasize the fact that most of the experts work in the private section.

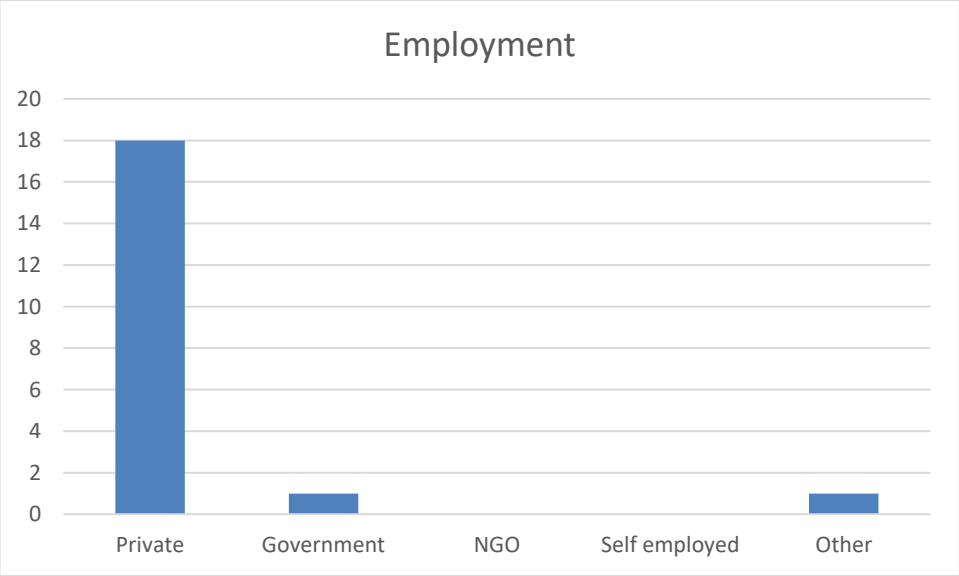

Figure 12 Employment of the expertise

The Figure 13 shows that the panellist gender variation is diverse and 30% of the respondents were not male.

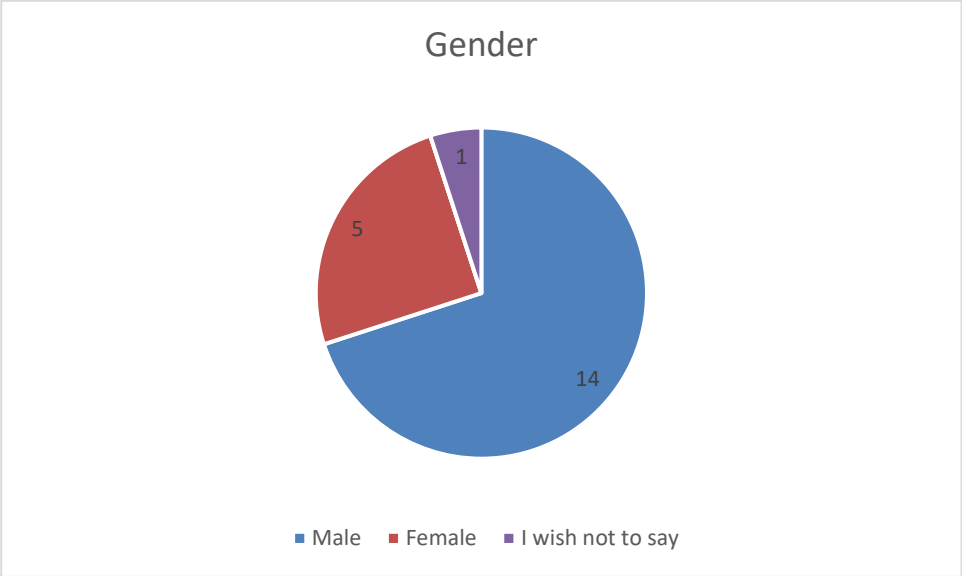

Figure 13 Gender of the expertise

4.3 First Delphi round

In this section the construction of the first survey will be described. The first questionnaire was conducted during 23.3.2022 – 1.4.2022. As explained in the section before, 30 experts received the link to respond to the survey and 20 panellists responded to the survey. The layout of the survey and how it looked to the respondent on the Webropol platform can be found from Appendix 3.

The survey started with the title of the survey "Impacts of crypto currencies on the future of Finnish banking" and an introduction part to familiarize the panellists with the survey ahead.

After the introduction part, the experts had the possibility to familiarize themselves to the "Privacy notice" and had to confirm that they understood the notice, as explained in the first section of this chapter, before continuing to the survey. After accepting the "Privacy notice" the panellist had the possibility to respond to the questionnaire.

The survey consisted of 14 questions. The questions were created with the help of the theoretical framework that can be found from chapter 2. In addition, the research questions of this dissertation were used as inspiration in making the questionnaire.

Questions were explorative, and their aim was to gain information on trends, weak signals and wild cards from the panellist on the topic studied. Saritas and Smith (2011) describe the term trends in the following way: “Trends are those change factors that arise from broadly generalizable change and innovation. They are experienced by everyone and often in more or less the same contexts insofar as they create broad parameters for shifts in attitudes, policies and business focus over periods of several years that usually have global reach. What is interesting about trends is that normally most players, organizations or even nations cannot do much to change them – they are larger than the power of individual organizations and often nation states as well.”. Before trends arises the first indications of upcoming trends are weak signals (Saritas & Smith 2011). Furthermore, Saritas and Smith (2011) describe the term wild cards as “Wild cards and shocks are those surprise events and situations which can happen but usually have a low probability of doing so – but if they do their impact is very high. These situations tend to alter the fundamentals, and create new trajectories which can then create a new basis for additional challenges and opportunities that most stakeholders may not have previously considered or prepared for.”.

The questionnaire used a mix approach in which quantitative questions and qualitative questions were used. This was done because qualitative responses could provide support in the cluster analysis of the quantitative data (Tapio 2003). The quantitative questions used ordinal scale from 0 to 100 for the panellist to answer on their views on probable and preferred future states of certain topics. The “probable future” questions were made for asking the experts on their view on what probably could happen in the future and the “preferred future” asked experts on their view on what they wanted on to happen in the future but still was realistic (Gall et al. 2022). In addition, the quantitative questions had a comment box in which the experts could support their response, answering the support box was not compulsory.

The 14 questions were divided into four categories: future trends, consumer finance, financial regulations, and future technology. After each questions the panellist had the opportunity to support their answer in written form. The questions belonging to each category are described below.

Future trends

- Question 1: To which extent will crypto currencies replace the euro in the next 10 years?

- Question 2: In your opinion will crypto currencies play a major role in the Finnish payment ecosystem in the next 10 years?
- Question 3: In your opinion will it be beneficial for Finnish banks to bring into use crypto currencies?
- Question 4: To which extent will crypto currencies influence the whole Finnish economy in the next 10 years?
- Question 5: In your opinion will the European Central Bank launch a digital currency in the near future?
- Question 6: If crypto currencies are more widely adopted how stable will the European financial system be in the next 10 years?
- Question 7: "In your opinion what are the biggest threats for the Finnish banking industry in the next 10 years?
- Question 8: "What could be an unexpected wild card affecting the future of the Finnish banking sector?

Consumer finance

- Question 9: How strong will consumers' willingness be to adopt crypto currencies 10 years from now?
- Question 10: How strong will crypto currencies' value volatility be 10 years from now?

Financial regulations

- Question 11: Crypto currencies are not controlled and sometimes may be used by criminals as a money laundering tool. How this will affect Finnish banks in adopting crypto currencies in the next 10 years?
- Question 12: In your opinion how strongly will the European Central Bank regulate crypto currencies in the future?

Future technology

- Question 13: There has been some debate on the energy consumption related to crypto currencies. How will crypto currencies environmental impacts influence on central banks in their decision of launching a digital currency?

- Question 14: According to some views due to crypto currencies tech companies might take over the role of banks. To which extent will Fintech companies replace banks in the next 10 years?

At the end of the questionnaire the experts had to respond to background questions. The questions used nominal scale for the possible answers. The background questions are explained below.

Background questions

- Age
- Gender
- Education
- Current employer
- Self-reported expertise area

In the next section the cluster analysis of the first survey's answers will be explained.

4.4 Cluster analysis

When making a Delphi study using the disaggregative policy method a cluster analysis is usually used as a tool for analysing the data (Tapio 2003). This section will describe the cluster analysis and will analyse the results of the first survey.

The cluster analysis was done using the software IBM SPSS Statistics 27 (SPSS) and the furthest neighbour clustering method was used. The furthest neighbour method emphasized the whole data. equally. A data matrix that included the panellists' answers ("probable future" and "preferred future") to the 11 quantitative questions was run through the SPSS software and a total of 40 cases was created. In the data matrix all variables had the same value for the cluster analysis and the qualitative statements were attached to the respective experts' quantitative answers. (Tapio 2002; Tapio 2018; Tapio 2022)

The dendrogram of the clusters analysis made can be seen from Figure 14. For this study it was decided to use three clusters and from the figure below the red line shows where the clusters were grouped. The three clusters' centres looked sufficiently diverse,

for this reason it was decided to use three clusters for this analysis. The clusters will be referred as Cluster 1, Cluster 2, and Cluster 3.

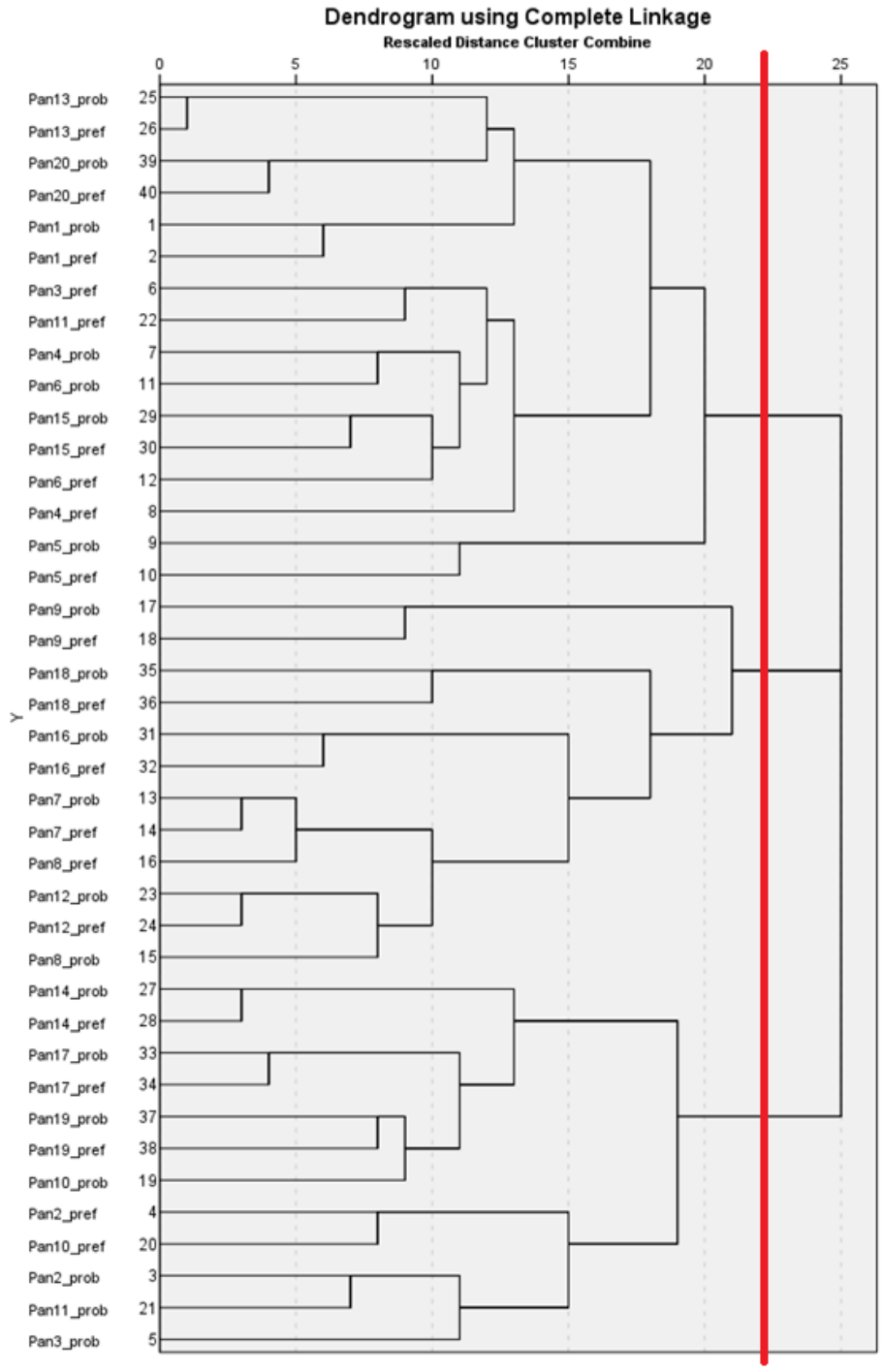

Figure 14 Grouping of the responses to the first survey in to a Dendrogram

In the following parts of this sections the different categories of the first survey's questionnaire will be analysed. The analyse will be performed by comparing the general averages to the probable and preferred futures answers to the cluster's average responses.

Furthermore, the qualitative statements will be used to make the analysis more robust. From the Table 2 the cluster's averages answers and standard deviations can be viewed.

Table 2 Responses to the first survey's quantitative questions grouped by cluster's averages and standard deviations

	Cluster 1 avg	Cluster 1 std	Cluster 2 avg	Cluster 2 std	Cluster 3 avg	Cluster 3 std
Q1. To which extent will crypto currencies replace the euro in the next 10 years?	23	21	19	13	15	13
Q2. In your opinion will crypto currencies play a major role in the Finnish payment ecosystem in the next 10 years?	33	15	31	16	11	8
Q3. In your opinion will it be beneficial for Finnish banks to bring into use crypto currencies?	48	31	50	28	22	20
Q4. To which extent will crypto currencies influence the whole Finnish economy in the next 10 years?	44	12	23	12	16	14
Q5. In your opinion will the European Central Bank launch a digital currency in the near future?	70	25	31	19	29	33
Q6. If crypto currencies are more widely adopted how stable will the European financial system be in the next 10 years?	40	24	66	20	11	9
Q9. How strong will consumers' willingness be to adopt crypto currencies 10 years from now?	57	25	39	20	31	23
Q10. How strong will crypto currencies' value volatility be 10 years from now?	65	30	46	23	31	31
Q12. In your opinion how strongly will the European Central Bank regulate crypto currencies in the future?	64	28	59	23	66	29
Q13. There has been some debate on the energy consumption related to crypto currencies. How will crypto currencies environmental impacts influence on central banks in their decision of launching a digital currency?	88	14	22	14	66	36
Q14. According to some views due to crypto currencies tech companies might take over the role of banks. To which extent will Fintech companies replace banks in the next 10 years?	28	17	38	22	11	7

a

4.4.1 Future trends

The first eight questions were regarding the category of future trends. Figure 15 shows the cluster's averages to the six quantitative questions belonging to the futures trends category.

[a]Average response categories: Q1 and Q14: 0=Not at all / 100=Completely. Q2 and Q4: 0=Not at all / 100=Complete game changer. Q3 0=Not at all / 100=Very beneficial. Q5 0=Strongly disagree / 100=Strongly agree. Q6 0=Not at all / 100=Very stable. Q9 0=Not at all / 100=Very high willingness. Q10 and Q12 0=Not at all / 100=Very strong. Q13 0=Not at all / 100=Very much.

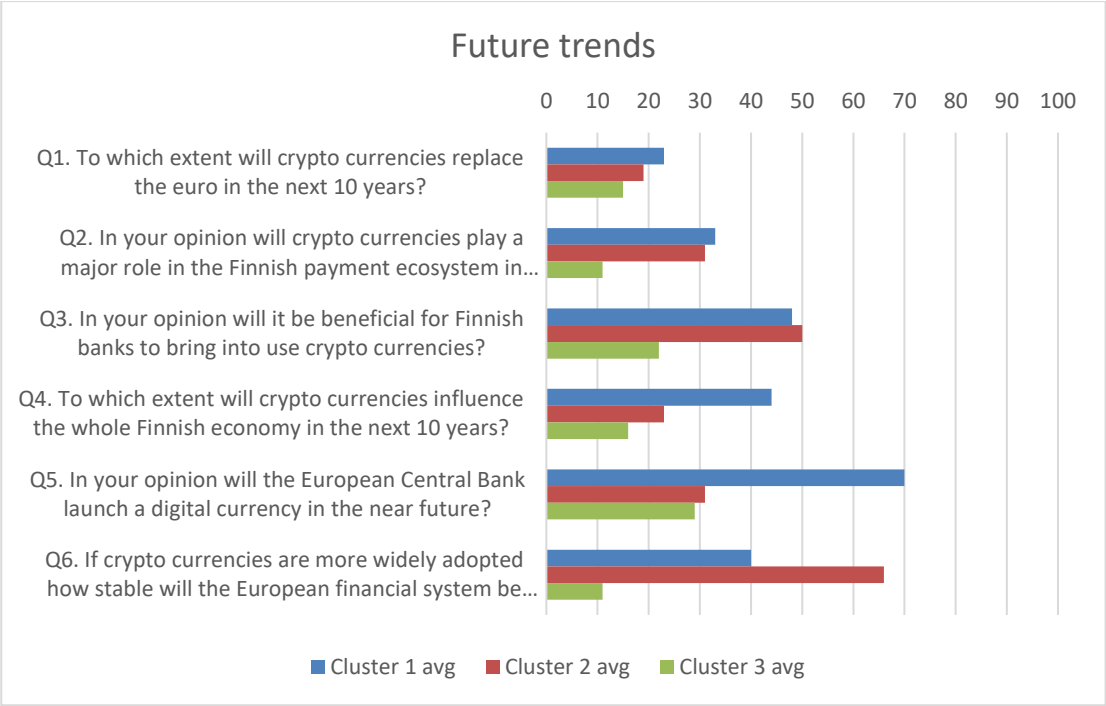

Figure 15 Cluster's averages answers regarding Future trends[b]

When asked to which extent will cryptocurrencies replace the euro in the next 10 years (Q1) the general average was 15,5/100 (Probable future) and 23/100 (Preferred future) There were not major differences between the clusters. Experts believe that a ten-year period is too short to see any major change, Expert 6 argued:

> *"I believe the growth of crypto currencies and fintech will continue to be rapid, but during a 10 year span it is unlikely to replace the euro entirely. If a sustainable method of utilizing crypto currencies in EU is maintained, I could see a future in which more and more transactions move towards crypto."*.

In addition, some experts believe that the adopting of cryptocurrencies could phase major resist from banks and existing financial institutions, Expert 10 described this concern:

> *"Digital currencies are still in their infancy, and I do not believe consumers, institutions or governments will have the consensus needed to bring about a shift toward crypto currency. Also, because the technology is so*

[b] Average response categories: Q1: 0=Not at all / 100=Completely. Q2: 0=Not at all / 100=Complete game changer. Q3 0=Not at all / 100=Very beneficial. Q4: 0=Not at all / 100=Complete game changer. Q5 0=Strongly disagree / 100=Strongly agree. Q6 0=Not at all / 100=Very stable.

disruptive to traditional banks and financial institutions, I believe they could provide blocks to its mainstream adoption.".

The second question of the survey asked the panellists opinion in will cryptocurrencies play a major role in the Finnish payment ecosystem in the next 10 years (Q2). Cluster groups 1 and 2 answered around 32/100 and Cluster 3 average was 11/100. As for the previous question, experts did not believe that cryptocurrencies will play a major role in the Finnish payment ecosystem in the next ten years. However, some experts believed that cryptocurrencies would play an important role in the ambient of internet transactions. Expert 4 argued:

"If certain crypto-related problems would be solved I don't see a problem with using them as a part of the payment system. On the contrary, there should be processes to make sure we are ready if crypto currencies become more used in payments.".

"I think crypto will become a common mean of payment for internet transactions. It's already visible in the NFT world and how NFTs themselves can fund certain projects, with crypto being a currency used." (Expert 5).

When moving to the third question "In your opinion will it be beneficial for Finnish banks to bring into use crypto currencies?" (Q3). Cluster 3 believed that it is not beneficial, answering 22/100, the other two cluster groups of experts answered around 50/100. However, from Cluster 3 one experts provided an interesting argument regarding the possibility of banks losing customers and investment funds if not starting to considering cryptocurrencies as an alternative:

"I think this is something the banks and other financial institutions must think about. We already see that cryptocurrencies interest people, both in good and bad way. If banks are not ready to start considering bringing cryptocurrencies into use, they might lose lot of potential customers as well as investable funds. I also think that if banks and other financial institution step into the field of cryptocurrencies, those could maybe be more regulated which would be a good thing, in my opinion." (Expert 12).

In addition, other experts shared the same ideas:

"I think ultimately, blockchain and digital coins are the future" (Expert 3).

"I think banks should investigate crypto and add it to their list of services, as it could be a huge line of business for them. My preferred future: with

> *banks involved, it might influence the freedom that comes with crypto."* (Expert 5).

Moving on to question four, experts were asked to which extent cryptocurrencies will influence the whole Finnish economy in the next ten years (Q4). Experts were again not confident that cryptocurrencies will have a major impact on the Finnish economy and financial system giving an average answer of 26/100 (Probable future) and 33/100 (Preferred future). Cluster 1 believe that the influence will be higher with an average answer of 44/100. An expert, from Cluster 1, that had an opinion against the general average was Expert 5:

> *"There was already a boom in crypto register taxpayers in 2021. People are more and more interested, and more people are adopting crypto. It will play a role, but not fully influence it, […]."*.

Chapter 2.3. discussed the case of a possible ECB issued virtual currency. Experts were asked on their opinion: "In your opinion will the European Central Bank launch a digital currency in the near future?" (Q5). The average answer was 44/100 (Probable future) and 48/100 (Preferred future). Cluster groups 2 and 3 were more sceptical but Cluster 1 was confident that the ECB will launch a virtual currency answering 70/100, however experts believe that it will take some years before it happens:

> *"I think the ECB is quite slow with this kind of changes, but something is coming to compete against other similar set ups in the world's economy. Cryptos aside, I think Europe needs to go towards a cashless world. Some countries are going there already, but in some countries, it will take tens of years in their current speed. When a country is almost 100% cashless, change to blockchain based monetary system is quite easy step to take. At least alongside the current monetary system."* (Expert 20).

The last quantitative question of the Future trends category asked about how stable the European financial system will be in the next 10 years if cryptocurrencies will be widely adopted (Q6). The average answer was 36/100 (Probable future) and 43/100 (Preferred future). The three clusters had different opinions, Cluster 1 and Cluster 3 had more pessimistic opinions and Cluster 2 believing that cryptocurrencies will bring stability. Even if belonging to the Cluster 1, Expert 20 provided a proper argument in favour of cryptocurrencies adaptation:

> *"When the time horizon is long enough, the problems will be solved, but in short term, there will be lots of issues and problems when adapting to the new world.*

Euro has been a currency in Europe for over 20 years, but still, it is not "ready" or fully stable. In the long run, the more options there are for citizens and/or investors more stable the financial system will be when facing system issues, financial crises etc.".

Question seven and eight asked about what are the greatest threats for the Finnish banking industry in the next ten years are (Q7) and what could be unexpected wild cards affecting the future of the Finnish banking sector in the future (Q8). Figures 16 and Figure 17 shows experts' words used in describing threats and wild cards.

Figure 16 Word cloud "biggest threats"

As can be seen from Figure 16 the panellists believe that cyber security, inflation, debt, and war are the major threats for the Finnish economy. In addition, cryptocurrencies are viewed as a threat.

Figure 17 Word cloud "wild cards"

When experts were asked about wild cards a variety of subjects appeared. As it can be seen from Figure 17 some topics got consensus. An upcoming total war in Europe, the collapse of our current financial system and a possible dismantling of the euro system are wild cards that many experts provided. Those topics are clearly issues that in case of happening they will have unexpected consequences to the Finnish banking sector, the Finnish economy, and the Finnish country.

4.4.2 Consumer finance

The following two questions were regarding the category of consumer finance. Figure 18 shows the cluster's averages to the two quantitative questions belonging to the consumer finance category.

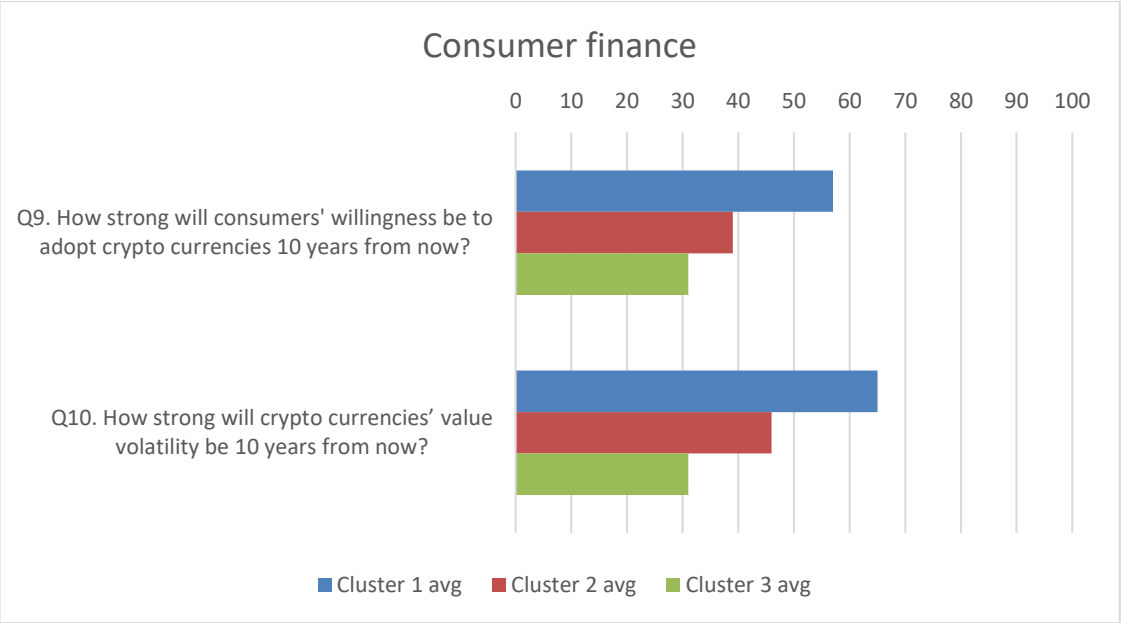

Figure 18 Cluster's averages answers regarding Consumer finance[c]

Experts were asked their opinion on "How strong will consumers' willingness be to adopt crypto currencies 10 years from now?" (Q9). The average answer was 41/100 (Probable future) and 47/100 (Preferred future), as it can be seen from Figure 18 the three cluster groups had different ideas. Cluster 1 responded 57/100 and see that the public could possibly adopt cryptocurrencies in the long term, for example Expert 3 argued:

> *"I believe the younger generation will make the transition quite easily. The older generation will most likely not fully trust this (on average). Again, it might need 20-30 years instead of 10".*

In contrast, Cluster 3 did not believe in the society adopting cryptocurrencies, however experts' arguments were pro to the adoption of cryptocurrencies from the public:

> *"[…]. It's already easy to see that people are interested in cryptocurrencies and they are willing to invest in them. I think people are more willing to invest in them that to use them as a day-to-day currency."* (Expert 12).
>
> *"A major entry barrier to crypto currencies is the need for a certain level of technology affinity. I would believe that in 10 years' time, these technology-related entry barriers will have reduced significantly making adoption of crypto currencies more viable for normal people."* (Expert 18).

[c] Average response categories: Q9 0=Not at all / 100=Very high willingness. Q10 0=Not at all / 100=Very strong.

The next question asked the panellist on how strong the value volatility will be in the next ten years (Q10). The average answer was 57/100 (Probable future) and 42/100 (Preferred future). Cluster group 1 believed that the value volatility will be even higher, and Cluster 3 responded 31/100. Almost all the experts believe that cryptocurrencies value volatility will continue to be strong and the main issue influencing it is the fact that most of the available cryptocurrencies as decentralized.

4.4.3 Financial regulations

After the consumer finance category, the following question was regarding the category of financial regulations. Figure 19 shows the cluster's averages to the only quantitative question belonging to the financial regulations category.

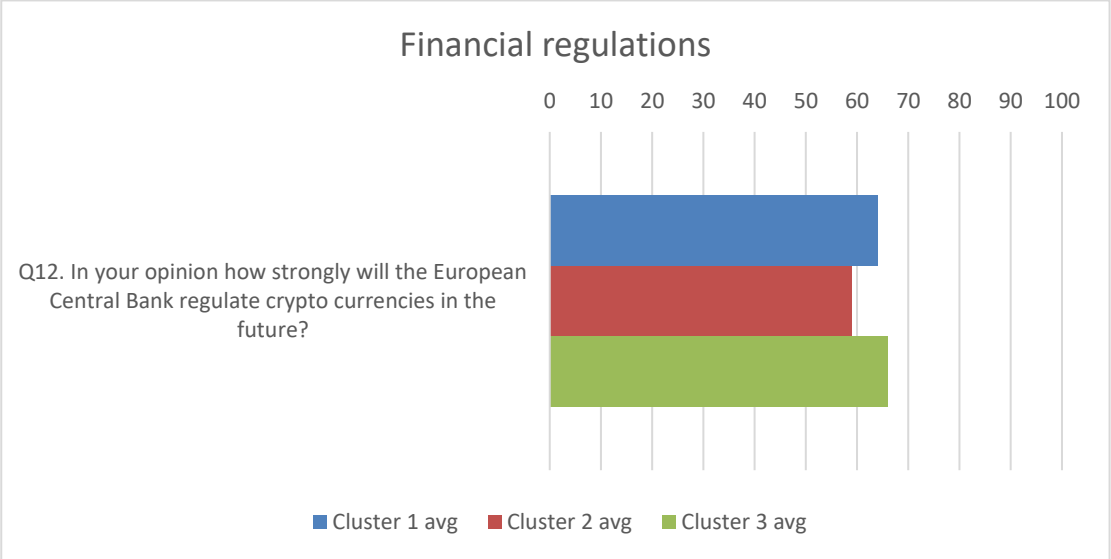

Figure 19 Cluster's averages answers regarding Financial regulations[d]

The only quantitative question of the financial regulations category was "In your opinion how strongly will the European Central Bank regulate crypto currencies in the future?" (Q12). The average answer was 68/100 (Probable future) and 58/100 (Preferred future). All cluster answered quite similarly to this question and there is a quite solid opinion that the ECB will regulate cryptocurrencies in the future. However, some experts believe that decentralized cryptocurrencies will be difficult to regulate and that will influence the ECB decision in launching its own virtual currency.

[d] Average response categories: Q12 0=Not at all / 100=Very strong.

The last open-ended question of the questionnaire was regarding the control of cryptocurrencies, money laundering and criminality "Crypto currencies are not controlled and sometimes may be used by criminals as a money laundering tool. How this will affect Finnish banks in adopting crypto currencies in the next 10 years?" (Q11). Some experts believe that those issues will slow down the adoption process of cryptocurrencies:

> *"It will slow the adoption down a little if don't have clear legislation and international rules as well."* (Expert 4).
>
> *"Banks would have to work very tightly with crypto platforms and expand their teams of developers and investigators in order to ensure the source of money and who receives it."* (Expert 5).

However, Expert 2 does not believe that those are issues in the adopting process of cryptocurrencies:

> *"[…]. Cash is used more criminal acts nowadays I would say. I am not seeing any threats in adaptation of cryptos when it comes to criminal acts."*.

Furthermore, some experts believe that control and the monitor of transaction will be required since Finnish banks are regulated by strict laws.

4.4.4 Future technology

Finally, the category of future technology had the last two quantitative questions of the survey. The cluster's averages to the last two question of the survey can be found from Figure 20.

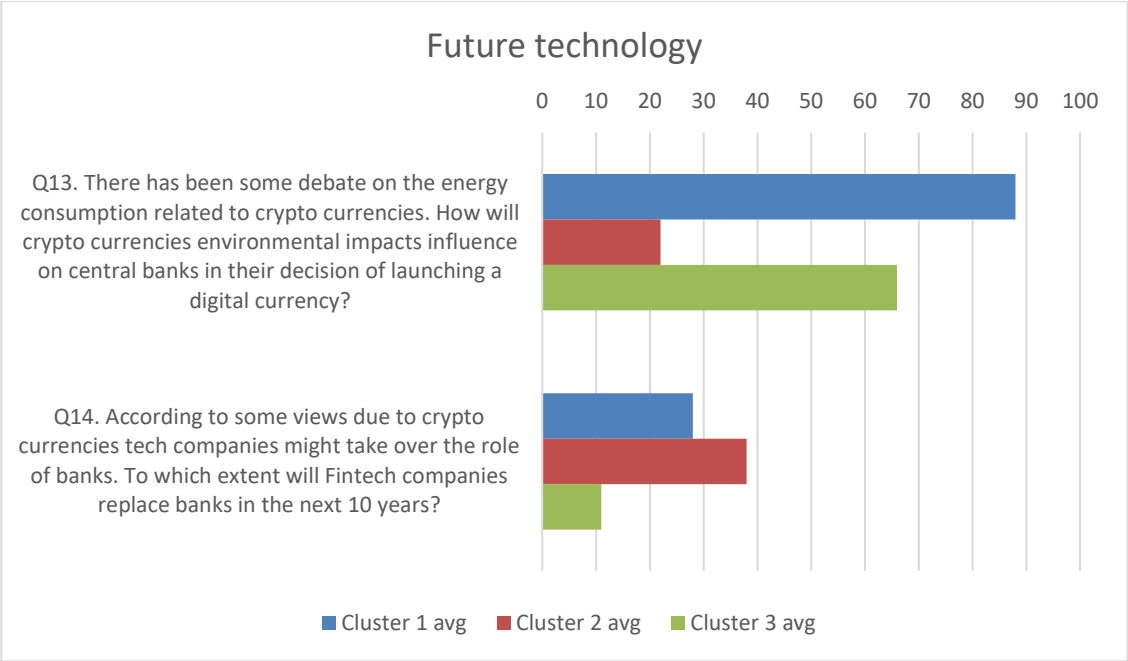

Figure 20 Cluster's averages answers regarding Future technology[e]

Question 13 asked regarding the debate on cryptocurrencies energy consumption and how it will influence central banks in their decision of launching a digital currency (Q13). The average answer was 59/100 (Probable future) and 65/100 (Preferred future). Cluster 1 believed that this issue will have major influences on central banks with an average answer of 88/100, Expert 20 argued:

> *"[…]. Europe is going through the "green transition", and it will be hard to combine cryptos for this. This is something that need to be solved world-wide if cryptos are going to be more mainstream in the future.".*

Cluster group 2 had an opposite opinion answering 22/100, for example Expert 10 states:

> *"Yes, it does use a lot of energy, but this won't be a factor in whether or not to use it. This is a different question of whether energy supporting the grid as a whole is renewably sourced or not. If it is used at the endpoint for crypto or anything else in society is irrelevant.".*

The last question of the survey was: "According to some views due to crypto currencies tech companies might take over the role of banks. To which extent will Fintech companies replace banks in the next 10 years?" (Q14). All the cluster responded in a similar way and the average was 26/100 (Probable future) and 26/100 (Preferred future). Fintech

[e] Average response categories: Q13 0=Not at all / 100=Very much. Q14: 0=Not at all / 100=Completely.

companies are not seen as a major threat to current Finnish banks. However, some experts would like to see changes in the industry, new players and new technology:

> *"I would welcome this change although I do not think it is likely as banks will not relinquish this control so easily. However, a crypto-based system that is fairer and more democratic for consumers has to be beneficial, even if this sounds too utopian."* (Expert 10).
>
> *"If traditional financial institutions are slow to adapt an arising adoption of crypto in the economy, more agile FinTech companies may be able to take a bigger piece of the cake. However, I believe that stability is absolutely essential for our financial system and thus do not desire for tech companies to take over traditional banking roles."* (Expert 18).
>
> *"I think the ecosystem need all parties for the future. FinTech to boost more conservative bank to rethink the way they think about the future. Still, there's a reason for bank licenses for example. License means more regulation. Are FinTech ready for it? This can't be a wild wild west. Banks are also creating own inhouse FinTech, so where's the line between banks and FinTech."* (Expert 20).

4.5 Second Delphi round

In this section the construction of the second survey will be described. The second questionnaire was conducted during 16.11.2022 – 30.11.2022. The 30 experts that received the link to the first Delphi survey were contacted with an invitation letter to the second Delphi round, the invitation letter can be found from the Appendix 2. The second Delphi panel's survey got 11 answers.

The layout of the survey and how it looked to the panellists on the Webropol platform can be found from Appendix 4.

The survey started with the same title as in the first survey "Impacts of crypto currencies on the future of Finnish banking" and had an introduction part to familiarize the panellists with the survey ahead.

The design of the first survey page followed the same layout as in the first survey. After the introduction part, the experts had the possibility to familiarize themselves again to the "Privacy notice" and had to confirm that they understood the notice, as explained in the first section of this chapter, before continuing to the survey. After accepting the "Privacy notice" the survey started.

The second survey used the qualitative approach. The questionnaire consisted of four images of the future that were created from the results of the analysis of the first survey that was described in the section before. The concept of images of the future was described in chapter 3.4. of this paper. After each image of the future the panellists had the possibility to provide their opinion regarding the image of the future described with an open-ended answer. Each image of the future had to be commented for successfully finishing the survey. The four images of the future can be found below.

Image of the future 1: The European Central Bank (ECB) will launch a digital currency by the year 2035

- The growth of crypto currencies and FinTech will continue to be rapid. Technology development continues to be fast. Crypto currencies become more used in payments. The public is increasingly interested in adopting crypto currencies. Cultural shift in the use of crypto currencies is treating the stability of the Finnish banking system.
- Finnish banks had to consider bringing crypto currencies into use to not lose potential customers and funds. However, there is a need from the ECB to regulate crypto currencies for them to be adopted by Finnish banks. In addition, crypto currencies value volatility is still high. Europe is still in the "green transition" and decentralized crypto currencies do not meet those standards.
- There is a strong demand for a digital currency launched by the ECB. The ECB will guarantee the digital currency's value and new regulations will be implemented to guarantee the new currency's security. Anti-money laundering regulations are implemented to cover also crypto currencies.
- The ECB will mandate that only the ECB issued digital currency will be used by banks in the euro zone.

Image of the future 2: Crypto currencies will bring stability to the Finnish economy in 2035

- Finland utilizes mostly renewable energy sources and a sustainable method for mining crypto currencies have been invented. Crypto currencies have become a common mean of payment for internet transactions world wide. In addition, certain projects and services use only crypto currencies as a payment method.

- The amount of crypto registered tax payers have increased every year. Nordic banks and FinTech players cooperate in finding new technologies to adopt crypto currencies and Finnish banks decide to add different crypto currencies to their investment's and currencies' portfolios. However, crypto currencies' value volatility is still high and crypto currencies are handled as high risk investments.
- Finnish citizens have different payment and investment options. Different payment options provide stability to the financial system that is more prepared when facing future crises.

Image of the future 3: The European Central Bank (ECB) will increase banking regulations by the year 2035

- Digitalisation and technology development continues to growth. Crypto currencies value volatility continues to be high. CO2 emissions derived from crypto currencies mining increase every year.
- Traditional banks and financial institutions have difficulties in adopting crypto currencies because of its disruptive technology that do not adapt with the banking systems.
- The ECB sees crypto currencies as a speculative investment instrument. In addition, the ECB views crypto currencies as a not reliable method for payment. Furthermore, the adoption of crypto currencies is seen as not increasing the stability of the European financial system.
- The ECB decided to increase banking regulations, especially regulations on anti-money laundering and know your customer requirements. In addition, regulations are created to compensate CO2 emissions from crypto currencies mining. Finnish banks have no intention in adopting crypto currencies and the Finnish banking sector do not have any new players entering its market because of the complexity of regulations.

Image of the future 4 "Wild card": Vast scale adoption of crypto currencies and the fall of the modern Finnish banking sector. "Wild cards are surprising factors, which have a low probability, but if realised they can have a major impact on the current state of affairs." (Saritas & Smith 2011)

- Tensions between the West and the East have increased. Crypto currencies are widely adopted by many countries outside Europe. The European financial system has been unstable for many years.
- Finnish banks and financial institutions are slow in adopting crypto currencies. More agile FinTech companies have adopted crypto currencies and provide the technology for its use.
- The European Central Bank (ECB) increases regulations and try to stop the use of crypto currencies. The ECB have not issued digital currencies of its own and crypto currencies available are all decentralized. Despite its tries the ECB do not have any means to control crypto currencies.
- Crypto currencies are fully embraced by private individuals and consumers across Finland and the traditional Finnish banking sector shrinks in to irrelevance.

4.6 Results of the second Delphi round

As discussed in the previous sections the second Delphi questionnaire received 11 answers in contrasts to the 20 answers that the first survey received. In the cluster analysis that can be found in chapter 4.4 experts were referred as Expert 1, 2, 3…20. In this section while analysing the results of the second Delphi round the experts will be referred with letters as Expert A, B, C…K, to not confuse the second surveys experts' opinions to the first survey opinion. The second survey panel, as it was to the first, was answered anonymously and it is not possible to understand which experts that answered to the first survey participated to the second survey.

The second questionnaire asked the panellists to comment on four images of the future with open-ended answers. In analysing the qualitative data of the second Delphi round it was chosen to use the conventional content analysis. In the conventional content analysis method, the research starts with observing the data acquired from the questionnaire. While the data is read and studied multiple times codes are created from the panellists' comments to each image of the future. The coding of the text is done by finding frequencies and patterns from the text. After the coding of the text was done the experts views and opinions regarding the different images of the future were grouped and summarized together. (Hsieh & Shannon 2005, 1279-1286)

The experts' opinions regarding the four images of the future were analysed with the following codes: agreement, disagreement, and additional opinions.

The first image of the future proposed an idea in which the ECB will launch a virtual currency by the year 2035. Four experts saw the image of the future as possible and with an earlier timetable:

> *"This kind of currency will very likely be launched but I would expect that the release will be earlier than 2035."* (Expert B).

Four experts disagreed with the image of the future, they were not confident in the public adopting an ECB regulated virtual currency and they did not believe in cryptocurrencies as being a used currency in the future. Expert I argued:

> *"I think there won't be" digital currency" like crypto in the future. What will happen is euro transforming to a digital currency. Some of the countries start to be quite cashless already. When one country stops using cash, others will follow. Some countries might be 10-15 years behind the most developed ones, but that will happen in the future. Cryptos, like said, are highly volatile and will be like that in the future as well. That's why it won't replace any traditional currency, cash or digital, in euro zone. Cashless Europe could be divided to different digital currencies. For example" Euro North" and" Euro South". In totally digital world this would not be even that hard to organize. ECB will keep hands tightly on currency markets with heavy regulations.".*

Three panellists provided additional opinions. Expert A argued that how consumers will value cryptocurrencies regarding regular fiat currencies will affect the ECB decision in launching a regulated cryptocurrency. In addition, Expert C believe that if cryptocurrencies will be widely adopted in the future it will be natural for the ECB to be involved in the process, however the fact that will the ECB see as a valuable project to launch its own virtual currency is debatable.

The second image of the future title was "Crypto currencies will bring stability to the Finnish economy in 2035". Seven experts from 11 answers were against this image of the future. The main reason is the high volatility of cryptocurrencies. In addition, Expert I described this image of the future as not even a preferred future state:

> *"Cryptos might still be available as a speculative investment instrument, but the image described on top on this scenario is just an utopia (and one that is not probably even wanted).".*

Only one expert provided positive feedback regarding this image of the future and described that different payment method could bring stability to an economy.

The image of the future three proposed a future state in which the ECB will increase banking regulations by the year 2035. Most of the panellists agreed with the image, seven. In addition, Expert D describe the ECB could use new tools, such as artificial intelligence (AI) for monitoring for example money laundering:

> *"This image is probable. The strong increase in digitization has a significant influence on financial crime, and therefore new regulations are introduced. At the same time the investigation of financial crimes is changing. AI will be used more widely in the investigation of economic crimes, for example in the detection of money laundering.".*

Three experts did not see this image as a probable. For example, Expert A argued that banks do not want to see an increase to already heavy regulations. In addition, Expert J propose a future in which banks should accept the existence of cryptocurrencies:

> *"I disagree in part. Compensating CO2 emissions will be big in future in the ECB and European banking systems. Cryptos are already a thing of the present in 2022 and there's a need to balance and understand the system rather than speculating and not rely on its potential.".*

Finally, Expert G argued that regulation could bring confident to the public in using cryptocurrencies but the cryptocurrencies users that believe in the de-centralization of the currencies will not adopt the idea.

The last image of the future was a "wild card", and the idea was to bring debate between the experts and additional comments to the topic studied. The image of the future title was "Vast scale adoption of crypto currencies and the fall of the modern Finnish banking sector". No one of the panellists saw the image of the future as possible and the image produced discussion between the experts. Banks are slow in adopting new technologies and the must react faster regarding cryptocurrencies:

> *"To remain relevant all banks must adapt their operations so that crypto currencies (albeit a select group of them) will be accepted widely. However, banks will do this at the very last moment unless one of them breaks the front and begins serving customers with crypto-related needs."* (Expert B).

In addition, if banks will not react to the increase popularity of cryptocurrencies FinTech companies could benefit from it. Finally Expert J see that there is a risk for Finland to fell behind of progress and there are threats to the economy:

> *"I believe ECB will support the Finnish banking sector if it would occur that the Finnish system would stay behind of development. However, the tension between Western and Eastern cultures will increase instability in the global perspective and especially Europe will have to step up its game. Information influencing and the power instability with China is a risk. Europe will have to proactively find means to stay relevant by progressively developing its digital knowhow by acting via the European Union and its monetary systems.".*

In the next chapter a futures table will be created from the results of the first survey's cluster analysis and the analysis of the second surveys qualitative data. The futures table will act as a tool to create scenarios on the impacts of cryptocurrencies on the future of the Finnish banking sector.

5 RESULTS OF ANALYSIS

5.1 Futures table

After the two Delphi rounds were completed, a futures table was created to help in the construction of the scenarios. Although the first round of the Delphi process produced four images of the future, from the futures table three scenarios where produced. A "wild card" scenario was not produced and the objective of the "wild card" image of the future, in the second survey, was to encourage the panellist to think outside the box and to gain different views on the topic. As already discussed in chapter 3.3., PESTLE categories were used for defining the variables of the futures table (Tapio et al. 2013).

After the variables of the futures table were defined, the futures states of each variable were created from the results acquired from the Delphi process.

The futures table variables were defined in the following way (Sammut-Bonicci & Galea 2014; Satutikirono & Sunitiyoso 2021; Yüksel 2012):

Political:

- ECB to launch a digital currency.
- Political stability.
- Funding and initiatives.
- Lobbying.
- Taxation.

Economic:

- Interest rates.
- Inflation rates.
- Economic growth or decline.
- Bank's investment capital.
- Cryptocurrencies value volatility.

Social:

- Cryptocurrencies influencers.
- Cyber security.
- Adoption of cryptocurrencies by the public.
- Consumers behaviour.
- Use of cryptocurrencies from the public as a payment method.
- Use of cryptocurrencies from the public as an investment method.

Technological:

- Blockchain technology.
- Links of blockchain technology to banking.
- Supply of cryptocurrencies.
- Automation.
- Technology awareness.
- Adoption rate of cryptocurrencies.
- New players in the field of banking.
- Digitalization of banking.
- Payment ecosystem-
- Artificial intelligence-

Legal:

- Regulations.
- Anti-money laundering laws.
- Responsibility and liability of cryptocurrencies developers.
- Privacy.
- Licences to operate in the financial market.

Environmental:

- Carbon emissions.
- Transition to renewable energy.
- Climate change.
- Corporate responsibility.

After the futures table was created, futures states of each variable were connected to produce scenarios. In the next section the three final scenarios will be described. First the part of the futures table belonging to each scenario will be visualized (Table 3, Table 4, and Table 5) and after a short description of the scenario will be explained.

5.2 Scenarios

5.2.1 Business as usual

The first scenario created from the results of the conducted Delphi study and with the use of the futures table was named “Business as usual”. This scenario is characterized by the decrease in popularity of cryptocurrencies and increase in banking regulations. The

futures states that were connected to produce this scenario are described in Table 3. After the futures table a description of the scenario will be presented.

Table 3 Futures table of the scenario "Business as usual"

Variables	Future state
Political	
ECB to launch a digital currency	ECB do not issue a regulated virtual currency in the future
Political stability	Finland as a NATO member have increased its security; however, the west vs east tensions are affecting the economy of the euro zone
Funding and initiatives	ECB is not interested in launching its own cryptocurrency. For this reason and the increase in regulations Finnish banks have no intention in investing in cryptocurrencies options
Lobbying	European banks lobby for increasing regulations against cryptocurrencies
Taxation	Cryptocurrencies owners are required to declare their assets to be taxed
Economic	
Interest rates	Interest rates remain at same levels
Inflation rates	Inflation rates have achieved a steady acceptable rate
Economic growth or decline	After few years of slow economic growth, the Finnish economy is growing at acceptable levels
Bank's investment capital	Due to the increase in regulations banks have limited investment capital
Cryptocurrencies value volatility	Cryptocurrencies value volatility remain high, since the cryptocurrencies available are mainly decentralized
Social	
Cryptocurrencies influencers	Cryptocurrencies influencers are decreasing in comparison to the times in which cryptocurrencies' values were at its highest

Cyber security	Cyber-attacks are increasing, but banks are improving in contrasting them
Adoption of cryptocurrencies by the public	The wide public have not adopted cryptocurrencies
Consumers behaviour	Consumers favour the use of services of major and well-known Finnish and Nordic banks
Use of cryptocurrencies from the public as a payment method	The public do not use cryptocurrencies as a payment method
Use of cryptocurrencies from the public as an investment method	Cryptocurrencies are still used as an investment method
Technological	
Blockchain technology	Blockchain technology is not used by financial institutions in Finland
Links of blockchain technology to banking	Finnish banks do not adopt blockchain technology in the future
Supply of cryptocurrencies	Many smaller cryptocurrencies' suppliers have failed and only the major players remain
Automation	Finnish banks use automation in payments and banking services
Technology awareness	The Finnish population use of digital services have increase
Adoption rate of cryptocurrencies	Cryptocurrencies users counts decrease
New players in the field of banking	There are no new players in the Finnish banking sector
Digitalization of banking	Finnish banking services are mainly fully digital, and the use of cash is controlled
Payment ecosystem	Payments are almost only made digitally or with cards and the security is increasing. Cryptocurrencies, to be used as payment methods needs first to be changed into fiat currencies

Artificial intelligence	Finnish banks use AI for their customer service and in monitoring payments
Legal	
Regulations	Increase in regulations for banks
Anti-money laundering laws	Increase in anti-money laundering laws and requirements to banks. Owners of cryptocurrencies are required to declare their assets
Responsibility and liability of cryptocurrencies developers	Cryptocurrencies developers are required to follow anti-money laundering laws
Privacy	Consumers privacy and consumer rights decrease. Monitor of consumer's transaction is increasing
Licences to operate in the financial market	Increase in regulations make it difficult and expensive to new players to enter the Finnish banking market
Environmental	
Carbon emissions	Finland carbon emissions remain at steady levels
Transition to renewable energy	Finland transition to renewable energy methods is steady
Climate change	Climate change continues
Corporate responsibility	Finnish banks make efforts in tackling money laundering and cyber-criminals

As described in the introduction of this section the scenario “Business as usual” is characterized by the decrease in popularity of cryptocurrencies and the increase of regulations. In this scenario many smaller cryptocurrencies’ suppliers have failed and only the major players remain. Cryptocurrencies influencers had decreased in comparison to the times in which cryptocurrencies’ values were at its highest. Cryptocurrencies value volatility remain high, and the wide public have not adopted cryptocurrencies and consumers favour the use of regular banking services of sizable and well-known Finnish and Nordic banks.

Since the wide public have not adopted cryptocurrencies, the ECB have decided to not issues a regulated virtual currency. In addition, banking regulations have increased.

Furthermore, anti-money laundering laws and requirements to banks have intensified and the few owners of cryptocurrencies are required to declare their assets. In addition, cryptocurrencies developers are required to follow anti-money laundering laws. The increase in regulations make it difficult and expensive to new players to enter the Finnish banking market. In addition, due to the increase in regulations banks have limited investment capital for new technologies and operations. Since, the ECB is not interested in launching its own cryptocurrency and regulations have increased Finnish banks have no intention in investing in cryptocurrencies options.

Finally, in this scenario payments are almost only made digitally or with cards and the security of using those services is increasing. Cryptocurrencies, to be used as payment methods needs first to be exchanged into fiat currencies. In addition, Finnish banks make efforts in tackling money laundering and cyber-criminals.

5.2.2 Technological innovation

The second scenario created from the results of the conducted Delphi process and with the use of the futures table was named "Technological innovation". This scenario is characterized by economic growth, the ECB launching a regulated virtual currency and increase in popularity of cryptocurrencies. The futures states that were connected to produce this scenario are described in Table 4. After the futures table a description of the scenario will be presented.

Table 4 Futures table of the scenario "Technological innovation"

Variables	Future state
Political	
ECB to launch a digital currency	ECB will issue a regulated virtual currency in the future
Political stability	Finland and Europe are very stable politically
Funding and initiatives	The ECB will launch a regulated cryptocurrency. Since Finnish banks will need to develop their technology, the European Union is providing funds for European banks

Lobbying	European banks lobby for the introduction of a regulated cryptocurrency
Taxation	Cryptocurrencies owners are required to declare their assets to be taxed. In addition, de-centralized and centralized cryptocurrencies are taxed differently
Economic	
Interest rates	Interest rates have decreased
Inflation rates	Inflation rates have achieved a steady acceptable rate
Economic growth or decline	Finland is in a state of economic growth
Bank's investment capital	Banks have high volumes of capital to invest in new technology
Cryptocurrencies value volatility	Decentralized cryptocurrencies value volatility remains unpredictable
Social	
Cryptocurrencies influencers	Influencers of de-centralized and centralized cryptocurrencies are preaching their views on the benefits of cryptocurrencies
Cyber security	Cyber-attacks are decreasing since banks have invested in cyber-security
Adoption of cryptocurrencies by the public	The public adoption of cryptocurrencies is increased
Consumers behaviour	Consumers adopt new technologies and banking services from legacy banks and new players
Use of cryptocurrencies from the public as a payment method	Cryptocurrencies are widely used as a payment method
Use of cryptocurrencies from the public as an investment method	Cryptocurrencies are increasingly used as an investment method and is part of bank's investment portfolios
Technological	
Blockchain technology	Blockchain technology is used by financial institutions in Finland
Links of blockchain technology to banking	Finnish banks adopt blockchain technology for integrating the use of regulated cryptocurrencies

Supply of cryptocurrencies	Cryptocurrencies' providers increase
Automation	Automation is widely used in the Finnish banking sector
Technology awareness	Finnish population digital skills increase and the willingness to adopt new technologies increase
Adoption rate of cryptocurrencies	Cryptocurrencies users counts increase
New players in the field of banking	There are new domestic and foreign companies entering the Finnish banking sector
Digitalization of banking	Finnish banking services are fully digital
Payment ecosystem	Payments are only made digitally, with cards or with cryptocurrencies. The security is increasing, and cash is not used anymore
Artificial intelligence	AI is widely used in every industry
Legal	
Regulations	The introduction of cryptocurrencies affects the need to change regulations for banks and other financial institutions in Finland
Anti-money laundering laws	Anti-money laundering laws and requirements to banks change taking into consideration also cryptocurrencies. Owners of cryptocurrencies are required to declare their assets.
Responsibility and liability of cryptocurrencies developers	Cryptocurrencies developers are required to follow anti-money laundering laws
Privacy	Consumers privacy and consumer rights increase
Licences to operate in the financial market	The change of regulations makes it possible for new players to enter the Finnish financial market
Environmental	
Carbon emissions	Finland succeeds to decrease its carbon emissions
Transition to renewable energy	Finland transition to renewable energy methods is fast
Climate change	Climate change continues but progress in tackling the issue is made

Corporate responsibility	Finnish banks make efforts in tackling money laundering and cyber-criminals

As described in the introduction of this section the scenario "Technological innovation" is characterized by economic growth, the ECB launching a regulated virtual currency and increase in popularity of cryptocurrencies. In this scenario cryptocurrencies' providers have increase. In addition, influencers of decentralized and centralized cryptocurrencies have increased and are addressing their views on the benefits of cryptocurrencies. The value of the regulated cryptocurrencies are stable but decentralized cryptocurrencies value volatility remains unpredictable. The wide public have adopted cryptocurrencies and consumers adopt new technologies and banking services from legacy banks and new players in the industry.

Since the wide public have adopted cryptocurrencies, the ECB have decided to issue a regulated virtual currency. The introduction of cryptocurrencies affects the need to change regulations for banks and other financial institutions in Finland. In addition, anti-money laundering laws and requirements to banks change taking into consideration also cryptocurrencies. Cryptocurrencies developers are required to follow anti-money laundering laws and owners of cryptocurrencies are required to declare their assets. The change in regulations makes it possible for new players to enter the Finnish financial market. In addition, since the ECB will launch a regulated cryptocurrency, the European Union will be providing funds for European banks for develop their technologies to adopt the new currency.

Finally, in this scenario payments are only made digitally, with cards or with cryptocurrencies. The security of the banking services has increased, and the use of cash is almost extinct. In addition, also in this scenario Finnish banks make efforts in tackling money laundering and cyber-criminals.

5.2.3 Decentralized movement

The third scenario created from the results of the conducted Delphi process and with the use of the futures table was named "Decentralized movement". This scenario is characterized by increase in popularity of cryptocurrencies and increase in banking regulations.

The futures states that were connected to produce this scenario are described in Table 5. After the futures table a description of the scenario will be presented.

Table 5 Futures table of the scenario "Decentralized movement"

Variables	Future state
Political	
ECB to launch a digital currency	ECB is still only considering the launching of a regulated cryptocurrency
Political stability	The political situation in Finland and Europe is unstable
Funding and initiatives	ECB is considering in launching a regulated cryptocurrency. Finnish banks have invested in research of how possibly adopt cryptocurrencies as, first investment method and second, payment method
Lobbying	European banks lobby for increasing regulations against cryptocurrencies. However, some players lobby for the adoption of cryptocurrencies because of its increase in popularity
Taxation	Cryptocurrencies owners are required to declare their assets to be taxed. However, the control of this is difficult
Economic	
Interest rates	Interest rates have increased
Inflation rates	Inflation rates continue to increase
Economic growth or decline	Finnish economic growth is slow
Bank's investment capital	Due to the increase in regulations banks have limited investment capital. However, the movement of customer's capital to cryptocurrencies have forced banks to invest in possible new technologies
Cryptocurrencies value volatility	Cryptocurrencies value volatility have decreased
Social	
Cryptocurrencies influencers	Cryptocurrencies influencers are increasing

Cyber security	Cyber-attacks are increasing, especially in the cryptocurrencies sector. Banks and cryptocurrencies providers are improving in tackling them
Adoption of cryptocurrencies by the public	The public adoption of cryptocurrencies is increased
Consumers behaviour	Most consumers still favour the use of services of major and well-known Finnish and Nordic banks. However increased number of consumers favour cryptocurrencies
Use of cryptocurrencies from the public as a payment method	Cryptocurrencies are used as a payment method, when possible
Use of cryptocurrencies from the public as an investment method	Cryptocurrencies are increasingly used as an investment method
Technological	
Blockchain technology	Blockchain technology is not yet used in Finnish banks, but it is used in other industries and in other countries
Links of blockchain technology to banking	Finnish banks start to investigate in the possibility of adopting blockchain technology
Supply of cryptocurrencies	Cryptocurrency providers increase
Automation	Finnish banks use automation in payments and banking services. Cryptocurrency providers use widely automation
Technology awareness	Finnish population digital skills increase and the willingness to adopt new technologies increase. However, there is still a part of the population that do not have digital skills
Adoption rate of cryptocurrencies	Cryptocurrencies users counts increase
New players in the field of banking	There are some foreign companies trying to enter the Finnish banking sector but the increase in regulation makes it difficult and expensive

Digitalization of banking	Finnish banking services are mainly fully digital, and the use of cash is controlled
Payment ecosystem	Payments are made digitally or with cards and the security is increasing. Consumers still also favour the use of cash. Cryptocurrencies are used as payment method when possibly, cryptocurrencies are widely used as payment method for internet transactions
Artificial intelligence	Finnish banks use AI for their customer service and in monitoring payments. AI is used by cryptocurrencies providers
Legal	
Regulations	Increase in regulations for banks. However, cryptocurrencies remain unregulated
Anti-money laundering laws	Increase in anti-money laundering laws and requirements to banks. Owners of cryptocurrencies are required to declare their assets
Responsibility and liability of cryptocurrencies developers	Cryptocurrencies developers are required to follow anti-money laundering laws. However, it is difficult to verify
Privacy	Consumers privacy and consumer rights increase. Consumers use of cryptocurrencies is still unregulated
Licences to operate in the financial market	Increase in regulations make it difficult and expensive to new players to enter the Finnish banking market. However, cryptocurrencies popularity affects the amount of investment capital cryptocurrencies providers have for entering the market
Environmental	
Carbon emissions	Finland carbon emissions remain at steady levels
Transition to renewable energy	Finland transition to renewable energy methods is slow
Climate change	Climate change continues

Corporate responsibility	Finnish banks and cryptocurrencies providers make efforts in tackling money laundering and cyber-criminals. Cryptocurrencies provides move to the use of renewable energy pressured by the public

As described in the introduction of this section the scenario “Decentralized movement” is characterized by increase in popularity of cryptocurrencies and increase in banking regulations. In this scenario supplier of cryptocurrency have increased. In addition, the number of cryptocurrencies influencers have increased. The cryptocurrencies value volatility has decreased, and the wide public have adopted cryptocurrencies. Most consumers still favour the use of services of major and well-known Finnish and Nordic banks. However increased number of consumers favour cryptocurrencies.

Since the wide public have adopted cryptocurrencies, the ECB started to seriously consider the launching of a regulated virtual currency. In addition, regulations for banks have increased but cryptocurrencies remain unregulated. In addition, there is an increase in anti-money laundering laws and requirements to banks. Furthermore, owners of cryptocurrencies are required to declare their assets and cryptocurrencies developers are required to follow anti-money laundering laws. However, the control and taxation of cryptocurrencies is difficult for its decentralized nature. The increase in regulations make it difficult and expensive to new players to enter the Finnish banking market. Nevertheless, cryptocurrencies popularity affects the amount of investment capital cryptocurrencies providers have for entering the market. Due to the increase in regulations banks have limited investment capital. However, the movement of customer's capital to cryptocurrencies have forced banks to invest in possible new technologies.

Finally, in this scenario payments are made digitally or with cards and the security of this services have increased. In addition, consumers still also favour the use of cash. Cryptocurrencies are used as payment methods, when possible, cryptocurrencies are widely used as payment method for internet transactions. In addition, Finnish banks and cryptocurrencies providers make efforts in tackling money laundering and cyber-criminals. Cryptocurrencies provides move to the use of renewable energy pressured by the public.

5.3 Validity and reliability of the research

This paper tried to explain as detailed as possible how the methods of data collection and data analysis were applied. One of the most critical aspects of this research was on how to select the experts that participated to the Delphi study. This aspect was important because the results of this dissertation are based on the experts' opinions, as well it was critical to find experts from different backgrounds to avoid a biased group of panellists (Tapio 2003). How the experts were selected was described in detail in chapter 4.2.

The final three scenarios were produced with the help of a futures table. The futures table technique was selected because it helped in producing comparable scenarios. However, since the scenarios were produced by the author of this dissertation if someone else will produce scenarios with the information of the conducted Delphi study maybe different scenarios will be produced. Nevertheless, the aim of this paper was not to produce scenarios that will predict the future but instead to scan the possible impacts of cryptocurrencies in the future of the Finnish banking sector and the scenario method was selected as a method to illustrate the data collected from the Delphi process.

6 CONCLUSION & DISCUSSION

6.1 Answers to the research questions

The two research questions of this dissertation were described in the introductory chapter 1.3. The aim of this thesis was to answer to the two research questions with the production of future scenarios. The three scenarios were descripted in detail in the results of analysis chapter 5.2.

What will be the payment methods and currencies of the euro zone in the year 2035?

The three scenarios provided different answers to this question. The scenario "Business as usual" predicts a future in which the conventional payment methods and currencies that are used now will continue to prevail. The second scenario "Technology innovation" forecasts a future in which the ECB will launch a regulated virtual currency that will be used alongside the euro. In addition, decentralized cryptocurrencies will be popular and used as a common payment method. The last scenario "Decentralized movement" predicts a future in which cryptocurrencies are increasing their popularity and are used as a payment method. However, in this last scenario the ECB will still only investigate the possibility of launching a regulated virtual currency.

What impacts cryptocurrencies will have on the Finnish banking industry by the year 2035?

The research question is more complicated to be answered directly with the use of the three scenarios produced in this thesis. The scenario "business as usual" describe a future where cryptocurrencies will not play a major role in the Finnish banking sector, but cryptocurrencies will influence a possible increase in banking regulations. The scenario "Technology innovation" illustrates a future were cryptocurrencies flourish and affect technology innovation in the banking industry. The last produced scenario "Decentralized movement" foresees a future where the role of cryptocurrencies is major, and they will possibly disrupt the Finnish banking industry.

6.2 Limitations

When analysing the possible limitations of this paper there are three topics to take into consideration. The selection of the experts, the response rate of the questionnaires and the produced scenarios.

The first limitation is regarding the experts that participated to the Delphi study. Even if the selection of the experts was made carefully as described in this paper the area of expertise was self-reported by each expert that answered to the first survey. We need trust the responses of the experts for that. In addition, all the experts were kept anonymous for the entire research process.

The second limitation is regarding the response rate to the two questionnaires. The first Delphi round received 20 responses. On the other hand, the second Delphi round received only 11 responses. Maybe a higher response rate to the second survey could have produced relevant data for the creation of the final scenarios.

The last limitation is regarding the produced scenarios. After the three scenarios were produced using the futures table, the scenarios were not commented by any expert.

In addition to the previously discussed limitations the shortage of discussion on existing research papers on the topic can be seen as an additional limitation. In the introduction chapter 1.1. the author argued that when this paper was written there was no existing research on the topic studied. To be more specific the author did not find any research that used the Delphi method in studying the impacts of cryptocurrencies on the future of the Finnish banking industry. However, there are existing research papers that investigated the future of cryptocurrencies and the banking industry using different methods. A broader review on existing research papers could have been valuable for this research.

6.3 Implications of the research findings

This thesis showed how various futures studies methods can be used and mixed in practise. This paper and its findings could be useful for companies operating in the Finnish banking sector. The information of this thesis, especially the experts' opinions on the probable and preferred futures and for example the world cloud of the threats and wild card in the future of the Finnish banking industry could be beneficial for Finnish financial organisations and its decision makers.

Moreover, the images of the future created from the cluster analysis of the first Delphi round and the three final scenarios produced in this paper can help organisation in

thinking and preparing to the future by giving alternatives on the possible impacts of cryptocurrencies in the future of the Finnish banking sector.

Finally, the author of this dissertation wants to stress the fact that the produced images of the future and scenarios are not predictions of the future but tools to illustrate the information gathered from the Delphi study. Only time will tell on what the real impacts of cryptocurrencies in the future of the Finnish financial sector will be.

6.4 Suggestions for future research

In the final section of this thesis, I wanted to discuss possible suggestions for future research. First, the market of cryptocurrencies is constantly changing. For this reason, it will be beneficial to conduct a new Delphi study in the future with different experts. The conduction of a new Delphi study with different experts and a different facilitator could produce new information that could be compared to the one illustrated in this thesis. The new information produced could be used to test the validity of the produced scenarios in this paper.

Second, this topic is wide and even if the Delphi process tried to narrow the topic studied the final scenarios produced provide only narrow examples of the possible futures.

Finally, there are still many questions that could be answered in future research. Some examples are:

- How will the Finnish banking industry look in the future?
- What alternative ways the Finnish banking sector have in reacting to the increasing popularity of cryptocurrencies?
- How will the payment ecosystem in the euro zone look like if the ECB will launch a regulate virtual currency?
- What role the ECB and the European Union play in the future of the Finnish banking sector?
- How Finnish banks will react if banks in foreign countries will start to widely adopt cryptocurrencies?

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APPENDICES

Appendix 1. First invitation letter

Title: Expert panel on the impacts of crypto currencies on the future of Finnish banking sector

Dear (name of the expert),

I am inviting you to participate as an expert in my thesis' Delphi panel.

For my thesis I am planning to host a two round online Delphi panel. A Delphi panel is an exercise involving experts of the field studied. All experts will remain **anonymous** for the entire study. In the first-round you will be asked to answer 14 questions in an online survey. Answering the questions will take around 15-25 minutes.

After all experts have responded to the questionnaire, I will provide all the experts with a second questionnaires for comments. In addition, at the end of the Delphi panel every participant will have the possibility to view all the results.

I am currently writing my thesis for the Turku School of Economics and my subject is to study how crypto currencies will influence the future of Finnish banking sector. My research focuses on payment methods, future currencies, and the role of crypto currencies. My thesis supervisors are Petri Tapio (Professor, Finland Futures Research Centre (FFRC) and Matti Mäntymäki (Associate Professor, Information Systems Science).

Could you please answer this email and confirm if you can participate? In addition, please provide your email address to which I could send the link for participating to the panel.

Thank you for your time!

Best regards,
Enrico Sciurca
Enrico.m.sciurca@utu.fi
+358 44 2830964

Appendix 2. Second invitation letter

FINLAND FUTURES RESEARCH CENTRE

Title: Invitation to participate to the second and final expert panel on the impacts of crypto currencies on the future of Finnish banking sector

Dear (name of the expert),

last March you received an invitation to answer a survey regarding crypto currencies' impacts on the Finnish banking sector.

Now I have created a second and final survey using the answers of the first survey. Since answering the survey was anonymous, I do not know if you answered to the survey. I would be grateful if you will find time to answer this survey.

Answering to the survey is again anonymous and it will take approximately 10 minutes. The survey's link will close on 30.11.2022.

Here is the link to the survey: https://link.webropolsurveys.com/S/B058CF0CCFB96455

Thank you! 😊

Best regards,
Enrico Sciurca
Enrico.m.sciurca@utu.fi
+358 44 2830964

Appendix 3. First questionnaire of the Delphi study

Impacts of crypto currencies on the future of Finnish banking

Dear expert,

In the following survey you will be asked to answer 14 questions on the future of the Finnish Banking sector, focusing on payment methods, future currencies, and the role of crypto currencies. Some of the questions are open ended and require a written response. In addition, some of the questions will ask you the probable and preferred future of certain issues.

Probable future = the future that you think will most likely happen.

Preferred future = the future you wish to happen and believe is realistic.

In these questions you will be also given the possibility to explain your answer in a comment box.

Privacy Notice

Purpose of processing data

Questionnaire for the master's thesis "Scanning the impacts of crypto currencies on the future of the Finnish banking sector". All experts will remain anonymous. Anonymized quotations may be used in the thesis publication.

Legal basis for processing data

Processing is based on the basic mission of the University stipulated in Section 2 of the Universities Act (558/2007) and its implementation.

Contact information

Project conducted by: Enrico Sciurca
Contact: enrico.m.sciurca@utu.fi
Project: master's thesis "Scanning the impacts of crypto currencies on the future of the Finnish banking sector".
Thesis supervisor: Professor Petri Tapio
Thesis supervisor: Associate Professor Matti Mäntymäki
Turku School of Economics. University of Turku.

Processed personal data categories

Retention period for personal data: All personal data will be disposed of after the need for its handling has ended.
Possible recipients or recipient groups of personal data: the data will not be disclosed to recipients outside the University.

Right to access, rectify, erase, restrict and object

You have the right to access your personal data retained by the Data Controller, the right to rectification or erasure of data, and the right to restrict and object the processing of data. You have the right to lodge a complaint with the supervisory authority.

Further information

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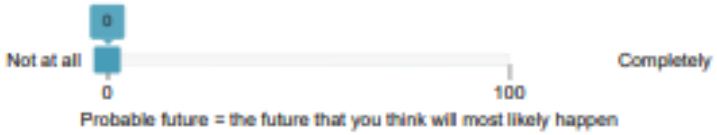
Contact information of the Data Protection Officer at the University of Turku: dpo@utu.fi
You can find the principles for the protection of personal data on a separate page: https://www.utu.fi/en/privacy/data-security-description. *

○ I confirm that I understand what the survey is about and I agree that anonymised quotations may be used in the thesis publication

Future trends

Q1. To which extent will crypto currencies replace the euro in the next 10 years? *



Probable future = the future that you think will most likely happen

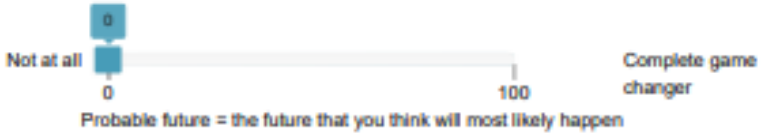
*

Preferred future = the future you wish to happen and believe is realistic

Please support your answer with your argument

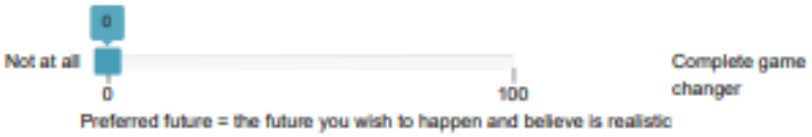
Future trends

Q2. In your opinion will crypto currencies play a major role in the Finnish payment ecosystem in the next 10 years? *



Probable future = the future that you think will most likely happen

*

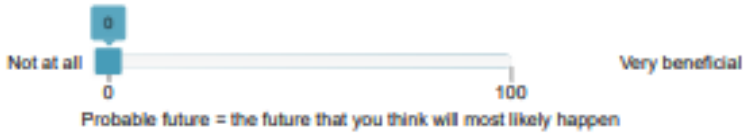


Preferred future = the future you wish to happen and believe is realistic

Please support your answer with your argument

Future trends

Q3. In your opinion will it be beneficial for Finnish banks to bring into use crypto currencies? *



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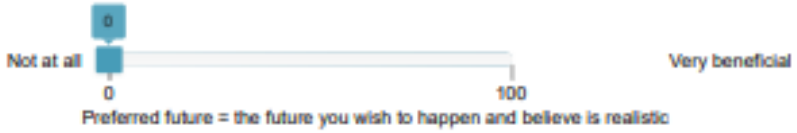
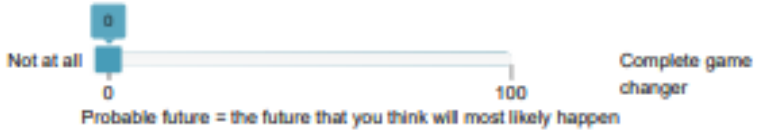


Please support your answer with your argument

Future trends

Q4. To which extent will crypto currencies influence the whole Finnish economy in the next 10 years? *



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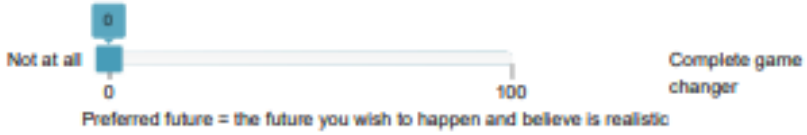
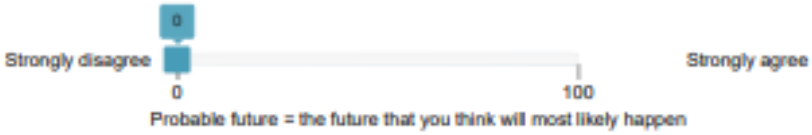


Please support your answer with your argument

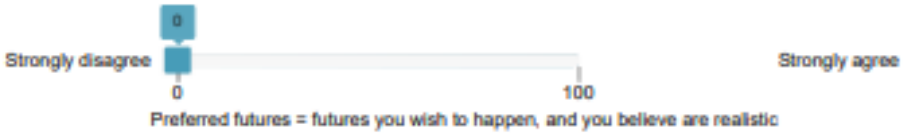
Future trends

Q5. In your opinion will the European Central Bank launch a digital currency in the near future? *



Probable future = the future that you think will most likely happen

*

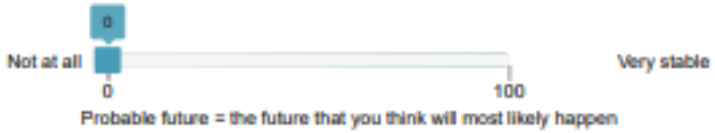


Preferred futures = futures you wish to happen, and you believe are realistic

Please support your answer with your argument

Future trends

Q6. If crypto currencies are more widely adopted how stable will the European financial system be in the next 10 years? *



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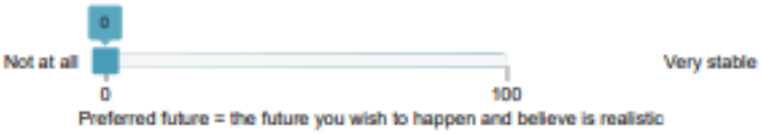


Please support your answer with your argument

Future trends

Q7. In your opinion what are the biggest threats for the Finnish banking industry in the next 10 years? *

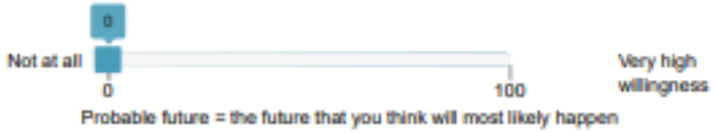
Future trends

Q8. What could be an unexpected wild card affecting the future of the Finnish banking sector?

"Wild cards are surprising factors, which have a low probability, but if realised they can have a major impact on the current state of affairs." *

Consumer finance

Q9. How strong will consumers' willingness be to adopt crypto currencies 10 years from now? *



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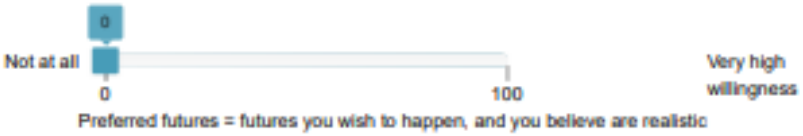
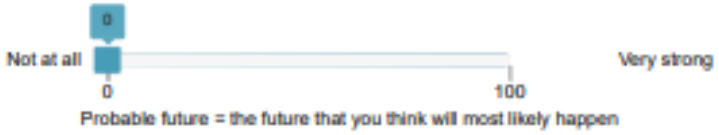


Please support your answer with your argument

Consumer finance

Q10. How strong will crypto currencies' value volatility be 10 years from now? *



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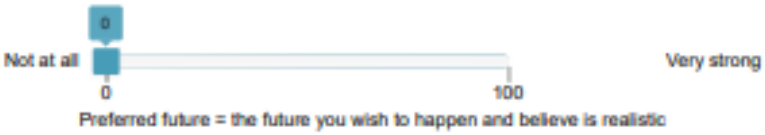


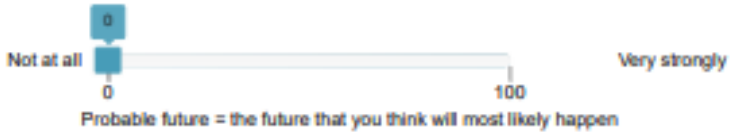
Please support your answer with your argument

Financial regulations

Q11. Crypto currencies are not controlled and sometimes may be used by criminals as a money laundering tool. How this will affect Finnish banks in adopting crypto currencies in the next 10 years? *

Financial regulations

Q12. In your opinion how strongly will the European Central Bank regulate crypto currencies in the future? *



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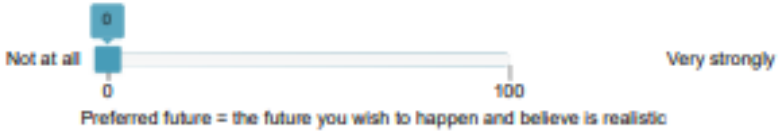
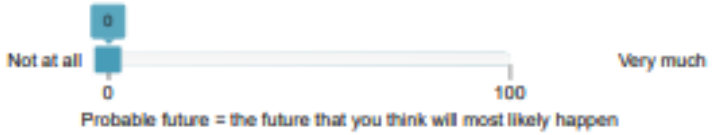


Please support your answer with your argument

Future technology

Q13. There has been some debate on the energy consumption related to crypto currencies. How will crypto currencies environmental impacts influence on central banks in their decision of launching a digital currency? *



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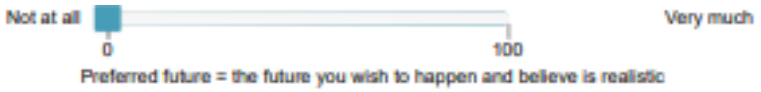
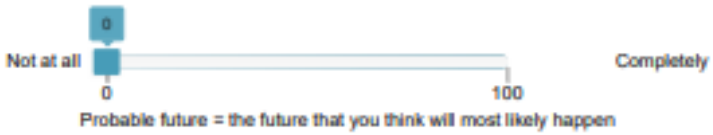


Please support your answer with your argument

Future technology

Q14. According to some views due to crypto currencies tech companies might take over the role of banks. To which extent will Fintech companies replace banks in the next 10 years? *



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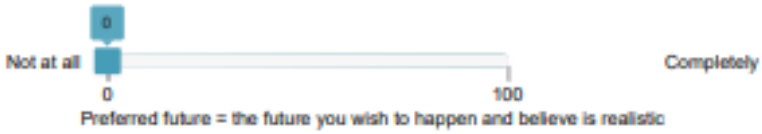

Please support your answer with your argument

Background questions

Age *

- ○ Under 30
- ○ 31-40
- ○ 41-50
- ○ 51-60
- ○ Over 61

Gender *

- ○ Male
- ○ Female
- ○ Other
- ○ I wish not to say

Education *

- ○ Bachelor's degree or equivalent
- ○ Master's degree or equivalent
- ○ PhD degree or equivalent
- ○ Other

Current employer *

- ☐ Private
- ☐ Government
- ☐ NGO
- ☐ Self employed
- ☐ Other

Self-reported expertise area. Please choose which areas (one or more) you believe you are an expert of: *

- ☐ Regulations, policy, governmental matters and/or law
- ☐ Banking, finance and/or consumer finance

- [ ] Crypto currencies and/or data mining
- [ ] Investment management and/or responsible investing
- [ ] Management consulting and/or foresight
- [ ] Payment ecosystem
- [ ] Privacy, cyber security and/or GDPR
- [ ] Anti-money laundering regulations and/or KYC
- [ ] Additional proficiencies (fill in below)

Additional proficiencies

_____

_____

_____

_____

_____

Appendix 4. Second questionnaire of the Delphi study

Impacts of crypto currencies on the future of Finnish banking

Dear expert,

during March 2022 you had the possibility to answer to a set of 14 questions on the future of the Finnish Banking sector, focusing on payment methods, future currencies, and the role of crypto currencies.

The survey was answered anonymously by 20 experts.

In the following survey you will find 4 images of the future impacts of crypto currencies on the future of the Finnish banking sector. The images of the future were created using the answers, arguments, and quotations of the respondents of the first survey.

After each image of the future, you will have the opportunity to comment.

"Images of the future are short descriptions of possible futures"

Privacy Notice

Purpose of processing data

Questionnaire for the master's thesis "Scanning the impacts of crypto currencies on the future of the Finnish banking sector". All experts will remain anonymous. Anonymized quotations may be used in the thesis publication.

Legal basis for processing data

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Contact: enrico.m.sciurca@utu.fi
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○ I confirm that I understand what the survey is about and I agree that anonymised quotations may be used in the thesis publication

Image of the future 1: The European Central Bank (ECB) will launch a digital currency by the year 2035

- The growth of crypto currencies and FinTech will continue to be rapid. Technology development continues to be fast. Crypto currencies become more used in payments. The public is increasingly interested in adopting crypto currencies. Cultural shift in the use of crypto currencies is treating the stability of the Finnish banking system.

- Finnish banks had to consider bringing crypto currencies into use to not lose potential customers and funds. However, there is a need from the ECB to regulate crypto currencies for them to be adopted by Finnish banks. In addition, crypto currencies value volatility is still high. Europe is still in the "green transition" and decentralized crypto currencies do not meet those standards.

- There is a strong demand for a digital currency launched by the ECB. The ECB will guarantee the digital currency's value and new regulations will be implemented to guarantee the new currency's security. Anti-money laundering regulations are implemented to cover also crypto currencies.

- The ECB will mandate that only the ECB issued digital currency will be used by banks in the euro zone.

Please provide your opinion on this image of the future *

Image of the future 2: Crypto currencies will bring stability to the Finnish economy in 2035

- Finland utilizes mostly renewable energy sources and a sustainable method for mining crypto currencies have been invented. Crypto currencies have become a common mean of payment for internet transactions world wide. In addition, certain projects and services use only crypto currencies as a payment method.

- The amount of crypto registered tax payers have increased every year. Nordic banks and FinTech players cooperate in finding new technologies to adopt crypto currencies and Finnish banks decide to add different crypto currencies to their investment's and currencies' portfolios. However, crypto currencies' value volatility is still high and crypto currencies are handled as high risk investments.

- Finnish citizens have different payment and investment options. Different payment options provide stability to the financial system that is more prepared when facing future crises.

Please provide your opinion on this image of the future *

Image of the future 3: The European Central Bank (ECB) will increase banking regulations by the year 2035

- Digitalisation and technology development continues to growth. Crypto currencies value volatility continues to be high. CO2 emissions derived from crypto currencies mining increase every year.

- Traditional banks and financial institutions have difficulties in adopting crypto currencies because of its disruptive technology that do not adapt with the banking systems.

- The ECB sees crypto currencies as a speculative investment instrument. In addition, the ECB views crypto currencies as a not reliable method for payment. Furthermore, the adoption of crypto currencies is seen as not increasing the stability of the European financial system.

- The ECB decided to increase banking regulations, especially regulations on anti-money laundering and know your customer requirements. In addition, regulations are created to compensate CO2 emissions from crypto currencies mining. Finnish banks have no intention in adopting crypto currencies and the Finnish banking sector do not have any new players entering its market because of the complexity of regulations.

Please provide your opinion on this image of the future *

Image of the future 4 "Wild card": Vast scale adoption of crypto currencies and the fall of the modern Finnish banking sector

"Wild cards are surprising factors, which have a low probability, but if realised they can have a major impact on the current state of affairs."

- Tensions between the West and the East have increased. Crypto currencies are widely adopted by many countries outside Europe. The European financial system has been unstable for many years.

- Finnish banks and financial institutions are slow in adopting crypto currencies. More agile FinTech

companies have adopted crypto currencies and provide the technology for its use.

- The European Central Bank (ECB) increases regulations and try to stop the use of crypto currencies. The ECB have not issued digital currencies of its own and crypto currencies available are all decentralized. Despite its tries the ECB do not have any means to control crypto currencies.

- Crypto currencies are fully embraced by private individuals and consumers across Finland and the traditional Finnish banking sector shrinks in to irrelevance.

Please provide your opinion on this image of the future *