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RISKS AND BENEFITS OF CENTRALIZED AND DECENTRALIZED CRYPTOCURRENCY EXCHANGES AND SERVICES



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RISKS AND BENEFITS OF CENTRALIZED AND DECENTRALIZED CRYPTOCURRENCY EXCHANGES AND SERVICES

The thesis takes a close look at the emerging industry of decentralized finance and aims to help those interested in the industry to choose the right platform to get started with. To further help with making an educated choice on the matter, new relevant technologies such as cryptocurrencies and smart contracts are introduced.

To determine the benefits and risks presented by both centralized and decentralized exchanges and services, data was collected from a group of people who have used both types of platforms, and from two cryptocurrency exchange representatives. The data was collected with a user survey in a cryptocurrency-related chat group and by conducting interviews with representatives from both centralized and decentralized platforms.

The conclusion is that centralized exchanges and services are more beginner friendly and secure than decentralized exchanges and services. The latter however provides much greater trading opportunities to users who have the necessary experience and risk appetite.

Keywords:

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RISKS AND BENEFITS OF CENTRALIZED AND DECENTRALIZED CRYPTOCURRENCY EXCHANGES AND SERVICES

Opinnäytetyössä tarkastellaan hajautetun rahoituksen kehittyvää alaa ja pyritään auttamaan alasta kiinnostuneita valitsemaan oikea alusta jolla osallistua. Jotta valistuneen valinnan tekeminen asiassa olisi vielä helpompaa, esitellään uusia merkityksellisiä teknologioita, kuten kryptovaluutat sekä älykkäät sopimukset.

Sekä keskitettyjen että hajautettujen pörssien ja palvelujen tarjoamien hyötyjen ja riskien määrittämiseksi kerättiin tietoja ryhmältä ihmisiä, jotka ovat käyttäneet molempia alustatyyppisiä. Tiedot kerättiin käyttäjäkyselyllä kryptovaluuttaan liittyvässä keskusteluryhmässä ja haastattelemalla sekä keskitettyjen että hajautettujen alustojen edustajia.

Johtopäätöksenä on, että keskitetyt pörssit ja palvelut ovat aloittelijalle ystävällisempiä ja turvallisempia kuin hajautetut pörssit ja palvelut. Jälkimmäiset tarjoavat kuitenkin paljon enemmän kaupankäyntimahdollisuuksia käyttäjille, joilla on tarvittava kokemus ja riskinottohalukkuus.

Asiasanat:

Kryptovaluutat

Ethereum

Bitcoin

Hajautetut rahoituspalvelusovellukset

Älysopimus

Lohkoketju

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List of abbreviations (or) symbols

AMM Automatic Market Maker

KYC Know Your Customer

USD United States Dollar

INTRODUCTION

Traditionally, financial services have been provided by banks and other financial institutions. Banks enable individuals and entities such as companies and governments to store funds, lend and borrow and act as an intermediary of fund transfers. While these institutions are seen as trustworthy intermediaries when it comes to money transactions, banks are also prone to issues. Bank fees and long transaction times are an issue for those who have access to banks, all the while there are almost 2 billion people who do not even have access to banking. Financial institutions are also prone to failure due to human error which has led to great financial losses in the past. (Azmi et al. 2021, 5-10)

To address these issues, a new type of digital currency called cryptocurrency was created. These cryptocurrencies are transacted within a blockchain – a completely decentralized technology that enables peer-to-peer transactions of cryptocurrencies. Cryptocurrencies can be safely sent to other users within the blockchain without the need for traditional financial institutions such as banks (Nakamoto 2008).

This technology has been refined further into decentralized financial services that are powered by blockchain technology and enable individuals and institutions to access financial services that were previously unavailable to them. These services often work within blockchains and require cryptocurrencies to utilize. Investing in these new technologies can be very profitable, but there is also a high risk in investing in unregulated products on decentralized platforms as theft is common and will often go unpunished (Browne 2021). To legitimize the cryptocurrency industry, multiple centralized exchanges and services have emerged. These centralized services have taken a role very similar to traditional financial institutions and they facilitate fund transfers from the traditional, central bank created fiat currencies to cryptocurrencies. But to safeguard their users they must limit access to more risky assets and collect user data which is not necessary when using decentralized services.

The cryptocurrency market has seen an incredible surge in its market capitalization, raising from under 300 million dollars in summer of 2020 to about three trillion dollars in November 2021. Cryptocurrencies are also affected by the negative global economic situation, and the market capitalization has lowered to around one trillion dollars by the end of 2022 (coinmarketcap 2022), but the number of cryptocurrencies is still on a steady rise (Statista 2022) meaning that the industry is moving forward regardless of the poor economic situation.

1.1 Research motivation

The writer has been trading cryptocurrencies on decentralized exchanges for over two years. When attempting to onboard other people into cryptocurrencies, he noticed that it was difficult to explain to a beginner the benefits or risks of centralized and decentralized exchanges as there was little information available about them. This served as the motivation to write about the technologies used with centralized and decentralized exchanges, and to find out what are the risks and benefits of both types of platforms. The writer hopes that the thesis will give the reader the knowledge to make an educated decision on how to start investing in cryptocurrencies.

1.2 Research objectives and questions

This thesis aims to research the risks and benefits of both centralized and decentralized exchanges and services and give a recommendation on both platforms for someone looking to get started with decentralized finance and cryptocurrencies.

This thesis attempts to answer two research questions:

1. What are the risks and benefits of both centralized and decentralized exchanges and services?

2. Which are more suitable cryptocurrency investment platforms for beginners: centralized or decentralized exchanges and services?

1.3 Thesis structure

The thesis is structured as follows. Firstly, blockchain technology, which is the basis for decentralized finance, is introduced and explained. Secondly, decentralized finance and its capabilities are introduced. Thirdly, primary data collected with a survey and interviews are presented and analysed. The final chapter concludes the thesis with answers to the two research questions along with some recommendations for future study.

BLOCKCHAIN – THE TECHNOLOGY POWERING DECENTRALIZATION

Blockchain technology is a combination of many separate theoretical and practical applications. While many different implementations of blockchains exist, the basic idea can be demonstrated with the original and most popular blockchain currently in existence – Bitcoin.

2.1 Defining blockchain technology

The simplest definition of blockchain technology can be found in white paper of Bitcoin, the first practical application of blockchain technology. In the paper, blockchain (and Bitcoin, the two were one and the same at the time of the white papers release) are described as a peer-to-peer electronic cash system which uses cryptographic proof instead of trust to allow parties to interact without the need for a trusted third party (Nakamoto 2008).

2.2 A brief history of blockchain technology

The blockchain technology used for Bitcoin is a combination of many different ideas and technologies. Some of them include the idea to create electronic cash with cryptographic methods and using a *Proof of Work* [explained in section 2.2] mechanism to control denial of service attacks and e-mail spam. (Imran 2017, 14-15) As these individual ideas and technologies progressed, they were combined, improved, and eventually led the pseudonym Satoshi Nakamoto to release a paper called 'Bitcoin: a peer-to-peer Electronic Cash System' in 2008 (Nakamoto 2008). This was the culmination of years of failures and successes by various groups and individuals. (Imran 2017, 16). Bitcoin was launched in 2009. (Imran 2017, 12).

Bitcoin was designed to be used as a form of currency on the internet that does not require third parties such as financial institutions to confirm transactions.

This would happen by having a system where users can send cryptocurrency (also known as tokens) to each other directly without the need for a third-party validator. These tokens would be created by validating transactions in the blockchain. To achieve this goal, the blockchain must be able to verify each transaction without the use of a central entity. With a complex combination of methods, Bitcoin achieved this goal. After Bitcoin's success, many other blockchain projects have appeared, with some of them refining Bitcoin's method and some presenting innovations such as more convenient smart contracts. (Dappradar 2022)

2.3 Theoretical principles of blockchain technology

To become completely independent of third parties, the blockchain's operation must be decentralized. This decentralization is achieved by making the blockchain a distributed system (Imran 2017, 10). A distributed system is one where two or more nodes work together in coordination, but not in parallel (Imran 2017, 36) In practice, this is achieved by creating independent nodes which are computers that can calculate complex calculations (Imran 2017, 136). The nodes then validate transactions and create rewards for the nodes as determined by the consensus method used within the blockchain (Imran 2017, 20).

2.3.1 Reaching consensus in a decentralized system

In a blockchain, nodes communicate with each other to find a consensus before accepting any new transactions within it. In a completely decentralized system, one of the biggest problems is finding consensus on the transaction events executed in the blockchain as there is no central authority to confirm them.

The theoretical problem of finding consensus has been commonly presented as the *Byzantine generals' problem*. The problem is as follows. Five generals are preparing to attack a city, and for the attack to succeed, every general must

attack at the same time. The problem is that one of the generals could be a traitor and communicate a misleading message to the messengers. This problem was first presented in the year 1982 and was solved in 1999, but the first practical implementation was made in 2009 when bitcoin was launched (Imran 2017, 11-12). Bitcoin's solution to this problem was using a *Proof of Work* system where the nodes (who represent the generals in the original problem) must compute complex calculations, and the consensus is then found among those nodes that have provably spent great effort to come to this conclusion. This way the bad actors would have to spend considerable effort to try to alter the approved state of the blockchain, and with time it becomes mathematically impracticable. (Nakamoto 2008)

Another common consensus mechanism used in blockchains is Proof of Stake. In this system, the nodes must invest financially in the blockchain so that the loss of these funds would outweigh any benefit gained from tampering with the blockchain (Imran 2017, 29).

2.3.2 Using cryptography for safe communication

To enable blockchain users to use the blockchain safely, there must be a way to communicate safely within the blockchain. This is achieved by using cryptography to separate and secure private and public information within the blockchain. Cryptography is the science of encrypting and decrypting information so that a third party cannot access it. (Imran 2017, 52). In the context of cryptocurrencies, it is used to create a private key, which then can be used to generate a public key. This public key is then encrypted to create an address which is then used to receive and send tokens within the blockchain (Imran 2017, 116). With this arrangement, it is possible to complete transactions publicly without the fear of compromising the sending or receiving address' funds. As seen in Diagram 1, When the private key is typed into a cryptocurrency wallet software [introduced in section 3.2], the user gains access to all cryptocurrencies sent to the corresponding public key. Users can only see the public keys of other users.

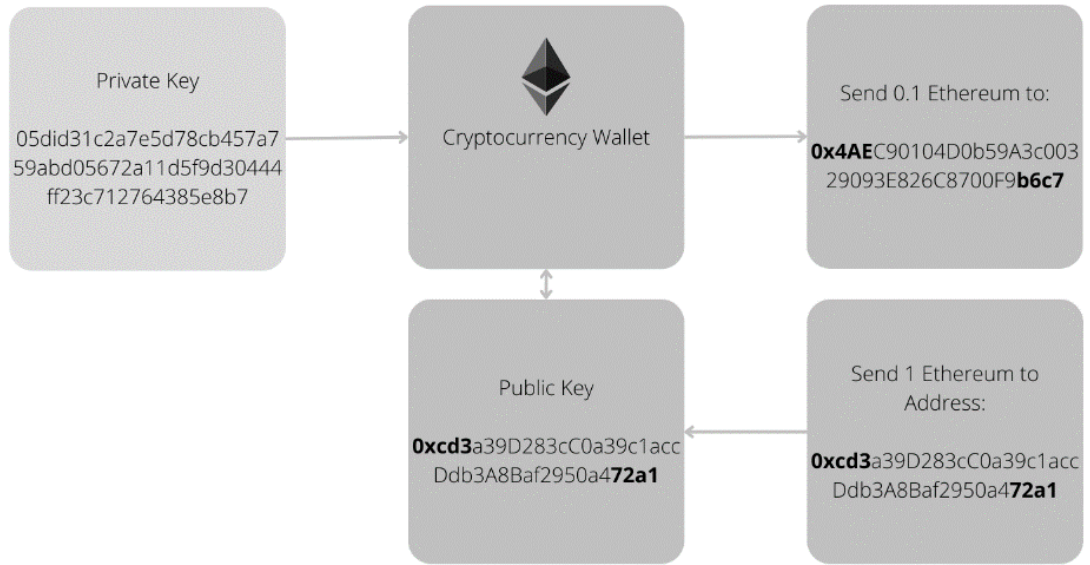


Diagram 2. Practical function of private and public keys. (Nummelin 2022)

DECENTRALIZED FINANCE

Decentralized finance enables completely new types of financial products to emerge. As blockchain technology enables anyone to create new financial products and services, decentralized finance as an industry is growing at an exponential rate. To understand the benefits these developments, it is necessary to understand the terminology related to these products and services.

3.1 Basic terminology for trading

Basic terminology for trading is universal and it remains the same regardless of the asset type. From the retail industry to cryptocurrency trading, same common terms can be found, and the meaning of these terms does not change with the asset type. To understand trading, and specifically decentralized trading, it is important to know the following basic terminology.

From the perspective of any exchange or asset, the *volume of trade* is a crucial metric of success. Volume of trade is the total sum of each trade made with an asset, or in the case of an exchange it is the aggregate of each trade completed on the platform. Each time an asset is bought or sold the total volume of trade goes up. Volume can be utilized in trading as an indicator of trader interest in the asset, and it also works as an indicator of the liquidity available for trading (Investopedia dictionary 2022). Exchanges measure their success by their volume, with high volume exchanges being the most successful.

Liquidity measures the ease of trading an asset. A practical example of this could be a comparison between owning 1000€ in cash and owning a car that is supposedly worth 1000€. As cash is the most liquid asset available, it can be swapped for almost anything at any time. The same cannot be said for the car which could be difficult to sell for the price of 1000€. This means that cash is a high liquidity asset, and the car is an illiquid asset as it cannot be easily

swapped for cash or other items of similar value. Company shares and cryptocurrencies follow the same logic: more sought after the asset is, the easier it is to swap it for something else, like cash. This means that the asset has high liquidity. High liquidity assets can be easily traded at any time, while low-liquidity assets can be difficult to trade back to cash. Lower liquidity often also means the asset will have a higher spread which makes selling or buying harder to profit from (Investopedia dictionary 2022).

Spread is the price difference between buy and sell orders in an order book. This means that if there is any spread between these two prices, a trader will take a loss if they buy and immediately sell their assets, as the buy price is higher than the sell price. For example, if a company suddenly informs investors that the company is in trouble, the following will happen. Share owners will try to sell their shares to avoid taking losses, but to sell the shares there must be a buyer. Buyers have the same information, and due to the risks involved they are not willing to pay the ask price for the shares. This leads to a situation where the buy and sell prices differ considerably, with the buy orders being at a much lower price point than the sell orders. This means that the share in question has a high spread, and it is not an attractive investment as buyers could be stuck with their shares as they would only be able to sell them for a loss. Lower liquidity often leads to a wider spread while high liquidity assets usually have a very tight spread as there often is a trader willing to buy or sell the slightest alterations in price (Investopedia dictionary 2022).

As demonstrated with the previous example, assets can have changes in their value or desirability. This could be due to new legislation, change in leadership or simply because the asset is highly successful or has failed in some way. Regardless of the reason for the change in value, these changes are measured as *Volatility*. Volatility is a measure used to determine how much the price of an asset has changed during a specific period. A highly volatile asset could have a price change of tens of percents in a day, while a low volatility asset could have a change of a few percent in a year. Depending on the individual trader's strategy, they may either prefer highly volatile assets as this gives the

opportunity to benefit from the price action, or they may dislike the risk of their asset's value decreasing, and rather avoid the risks by investing in low volatility assets. (Investopedia dictionary 2022)

3.2 Cryptocurrency wallets

For a person to be able to interact with a blockchain or decentralized finance application, they must have the necessary software. This software is called a wallet, and it works as an interface to the blockchain network. Wallets allow the user to receive, send and store cryptocurrencies. Just like any other application, cryptocurrency wallets can be downloaded as browser extensions or from mobile application shops. Once downloaded, the user creates private and public keys, and the application is ready to be used. (Azmi et al. 2021, 27)

3.2.1 Custodial and non-custodial wallets

There are two main types of wallets, custodial and non-custodial. As can be predicted from the name, their difference lies in who is in custody of the private keys that can be used to access the wallet. If a person downloads a wallet on their browser and creates the private key themselves, they own a non-custodial wallet. This means that they are in full control and at the same time carry the full responsibility for storing the private keys. Custodial wallets are owned by third parties like centralized exchanges. With custodial wallets the user gives the responsibility of storing the private keys with the custodian. This can be convenient as the burden of storing the private key is passed on to the third party, but there have been many cases where stored funds have been stolen from a custodial wallet. (Azmi et al. 2021, 27-28)

3.3 Smart contracts and decentralized applications

Smart contracts are programs that are executed within a blockchain at any time. A theoretical example on how to use a smart contract for lending and borrowing

without the use of a bank or other institution can be seen in diagram 2, and it works as follows. Person A wants to borrow money, and the lender requires them to give 100% collateral, so 1000€ collateral for a 1000€ loan. Person B sends 1000€ to the smart contract for lending. If person A wants to borrow it, he must send 1000€ to the smart contract as collateral. Once this step is completed, person A automatically receives the 1000€ loan. The collateral stays in the smart contract, and if person A repays his loan, they receive the collateral back, and if not, then person B receives the collateral automatically. Because the smart contract is in the blockchain, it cannot be changed after it has been created, and so there is no way for person A or B to receive or keep the collateral unless the prerequisites in the contract have been met.

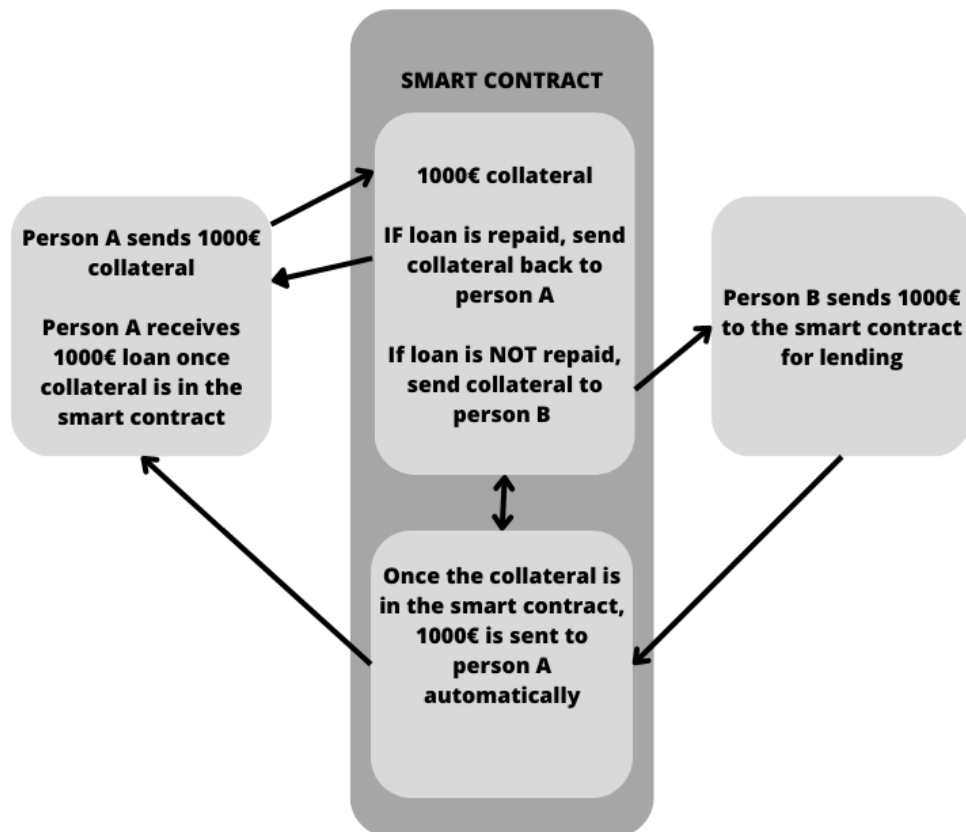


Diagram 2. Theoretical example of a smart contract (Nummelin 2022)

What makes smart contracts unique compared to normal contracts is that they usually cannot be changed once they have been implemented in the blockchain, meaning that the contract parties cannot back out of the contract. As this is not possible, no third parties are required to ensure that the contract parties do as they have agreed. Multiple smart contracts can be combined to make a decentralized application. These applications can look like a typical website, but they may require other applications that enable the user to interact with a blockchain to either use the smart contracts or store other data. (Azmi et al. 2021, 21-22) One of the biggest services provided by traditional financial services is the lending and borrowing of funds. With decentralized financial applications, anyone is allowed to lend or borrow their funds given that they have the necessary collateral. (Azmi et al. 2021, 14)

A common service offered by exchanges is leverage trading. Leverage trading is a form of trading where the trader borrows funds to purchase more cryptocurrency. For example, a trader could have 100€ of capital and borrow additional 100€ for a trade, doubling his investment. This would double any profits from the trade, but as leverage works both ways, it could also double any losses, and eventually lead to the liquidation of the invested capital to repay the loan (Investopedia 2022).

Alternative coins (altcoins) refer to any other token than Bitcoin. (Dematteo 2022) While anyone can create an altcoin with relative ease (Vittominacori 2022) there is one important distinction between these user-created tokens and the native token of the blockchain. The native token of a blockchain is also the transactional token, meaning that each transaction made in a specific blockchain requires the user to use the blockchain's transactional token. For example, in the Ethereum blockchain, if a user wants to make a transaction or to use a smart contract, they must always have Ether to pay for the transaction fees. (Ethereum 2022) This necessity for native tokens makes them some of the most highly valued tokens in the cryptocurrency markets (Binance 2022). As of writing, the Ethereum blockchain is the most popular blockchain to create new

altcoins, and many highly valued projects are based on the Ethereum blockchain (Coinmarketcap 2022).

Another important type of altcoins is stablecoins. These are altcoins designed to follow other assets' value, for example, the United States dollar (USD). Some stablecoins are centrally operated, and the user must believe that this central operator truly has 1:1 USD backing for the stablecoin, while other stablecoins use a trust less system where the creation of the stablecoin requires deposits from the users. They play an important part in the ecosystem as cryptocurrencies often have very high volatility. (Fang et al. 2021, 85-88) Without stablecoins, the user would only have the option to own either an altcoin or the native token of the blockchain. Both tokens could have high volatility, meaning they would lose value either way when calculated in USD. With stablecoins, they have the option to trade their tokens for their current USD value, and thus store the value of their portfolio until it is more favourable to trade them for other tokens.

3.4 Centralized and decentralized exchanges

Compared to centralized exchanges, decentralized exchanges have many differences. To fully understand the benefits of a decentralized exchange, it is necessary to explain the working principles of both centralized and decentralized exchanges. Centralized cryptocurrency exchanges mimic the traditional exchanges used for trading assets such as money, shares, options, and derivatives, among others. Centralized exchanges are widely used for cryptocurrency trading, and commonly provide many services such as lending and borrowing, and trading with options and derivatives. As with traditional assets, derivatives form a large amount of the total trade volume. It was reported in January 2021 that cryptocurrency derivatives account for over 60% of the market volume. (Crypto Compare 2022, 3) When trading in a centralized exchange, users can place a bid or ask for orders in the order books, and other users fill them to complete the trade. To have a well-functioning market, there must be substantial liquidity available. Central exchange's liquidity comes in the

form of user buy and sell orders, meaning that a wide user base and interest in trading the asset is required to have the necessary liquidity.

To gain access to the services of a centralized exchange, the user must first create an account, complete a KYC process, and deposit funds to the exchange. KYC – Know Your Customer – is a process where the customer provides details such as their identification documents. While legislation may differ from country to country, in Finland it is required by law that the service provider confirms the identity of users who deposit or withdraw funds from a service. (Finlex 2022) As users can be identified with the KYC process, these platforms can be used to purchase cryptocurrencies easily using credit cards or bank transfers. They also enable users to sell cryptocurrencies for fiat currencies such as the Euro, and these funds can be withdrawn back to a bank account. All of the funds that are traded and moved within the centralized exchange are held by the exchange, and each transaction must be approved by them. (Azmi et al. 2021, 6-7)

Compared to a centralized exchange, the main difference to a decentralized exchange is that they do not require any sort of registration from their users. Additionally, the most popular decentralized exchanges do not use order books, but instead, use a system where users instead trade tokens from liquidity pools.

3.5 Liquidity pool-based trading

A liquidity pool-based exchange works with smart contracts that automatically calculate the exchange ratio of the trading pair that the user wants to interact with. This interaction happens by utilizing an Automatic Market Maker (AMM) smart contract. When utilized, the AMM smart contract adds and removes tokens from the liquidity pool using a predetermined formula, removing one of the paired tokens and giving back the other paired tokens. This system enables trading without the need for an order book as the transaction is done between the user and the liquidity pool rather than between two users. While there is no spread like with order book-type exchanges, there is a premium paid for each

token depending on the size of the liquidity pool. Large liquidity pools have low volatility and small premiums, while small liquidity pools have extreme volatility and high price changes even with smaller trades. While there are multiple types of AMMs, the Constant Product Market Maker is the most popular type of AMM (Coinmarketcap 2022).

RISK AND BENEFITS OF CENTRALIZED AND DECENTRALIZED CRYPTOCURRENCY EXCHANGES AND SERVICES

To find out users' experiences of centralized and decentralized exchanges and services, a survey and two interviews were conducted by the writer. The questions in the survey were formulated based on the writer's personal experience of centralized and decentralized exchanges and services, and recent negative events in cryptocurrency industry such as multiple cryptocurrency company bankruptcies (Shaheen 2022). The questions asked both technical questions about the subjects found in the first three chapters of the thesis, and opinions which required the survey respondents to have a good understanding of cryptocurrencies and blockchain technology.

Over three days, a total of 18 responses were gathered anonymously from a cryptocurrency investor chat group that the writer has been a part of for over two years. Members of the group often invest in very risky small, decentralized cryptocurrency projects, and because of this they have good knowledge of the risks involved with decentralized cryptocurrency trading. Some members of the group are decentralized finance developers who have produced decentralized financial applications. The group was also deemed to be suitable as it was known that each member in the group had experience using both centralized and decentralized exchanges. The interview questions were formulated based on the survey results and the interviews were conducted after the survey had been completed.

4.1 Survey results

Each respondent answered that they have used a centralized exchange or service to deposit or withdraw fiat currency. This is often a necessary step to use a decentralized exchange as the user must have cryptocurrency in a cryptocurrency wallet to interact with a decentralized exchange. To do this, the

user must first use a credit card or a bank account to purchase cryptocurrency that can then be sent to the cryptocurrency wallet. As was expected by the writer, each respondent had also used both centralized and decentralized exchanges to trade with tokens. A notable difference between respondents' use of decentralized and centralized exchanges is that 44.4% had used a centralized exchange to leverage their positions, while only 16.7% had done so on a decentralized exchange. Many centralized exchanges provide the option to use leverage while decentralized exchanges often only have the option to swap cryptocurrency tokens. The preference to use centralized exchanges for leverage trading could be because this service is not often offered on decentralized exchanges and platforms.

3. Which of the following services have you used on centralized exchanges or platforms?

18 responses

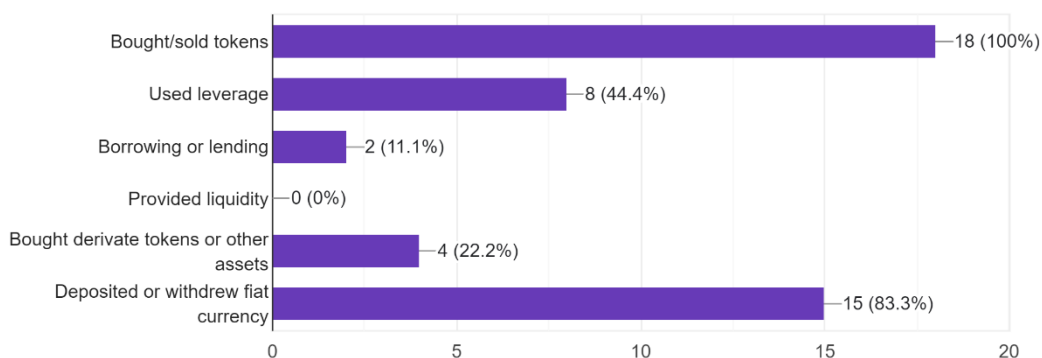


Figure 1 Respondents' usage of centralized exchange or platform services (Nummelin 2022)

Decentralized exchanges and services have some utilities that centralized exchanges do not have. Many decentralized exchanges allow anyone to list a new token for trading – the token creator just needs to create a liquidity pool so other users can swap their tokens from it. While creating new tokens is often done by more advanced users and is not very common, 44.4% of respondents had made a new token, and 77.8% had provided liquidity to a liquidity pool. The

high number of respondents that have used these advanced features can be explained by their experience with cryptocurrencies – 66.7% had used cryptocurrencies for over four years. To put this into context, the number of wallets in the Ethereum blockchain in July 2017 was around 4 million, 2018 this rose to 40 million, and from there it has increased to 200 million in July 2022. As some respondents had been involved with cryptocurrencies for over four years, it means that these respondents have possibly been involved with decentralized finance since its establishment. (Etherscan 2022)

2. Which of the following services have you used on decentralized exchanges or platforms?
18 responses

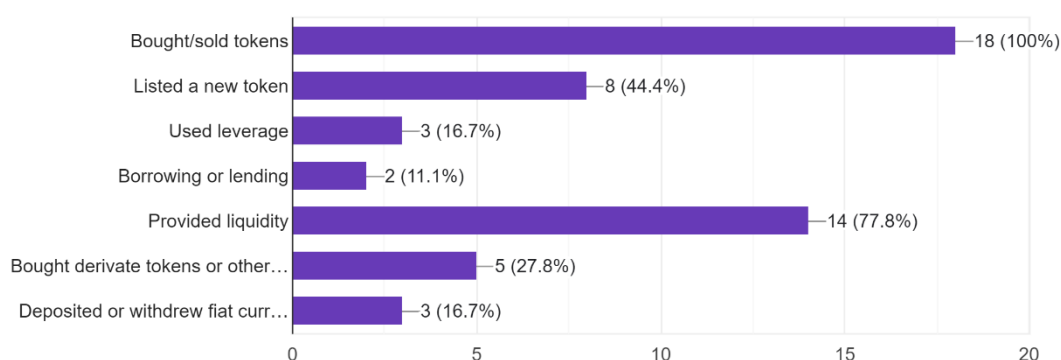


Figure 2. Respondents' usage of decentralized exchange or platform services (Nummelin 2022)

Using centralized exchanges requires the user to create an account and complete a KYC process. After the account is verified, the user can start buying cryptocurrency with a credit card or a bank account. 72.2% of respondents thought that centralized exchanges are more beginner-friendly to use compared to decentralized exchanges. To be able to use a decentralized exchange, the user must first install a suitable wallet that can interact with the exchange. Additionally, they must also buy a cryptocurrency and send it to this wallet. After this initial setup is done, 61.1% of the respondents thought that decentralized exchanges are easier to use compared to centralized exchanges. 61.1% of respondents also agreed that decentralized exchanges are safer than

centralized exchanges. These results imply that while centralized exchanges are more user friendly, decentralized applications are thought to be more convenient if the user has the necessary skills to use them effectively. The safety aspect was clarified in the following responses.

9. After the initial set up with wallets etc., using a decentralized exchange is easier than using a centralized exchange

18 responses

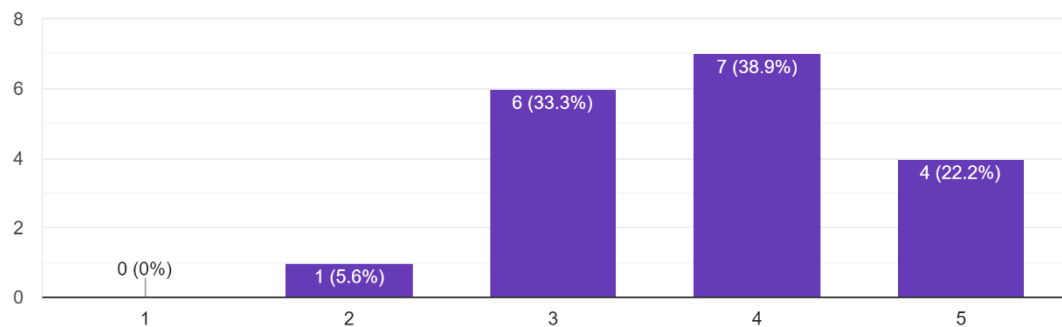


Figure 3. Respondents' opinion on how easy decentralized exchanges are to use (Nummelin 2022)

Respondents were allowed to elaborate on the reasons why they believe decentralized exchanges are safer. Multiple respondents believed them safer because decentralized exchanges do not require the user to deposit their funds on the platform, and they can be kept in the user's wallet. As the funds are kept in the user's wallet, the exchange cannot freeze withdrawals of funds in the case of bankruptcy as has been the case with centralized cryptocurrency services such as Celsius (Napolitano 2022) and Voyager (Patel et al. 2022). 77.8% of respondents were afraid that their funds could get stuck on an exchange in an event like this, and 50% of the respondents did not like to give custody of tokens to a centralized exchange. As many respondents were uneasy about giving custody of their funds to a third party, this was further investigated in the interviews.

16. I fear my funds could get stuck in an centralized exchange due to the actions of the exchange owners (i.e. freezing your funds to stop a bank run)

18 responses

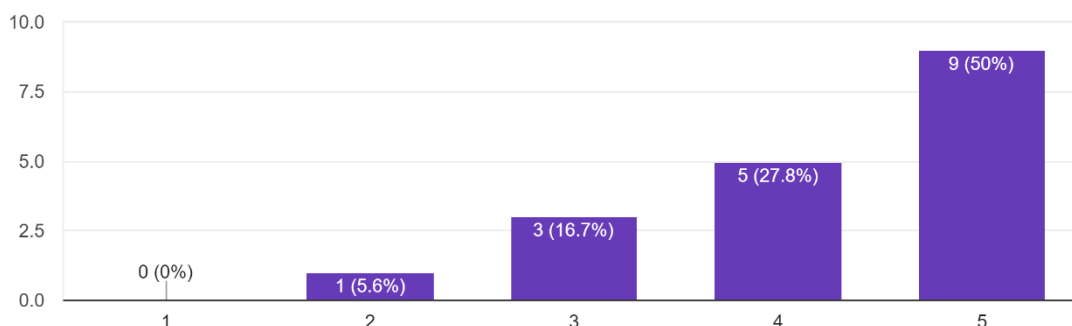


Figure 4. Respondents' opinion on the chances of a central exchange freezing their funds (Nummelin 2022)

Two respondents also noted that the source code of a decentralized exchange is public in the blockchain, which makes it possible for anyone to examine the code, and that every exchange is only as safe as the code that it has been made with. Some users did not think decentralized exchanges are safer as scammers are free to try and defraud other users of their funds. Two respondents also noted that the user carries the full responsibility for their actions in a decentralized exchange, and because of this, they are not safe for beginners to use. These responses give insight into the previous responses where most thought that centralized exchanges are more beginner friendly. It can also be noted, that while anyone could examine the code of a decentralized application, only a few people have the advanced programming skills to interpret the code in any way.

The respondents had a strong opinion of the risks involved with sending personal data to a centralized exchange to complete the KYC process. 61.1% of the respondents thought their data is at risk when they send it to a popular centralized exchange, and 83.4% thought this is a risk on a smaller centralized exchange. As seen in figure 5, only one respondent felt safe when sending KYC data to a small or unpopular centralized exchange. As this question gave a

strong response from the respondents, the subject was discussed in the later interviews.

18. I feel that my personal data is at risk when I complete the KYC process at a small/unpopular centralized exchange

18 responses

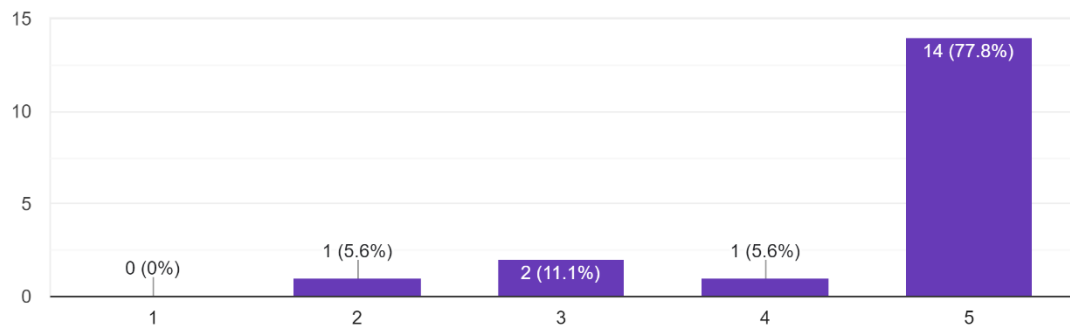


Figure 5. Respondents' thoughts on the safety of their personal data on small or unpopular centralized exchanges (Nummelin 2022)

Respondents were asked if they had been hacked or scammed while using either centralized or decentralized exchanges. While only 11.1% of respondents had been hacked, 72.2% had been scammed. Each of the hack victims described a hack that affected a centralized cryptocurrency wallet that had been hacked and the user tokens stolen. All the scams except for one happened on a decentralized exchange or platform. Respondents reported multiple different types of scams. The most common of these is called a "rug pull", where the token creators suddenly remove all liquidity from the liquidity pool, taking all the funds in it and leaving the investors with no way to sell their tokens (Binance Academy 2022). One user also reported having been the victim of a presale scam. In this scam, a new token is offered for sale before it is created in the blockchain. Users then purchase tokens before the token is launched, but the scammer will never create the token and then disappears with the presale funds. As cryptocurrency transactions cannot be traced to a person, the perpetrator can easily keep the funds (Investopedia, 2022).

Regardless that most respondents had been scammed, this did not change their opinion of the trustworthiness of decentralized exchanges. 33.4% thought that decentralized exchanges are more trustworthy than centralized exchanges, and 61.1% of respondents did not have an opinion on the matter. Half of the respondents did not think that cryptocurrencies need any more regulation from any authorities while 33.4% thought that additional regulation is necessary.

19. In general, the crypto space is in need of more regulation from the authorities (i.e. national financial supervision, tax office etc.)

18 responses

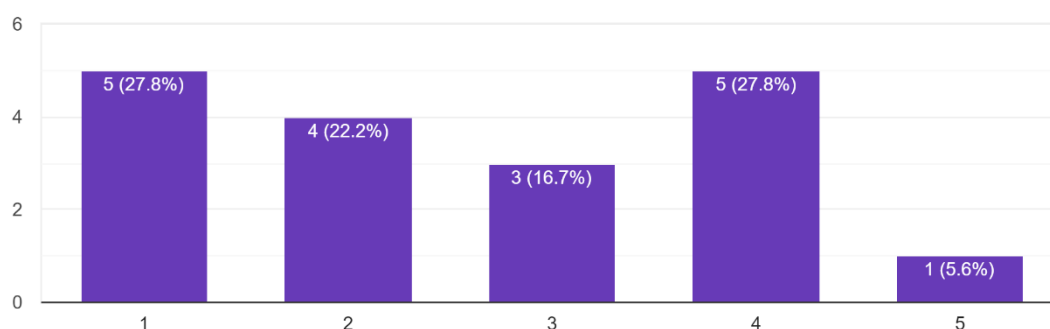


Figure 6. Respondents' thoughts on the need for additional regulation within the cryptocurrency industry (Nummelin 2022)

When asked to describe their risk appetite with crypto investing and trading, 55.6% answered high risk, 27.8% medium risk, and 16.7% low risk. Each respondent had used a decentralized exchange to buy an altcoin that is not yet listed on any centralized exchanges. 94.4% of respondents agreed that new altcoins are very risky to invest in. Altcoins listed on centralized exchanges did not change user opinion of safety as only 11.1% agreed that altcoins listed on popular centralized exchanges are safe to invest in. While altcoins were seen as very risky investments, 61.1% of respondents thought that decentralized exchanges provide better trade opportunities than centralized exchanges. 72.2% of respondents used decentralized exchanges more often than centralized exchanges.

Most respondents profiled themselves as high-risk investors and almost every respondent thought that new altcoins are very risky to invest in, but also provide the best trade opportunities. They also use decentralized exchanges more often. From these responses it could be reasoned that the respondents have observed that there are great risks involved with decentralized cryptocurrency projects, but they still have decided to keep investing in them despite the high risks involved. This could mean that decentralized exchanges and services are especially attractive to those who have a high risk appetite.

21. There are better trade opportunities in decentralized exchanges compared to centralized exchanges

18 responses

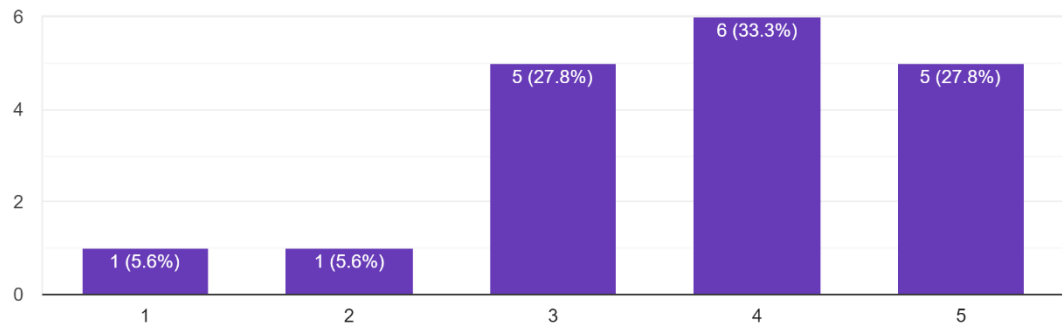


Figure 7. Respondents' thoughts of the trade opportunities in decentralized exchanges compared to centralized exchanges (Nummelin 2022)

4.2 Interviews with the owners of centralized and decentralized exchanges

Based on these responses, further information was gathered by interviewing the CEO of NorthCrypto Oy Ville Runola and the owner of a decentralized exchange who wished to remain anonymous.

4.2.1 Interview with the owner of NorthCrypto centralized exchange

Ville Runola has been involved in crypto for over nine years and started NorthCrypto Oy to enable people with less knowledge of cryptocurrencies to safely invest in them. He has also extensive experience in using decentralized exchanges. Questionnaire respondents believed that investing in altcoins is risky regardless of if they are listed on a centralized or decentralized exchange. To negate risks associated with altcoins, NorthCrypto has chosen to only provide cryptocurrencies that the company has determined to bring added value to the cryptocurrency industry. Respondents were also concerned for the safety of their data when using centralized exchanges. Finnish law states that any users who do transactions worth over 1000€ must verify themselves. As this could be circumvented by making multiple smaller unverified transactions, in practice users must verify themselves for any size transaction. When using NorthCrypto, Finnish customers can use their bank accounts to verify their identity. International customers must do typical KYC verification that involves sending details to a KYC service provider that is commonly used by multiple companies. Ville believed that this concern comes from differences in regulatory requirements in different countries. This means that while handling KYC data is strictly regulated in Europe, there might not be such requirements in other countries, or there might be stricter requirements which the provider must comply with. It requires extensive resources from a company to ensure legal compliance in multiple different jurisdictions. Previously users had to use services that were not regulated in any way, and the only option was to use shady websites that were under no regulation. Ville also preferred to distinguish centralized exchanges from those that are regulated and those that are not rather by their size or popularity.

Ville believed that more regulation would benefit the cryptocurrency industry. This is because it is detrimental to businesses as they cannot provide services to users unless they can be certain that the services are legal in the user's country of residence. Therefore, Ville thought that it is not necessarily important to make additional regulations but rather to make the rules more universal so

that services could be expanded to cover more potential customers. The regulation also gives the consumer the option to use a regulated service provider instead of having to trust the word of the service provider to store funds and data safely. NorthCrypto is regulated by Finnish Financial Supervisory Authority (NorthCrypto 2022). In practice, this means that many technical aspects of the business must be checked and approved by the authorities and that any employees have their backgrounds checked. The company agrees not to advertise its services with misleading ads that, for example, promise profits from investment.

Respondents were concerned that their funds could be frozen by a centralized exchange and preferred not to give custody of funds to them. According to Ville, no regulated entity will freeze funds without a good reason as they work predictably if they must freeze funds for any reason. A valid reason to freeze users' funds could be that they must provide more information to the service provider such as proof of the origin of their funds. Regulated services must stop the illegal activity which justifies this control over users' funds. Ville also noted that no amount of regulation can stop fraudsters from attempting to defraud other users as they will try to adapt to new regulations.

The respondents all used centralized exchanges to swap fiat currency to cryptocurrencies that are then immediately moved off the exchange to private cryptocurrency wallets. The same process can be reversed when a user wants to turn cryptocurrency into fiat currency. This process is called *on/off ramping*, and it is one of the main services that NorthCrypto provides. Ville informed that there is an ongoing discussion in the EU to regulate this type of service (European Parliament 2022). Private cryptocurrency wallets are anonymous, and Ville was doubtful that this could be done in practice as there is no way to verify who owns a specific wallet. The anonymity of cryptocurrency wallets is also an issue with taxation as it is impossible to tell who owns a specific wallet that receives or sends funds in a blockchain. Ville agrees with the respondents that decentralized exchanges have better trade opportunities for those users who are more experienced and have a high tolerance for risk. It was also noted,

that while decentralized exchanges provide better opportunities for more experienced users, using a centralized exchange is a prerequisite for anyone who wishes to trade on a decentralized exchange.

4.2.2 Interview with the decentralized exchange owner

The second interviewee requested to be anonymous. They have been involved with cryptocurrencies for nine years and took the opportunity to start a decentralized exchange when a new blockchain was launched in 2020. The exchange has been built by a team of developers, and some community members have been employed to develop the exchange. These contributors may work on the project for short or long periods, and they are employed similarly to freelancers. While these contributors can be completely anonymous, everyone in the main team has verified their identities with each other. To make sure the platform remains secure, the verified team reviews all code provided by contributors before it is added to the exchange.

The interviewee does not think that additional regulation is necessary. This is because they think that the cryptocurrency industry is the closest thing to a completely free market that has ever been available to investors. This freedom has been of great benefit to the development of financial services as there is no legislation to limit the development and deployment of new technologies. The interviewee acknowledges that there are many scams and failures, but that these are acceptable as investors are looking for very high returns on their investments. Instead of adding more regulation, they believe that educating the investors is the best way to reduce losses and that it is the wrong approach to regulate the industry as it will hinder further innovation.

The interviewee did not think that the people who run a decentralized exchange should have any responsibility for the funds of its users. This is because they only provide a platform that can be freely accessed and utilized by anyone. All actions in the decentralized exchange are done within the blockchain with public smart contracts. The exchange team cannot access any funds as every

transaction is done by the blockchain and all funds are stored by smart contracts. This removes any counter-party risk for the user. In this specific decentralized exchange, a warning is shown to users who interact with altcoins that are not verified by the exchange team. The user can then proceed to interact with the cryptocurrency at their own risk. The interviewee does not think there is anything that could be practicably done to stop the risks involved with investing in new altcoins, but that the risks are proportionate to the opportunities. Users can be educated on the risks involved so they can better evaluate if investing in a project is safe or not. While most questionnaire respondents thought that decentralized exchanges are easier to use after the initial setup, centralized exchanges are much easier for beginners. The interviewee thought this issue could be solved by making cryptocurrency wallets easier to understand and use, and by making on/off ramping funds easier. It would also be beneficial if moving funds between different blockchains would be made more convenient.

4.2.3 Analysis of survey and interview results

The survey and interview were conducted to find answers to the following research questions:

1. What are the risks and benefits of both centralized and decentralized exchanges and services?
2. Which are more suitable cryptocurrency investment platforms for beginners: centralized or decentralized exchanges and services?

To answer the first question, the risks and benefits of both centralized and decentralized exchanges and services must be considered. Based on the gathered information, the risks and benefits of both centralized and decentralized exchanges and services can be examined.

According to the survey results, centralized cryptocurrency exchanges and services are more beginner friendly and enable those who are not well

accustomed to cryptocurrencies to purchase them. As Ville explained in his interview, national authorities can regulate centralized exchanges and services, making it easier for potential users to trust the service. Regulated cryptocurrency services can detect fraud and stop suspicious activity on their platform. As is the case with NorthCrypto, centralized exchanges can also choose what cryptocurrencies to list for trading, meaning that any cryptocurrencies made available will have been thoroughly checked before users can trade with them. Centralized exchanges and services like NorthCrypto also provide on/off ramp services that enable users to purchase cryptocurrencies with a credit card or bank account, sell cryptocurrency for fiat and withdraw to a bank account. To use decentralized services the user must first use a centralized exchange that enables the purchase of cryptocurrencies that can be then used with decentralized services.

Decentralized exchanges and services provide a platform for financial technology innovation and unregulated investment opportunities to any user. The second interviewee thought that decentralized finance provides people the closest thing to a completely free market that has ever been available in history. Both interviewees and survey respondents agreed that decentralized platforms provide better trading opportunities with higher profits than centralized exchanges. These benefits come with the downside that bad actors can defraud users freely without any real risk of consequence. As was explained in the second section of the thesis, while blockchain technology enables each transaction to be seen in the blockchain, it also enables the transactor to remain anonymous. The survey results show that scamming and hacking are commonly committed on decentralized platforms, and it is practically impossible to stop as decentralized exchanges and services are completely automated with smart contracts. Using decentralized exchanges and services requires the user to have some level of understanding of cryptocurrency technology to safely utilize these services. This was confirmed by both survey respondents who recommended centralized exchanges for beginners, and Ville who started his business to enable those without these skills to invest in cryptocurrencies. According to Ville, regulated centralized exchanges and services are safe to

use, but many survey respondents still preferred to keep their funds in their cryptocurrency wallets and use decentralized exchanges and services so that they keep full custody of their funds. Decentralized services give the user the option to invest without giving any personal details to service providers or the counterparty. The second interviewee noted, that as decentralized exchanges and services use smart contracts, there is no counterparty risk on legitimate services as all contracts are completed automatically.

This data showed us the risks and benefits of both types of exchanges and platforms. Next, this data is used to answer the second research question, are centralized or decentralized exchanges and services more suitable for beginners.

Survey respondents thought that centralized exchanges are safer to use for beginners, and this was echoed in the interview with Ville who had started his business to cater to this demographic. He also explained that regulated centralized exchanges and services are safe to use as they comply with laws meant to safeguard the customer. Opening a centralized exchange account is easy and does not require any knowledge of blockchain technology or cryptocurrencies.

To use decentralized exchanges and services the user must have at least basic understanding of blockchain and cryptocurrencies. The reason is that while many respondents were very experienced with cryptocurrencies they had been scammed or hacked when using decentralized exchanges and services. Regardless of these losses, according to survey results they still believed that decentralized exchanges and services provided the best investment opportunities. The survey results show that experienced users preferred to use decentralized exchanges and services over centralized exchanges and services. As explained in section three, decentralized exchanges and services require the user to download wallet software and to interact with the blockchain, and this interaction could be confusing for a beginner to understand.

From this data it can be concluded that centralized exchanges and services are more suitable for beginners. They do not require the user to have any prior experience with cryptocurrencies nor do they require the user to download software to interact with the blockchain. As centralized exchanges check the cryptocurrencies they trade on their platform, the risk of being the victim of a scam is reduced considerably.

CONCLUSION

This thesis attempted to answer two research questions:

1. What are the risks and benefits of both centralized and decentralized exchanges and services?
2. Which are more suitable cryptocurrency investment platforms for beginners: centralized or decentralized exchanges and services?

Based on the analysis made of the survey and interviews it can be concluded that centralized exchanges and services are more suitable for beginners. Individuals who are just starting with cryptocurrency investing should first start by creating an account with a regulated centralized exchange.

Centralized exchanges provide a safe way to invest in cryptocurrencies that have been deemed trustworthy enough for the exchange to list them for trading. Purchasing cryptocurrencies on centralized exchanges and services can be done with a credit card or a bank transfer, meaning that no knowledge of blockchain technologies or cryptocurrencies is necessary to get started with investing. Centralized exchanges can also be used to sell cryptocurrencies for fiat currency, and these can be then withdrawn back to a bank account. Centralized exchanges use custodial wallets, which means that their customers must trust them to safeguard their funds.

Individuals with an appetite for high-risk/reward-style speculation can use decentralized exchanges and services to gain access to cryptocurrencies and utilities that have not yet been adopted by the mainstream user base. The risk of being a victim of a scam while using decentralized services is high, so anyone using decentralized services should have a good understanding of blockchain technology and common industry practices. While the risks are high, it is a widely accepted fact that decentralized exchanges and services offer the best opportunities for investment. In contrast to centralized exchanges, it is possible to use decentralized exchanges completely anonymous.

Additional findings were also made. From business point of view, there are conflicting findings regarding the need for additional cryptocurrency trading regulations. Businesses would benefit from international regulation as it would enable them to offer their services to a wider audience, but some argue that the lack of regulations is the driving force behind the extremely fast development of decentralized financial products. As EU is already working on further cryptocurrency regulation, it is likely that additional regulation will be enacted on the decentralized finance industry.

The presented analysis in this thesis has some limitations. The survey was conducted in a small group of about 40 people to ensure that enough high-quality answers could be collected within the short time frame that the writer had available at the time. This was a compromise between the reach of the survey and the quality of the answers.

While both interviews were successful and yielded useful data, they both only provided a single view and opinion from the viewpoints of both centralized and decentralized exchange owners.

Further research could be done with wider surveys that target cryptocurrency users who have never used decentralized exchanges or applications and vice versa. This data could be used to better profile the types of investors that exclusively use either decentralized or centralized exchanges and services. Additional interviews could be conducted with exchange or service owners to gain a better overall view of the effects of regulation in centralized and decentralized exchanges and services.

Additionally, the interview discussions regarding cryptocurrency regulation show that research into the challenges and possibilities presented by increased regulation could be of interest to companies that operate in the cryptocurrency industry.

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APPENDICES

7.1 Survey: User Experiences of Centralized and Decentralized Cryptocurrency Exchanges and platforms

1. How long have you used cryptocurrencies?

Mark only one oval.

0-1 years

2-3 years

4+ years

2. Which of the following services have you used on decentralized exchanges or platforms?

Check all that apply.

Bought/sold tokens

Listed a new token

Used leverage

Borrowing or lending

Provided liquidity

Bought derivate tokens or other assets

Deposited or withdrew fiat currency

3. Which of the following services have you used on centralized exchanges or platforms?

Check all that apply.

Bought/sold tokens Used leverage

Borrowing or lending Provided liquidity

Bought derivate tokens or other assets

Deposited or withdrew fiat currency

4. How would you describe your risk appetite with crypto trading and investing?

Mark only one oval.

High risk Medium risk Low risk

5. Have you been the victim of a hack when using a centralized or decentralized exchange?

If yes, please describe in short the type of hack and on which type of exchange it happened (example: wallet controlled by the centralized exchange was hacked with my funds in it)

Optionally you can also add how much you lost in the process (small/medium/large amount of funds)

6. Have you been the victim of a scam when using a centralized or decentralized exchange?

If yes, please describe in short the type of scam and on which type of exchange it happened (example: rug pulled after buying an altcoin from a decentralized exchange)

Optionally you can also add how much you lost in the process (small/medium/large amount of funds)

7A. Using a decentralized exchange is safer than a centralized exchange

Mark only one oval.

1 2 3 4 5

Strongly disagree Strongly agree

7B. You can elaborate your previous answer (7A) here

8. I have no issue with giving custody of my tokens to a centralized exchange

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

9. After the initial set up with wallets etc., using a decentralized exchange is easier than using a centralized exchange

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

10. I have used decentralized exchanges to purchase tokens unavailable on centralized exchanges

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

11. New altcoins are very risky to invest in

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

12. Altcoins listed on popular centralized exchanges are safe to invest in

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

13. Decentralized exchanges are more trustworthy than centralized exchanges

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

14. Decentralized exchanges are more prone to technical issues than centralized exchanges

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

15. Centralized exchanges are more beginner friendly than decentralized exchanges

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

16. I fear my funds could get stuck in an centralized exchange due to the actions of the exchange owners (i.e. freezing your funds to stop a bank run)

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

17. I feel that my personal data is at risk when I complete the KYC process at a popular centralized exchange (Binance, coinbase, Kucoin etc)

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

18. I feel that my personal data is at risk when I complete the KYC process at a small/unpopular centralized exchange

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

19. In general, the crypto space is in need of more regulation from the authorities (i.e. national financial supervision, tax office etc.)

Mark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

20. Which type of exchange do you use more often

Mark only one oval.

Decentralized exchange

Centralized exchange

21. There are better trade opportunities in decentralized exchanges compared to centralized exchangesMark only one oval.

1 2 3 4 5
Strongly disagree Strongly agree

23. Feel free to leave comments about any of the questions or your answers here