

Hochschule Bremen

Faculty 1

International Study Program Global Management (Spanish) B.A.

# **Bachelor Thesis**

## **Bitcoin Adoption**

Analysis of Factors for Missing Bitcoin Adoption in Germany using the  
example of Alumni at the Faculty of Economics at the University of  
Applied Sciences in Bremen

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## Abstract

In the following bachelor thesis, the missing Bitcoin adoption in Germany will be addressed. As a relatively low adoption of Bitcoin in Germany can be observed, the factors for missing adoption will be analyzed. The research question for the thesis is *“What are the factors for missing Bitcoin adoption in Germany using the example of alumni at the Faculty of Economics at the University of Applied Sciences in Bremen?”* and the formulated hypothesis is *“Lack of knowledge is a major factor for missing Bitcoin adoption in Germany using the example of alumni at the Faculty of Economics at the University of Applied Sciences in Bremen.”* Through applying the Diffusion of Innovations Theory by Rogers and the underlying frameworks on Bitcoin, the factors for missing Bitcoin adoption are examined. A focus on user’s adoption is set as individual decisions are eventually also a key factor in determining business decisions. In addition, a survey has been conducted by targeting alumni from the Faculty of Economics at the University of Applied Sciences Bremen in order to have a relatively highly-educated and well-earning group of participants. Consequently, the adoption rate among participants and the factors for an adoption or non-adoption are analyzed. The correlation between knowledge and ownership is then of special interest. The results show that lack of knowledge is a major factor for missing Bitcoin adoption in Germany, however, this is exacerbated by circumstances and external factors, which do not favor the reaching of the critical mass and the engagement in knowledge-seeking activities by users.

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## List of Abbreviations

BaFin	Bundesanstalt für Finanzdienstleistungsaufsicht (en. Federal Financial Supervisory Authority)
DeFi	Decentralized Finance
DOI	Diffusion of Innovations
m	million
NFT	Non-Fungible Tokens
PoW	Proof-Of-Work
P2P	Peer-To-Peer
USD	US Dollar

## **1 Introduction**

*“If you don’t believe it or don’t get it, I don’t have the time to try to convince you, sorry.”*

- Satoshi Nakamoto

Bitcoin<sup>1</sup> was introduced by Satoshi Nakamoto in 2007. Through a mailing list, Satoshi Nakamoto shared his whitepaper *“Bitcoin: A Peer-To-Peer Electronic Cash System”*, with cryptographers, technologists, and experts. His quote on the one hand indicates the religious traits that adopters sometimes display through stating *“If you don’t believe it”*. On the other hand, Satoshi displays a potential prerequisite to bitcoin adoption, which is knowledge through stating *“or don’t get it”*. Also, *“I don’t have the time to try to convince you, sorry.”* shows that effort is required to both explain and to gather knowledge in order to understand Bitcoin.

In the following thesis, Bitcoin adoption and factors affecting and influencing its potential adoption, will be explored. The motivation and problem formulation will display the research question and hypothesis that is set for this thesis. The research question deals with the analysis of factors for missing Bitcoin adoption. In the hypothesis it is claimed that knowledge is a major factor for bitcoin adoption, and more specifically, for bitcoin ownership. With reference to the quote, knowledge can be a major factor for potential adoption and its sustainability.

### **1.1 Motivation & Problem Formulation**

Bitcoin’s adoption in Germany is still lagging in comparison to international adoption levels. Different analyses of blockchains indicate higher usage and ownership levels in developing countries over in East Asia, Africa and Latin America, for example. Adoption, however, can be viewed from two different perspectives: First, from the business perspective and secondly, from the user perspective. A combination of both eventually determines the level and speed of adoption. The more merchants, stores and other businesses adopt Bitcoin and enable trading or payment activities for example, the more likely the user will consider to invest into or pay with bitcoin. Nevertheless, the user can be considered the key to adoption as individual users decide

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<sup>1</sup> Generally, when talking about Bitcoin with an uppercase “B”, it will be referred to the protocol and payment network. Bitcoin with a lowercase “b” is associated with the currency being bitcoin.



upon the enablement in businesses as well. Therefore, the focus will lie on the user perspective by also considering the business adoption as a factor in this thesis.

Furthermore, bitcoin is still viewed as a store of value, thus an investment product. When looking at private investors' activities in Germany, a preference over cryptocurrencies and bitcoin with other investment products such as funds and real estate, can be identified. However, there is also growing demand for bitcoin and investors wish to invest into bitcoin in the future. A lot of crypto exchanges exist as well as other enablers that facilitate the buying of bitcoin. Based on this, there is a huge amount of competition but also potential confusion for someone who is getting into this market for the first time. Therefore, there might be a hurdle to enter the sphere due to high complexity and also lack of knowledge.

Lastly, traditional banks, as a potential point of contact, are now slowly starting to offer institutional investors to buy bitcoin – but still not to private investors. As German private investors are still rather conservative, they might not have a reliable point of contact even if demand exists, which might be the reason for missing adoption as there is a lack of supply. Thus, private investors must do their own research and try to figure out a way into the space by themselves if they are interested. However, due to the sphere's complexity, it might be difficult for laymen to make educated decisions, which leads to the avoidance of adoption in the first place. As a result, lack of knowledge might be a crucial factor which deters private people from adopting bitcoin. On top of this, negative media coverage and reporting, which influences individuals' perceptions and behaviors, might have a major impact as well.

In conclusion, the still rather negative and critical public image, rather conservative private investment activities, and Bitcoin's complexity are potential factors claimed to affect bitcoin adoption in Germany. These factors are potentially grounded in lack of knowledge. In this thesis, the factors for missing adoption in bitcoin regarding private investors and specifically lack of knowledge as a potential deterring factor will therefore be investigated.

Following the above-described motivation and problem formulation, the thesis will focus on the factors for missing adoption. Alumni are chosen as the special focus group to be examined as they represent the well-educated part of society. In the empirical study, alumni from the Faculty of Economics at the University of Applied Sciences in Bremen have been questioned to have an example case. As lack of knowledge is a potential burden for potential bitcoin owners

in general, the pool of respondents shall have a relatively high standard of education. If lack of knowledge is a crucial factor for missing adoption in Bitcoin for alumni, the same can probably be applied to the general society which is less educated.

Based on this, the research question for the thesis is the following:

***What are the factors for missing Bitcoin adoption in Germany regarding alumni at the Faculty of Economics at the University of Applied Sciences in Bremen?***

Lack of knowledge is expected to be a key factor for missing adoption in Bitcoin pertaining to private persons and also alumni. This is due to the assumption that Bitcoin as an innovation is highly complex and points of contacts to gather reliable and easy understandable information in order to gain knowledge is lacking.

Based on this assumption, the following hypothesis is formulated and is to be elaborated throughout the thesis:

***Lack of knowledge is a major factor for missing Bitcoin adoption in Germany regarding alumni at the Faculty of Economics at the University of Applied Sciences in Bremen.***

## 1.2 Examination Approach & Structure of the Work

The examination approach aims to be the guide to find out what the factors for missing adoption in Bitcoin from alumni in Germany are and if indeed lack of knowledge is the key and deterring factor. Therefore, a focus on individual users is set and an example case of alumni is used.

At first, Bitcoin's underlying technology, its functions, and some basic information in order to understand the differences to traditional forms of money and to understand its innovativeness are set as theoretical foundations to be discussed. In addition to it, the theoretical framework to assess and investigate potential factors for missing adoption is introduced.

In the main section, the status quo of Crypto and Bitcoin adoption worldwide as well as in Germany in particular will be discussed. Based on this, the factors and influences on missing Bitcoin adoption in Germany will be explored. This will be conducted by using the “*Diffusion of Innovations Theory*” by Everett M. Rogers. The theory outlines the adoption and innovation-decision process of individuals in a social system. This model will be applied to the innovation of Bitcoin by specifically focusing on the first two phases, which are knowledge and the shift towards persuasion.

Lastly, results from a survey conducted with alumni at the Faculty of Economics at the University of Applied Sciences in Bremen will be displayed in order to understand and validate priorly discussed potential factors for missing adoption. Based on the outline of factors and influences on missing adoption in Bitcoin in Germany regarding alumni, recommendations for actions will be pointed out.

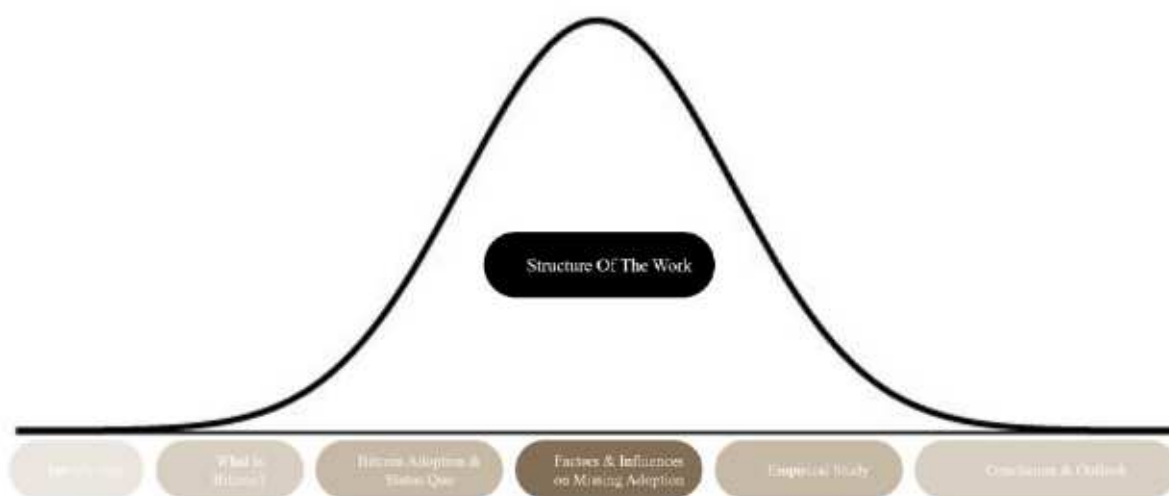


Figure 1: Structure of the Work

## **2 Definition of Bitcoin & The Diffusion of Innovations Theory**

In the following chapter, the theoretical classification and foundation will be provided. Bitcoin will be defined in order to establish a common ground for understanding. The definition will be split into two parts. First, Bitcoin will be classified in terms of an asset or a currency. Secondly, an insight into the underlying technology and differences to traditional forms of money and assets will be given in order to understand its complexity on the one hand, and its innovativeness on the other hand. Lastly, the model to analyze the factors for missing adoption “*Diffusion of Innovations*” will be introduced and its underlying frameworks will be depicted.

### **2.1 Definition of Bitcoin – Classification & Technology behind Bitcoin**

#### **2.1.1 Classification**

In 2008, Satoshi Nakamoto, whose real identity is still unknown, published the whitepaper “*Bitcoin: A Peer-To-Peer Electronic Cash System*”, which marks the birth of Bitcoin and its underlying technology. The birth of this innovation represents the first ever solution to the Byzantine General’s Problem and the enablement of the transfer of value at great speed and over great distance, without the reliance on a central authority – thus, peer to peer. The invention of Bitcoin is an answer to the Financial Crisis in 2008 as Nakamoto depicted in the first-ever minted block – the genesis block.

The solving of the Byzantine General’s Problem in a computer system, which was a study for computer scientists in fault tolerance and described the infeasibility for decentralized ledgers, represents a huge milestone and the major difference and innovation to traditional financial and monetary systems (Lamport et al. 1982: 1). Historically, all ledgers<sup>2</sup> have been centralized and left this measure of control to central record-keepers. This had the risks and weaknesses of potential corruption, exclusion, and technical failures. Through the collection of different concepts and technologies, Nakamoto created Bitcoin, which is a solution to solve these problems.

In the current financial system, individuals have the possibility to conduct *cash payments* on the one hand, “which are carried out in person between two parties” (Ammous 2018: 169)

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<sup>2</sup> A complete record for economic activities, usually to keep track of the transfer of money and asset ownership.

making it convenient for immediate payments. Also, there is no requirement of validation by a central authority as both parties agree upon the transfer and physically conduct the exchange. However, as digitalization advanced and the demand to conduct transactions with peers, who are at great distance and not in your direct neighborhood increased, *intermediated payments* occurred. Intermediated payments, as opposed to cash payments, historically required a middleman and third party conducting and handling the transfer of money. One of the main issues recognized by Nakamoto is the trust which is based on the third party that is involved in this process. This trust involves “the risk of the third party being compromised, and the costs and time required for the payment to be completed and cleared to allow the recipient to spend it.” (Ammous 2018: 169).

Bitcoin solves and eliminates the issue of reliance on a third party, the costs and time required for the payment to be completed and cleared in the field of intermediated payment. In terms of cash payment, Bitcoin’s solution has advancements in terms of portability, verifiability, divisibility, and censorship resistance (Boyapati 2018). Within the collection and orchestration of different technologies to form the ecosystem, bitcoin represents the monetary unit and currency. Individuals can store and transfer this value within this system, which happens on the internet mainly and can be conducted on a wide range of devices. Individual users can use bitcoin like money and buy and sell goods and services, however, now completely virtual (Antonopolous 2018: 1).

In order to classify Bitcoin and outline its innovativeness, it is crucial to look at the major functions a currency and asset can have:

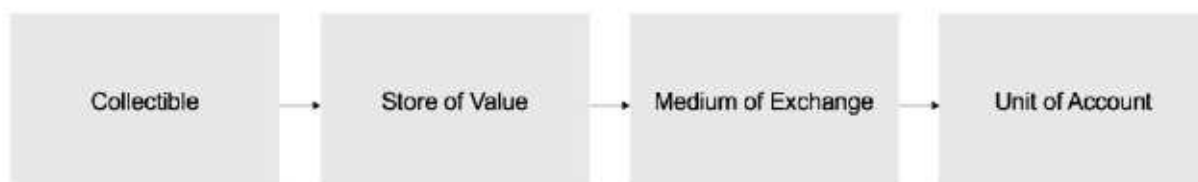


Figure 2: Evolution Stages of Money (inspired by Boyapati 2018)

During the last century, the issuance of money was monopolized and managed centrally. This meant that a central authority, such as a government, decided upon a common form of currency as legal tender. Historically, a form of money always evolved through four major stages.

A form of money first starts to become a *collectible*. People start to collect the form of money due to its properties and features. In the example of Bitcoin, early adopters and owners were impressed by the technology and its innovativeness, as they were able to conduct anonymous payments and participate in a decentralized network.

Consequently, when the form of money starts to be demanded by more people due to its properties and features, it will become a *store of value*, which means that people aim to hold the asset or currency across time in order to increase their wealth (Vaz et al. 2019: 22). Bitcoin finds itself in this evolution stage, as can be indicated through society's perception. Bitcoin is considered as an investment product by investors, which means that investors are looking to at least store but optimally gain value from an investment into Bitcoin (Jung 2022). In terms of having a store of value, people look for resources which are scarce and limited. Especially the fact that Bitcoin is strictly limited and cannot be changed, reinforces this perception as there can only ever be 21 million bitcoins in existence (Ammous 2018: 198).

As bitcoin is perceived as a store of value and people tend to hold on to bitcoin rather than use it, this brings up the fact that it is not yet to be considered as a medium of exchange, which would be the next step in the evolution. The function of *medium of exchange* describes the “capabilities that improve the ability of the money to be exchanged for goods or services in transactions such as being acceptable in society, convenient to use, having a low cost of use relative to the value being exchanged and easily transferable” (Vaz et al 2019: 22). Bitcoin does represent an improvement in this regard, however, is not yet to be considered as a medium of exchange in society in the most cases. Rather, as pointed out, people tend to store their bitcoins rather than spend them. Bitcoin holders hold their coins for an average of 2.7 years (Nock 2019). In order to reach the next evolution stage and eventually have people consider it as a unit of account, where society measures and values goods or services based on Bitcoin, adoption would potentially need to increase.

Various currencies have passed through phases of barter, primitive money, commodity money and fiat-money in the last centuries. Bitcoin and other cryptocurrencies, now, in comparison to previous forms of money, represent a new form of currency and money that is private, virtual, and decentralized with a fixed algorithmic supply. However, bitcoin finds itself in the early stages of evolving to a potential means of payment as it is not considered as a medium of exchange and a unit of account by most people yet but rather as a store of value and therefore as

an asset. It profoundly differs from the prior forms of money, which is why the underlying technology will be examined in the following.

### 2.1.2 Technology behind Bitcoin

Essentially, Bitcoin differs to traditional forms of money due to the orchestration of different underlying technologies. The technologies result in new forms of ensuring trust within a financial system and differences in utilization in comparison to the traditional financial system. The major and most obvious difference to traditional currencies is the fact that it is fully virtual and not physical (Antonopoulos 2018: 1). However, Nakamoto did not build Bitcoin from scratch but rather brought together different forms of technologies, which were developed earlier. Also, bitcoin is not the first decentralized and digital currency. In fact, many attempts preceded it and grounded the work for Nakamoto. In the following, the major differences, technologies, principles, and the overall innovation of Bitcoin will be depicted.

Bitcoin enables transactions in a peer-to-peer network. This is enabled through the usage of the blockchain technology. The blockchain represents a public ledger which stores all the transaction data from the first ever transaction in 2009 until today and continues to do so for all future transactions. This also means that anyone can trace back all transactions at any time, which eventually ensures transparency. The transactions are validated by so-called “miners”, stored in a block, and connected to previous blocks to build the blockchain. However, the process involves much more activity to allow for transparency.

One of the technologies used is the so-called *proof-of-work mechanism*, which was introduced in 1997 by Adam Back in his work “*Hashcash – A Denial of Service Counter-Measure*”. The purpose was to “throttle systematic abuse of un-metered internet resources such as email” (Back 2002: 1) and therefore to prevent email spam. This technology was later incorporated into Bitcoin by Nakamoto. This process involves a so-called *mining* activity, where nodes, which are computer systems located somewhere in the world running the open-source Bitcoin software, ensure the validity of transactions, and store them in data blocks by building the blockchain.

The validation and verification of transactions is conducted by miners through basically checking if the sent bitcoins are sent by a party which truly possesses the bitcoins in order to avoid

double-spending. A miner's task is to solve a mathematical problem through the usage of computing power as fast as possible in competition with other miners. This action of solving a cryptographic puzzle to validate a block of transactions by using computational power and work is then referred to as the PoW mechanism. As miners require computational power to validate transactions, they require an investment in acquiring hardware to participate in the network. The more computing power a miner has, the faster he is to solve the puzzle and the more likely he is to receive a block reward. For block validation, the respective miner receives a block reward and is issued newly minted bitcoins. The Bitcoin algorithm allows for a block to be added about every ten minutes, which is ensured by automatically adjusting the difficulty of block solving. The current block rewards amount 6.25 bitcoins. Initially, the block reward was set at 50 bitcoins but is then halved every 210,000 blocks, which is approximately every four years. As Bitcoin has a limited supply and only 21 million bitcoins will ever exist, bitcoins will be issued until the year 2140. From this point onwards, miners will not be rewarded by the issuance of bitcoin anymore but by transaction fees.

Essentially, the main idea through the usage of the PoW mechanism “is to ensure immutability of the ledger” (Halaburda et al. 2016: 106) and to incentivize participation to the good and benefit of the network. The solution of a block becomes a part and indication of the respective block, which is added to the blockchain and the previous block. Therefore, it is impossible to add fraudulent transactions or blocks as all preceding blocks would have to be redone. This mechanism, however, is often criticized as it involves a lot of computational power and therefore consumes a lot of energy.

Furthermore, another technology used is *public-key cryptography*. Public-key cryptography enables the identification of parties, allows to trace back the path of all transactions and builds the Peer-to-Peer network of Bitcoin. The parties are identified by strings of letters and numbers, which form the so-called “public key”. Eventually, the system is not fully anonymous, but rather pseudo-anonymous as individual users have public addresses as their consistent identifier. Public-key cryptography is also commonly applied in various internet systems such as e-mail or login passwords and is also fairly similar to existing procedures in centralized networks. Traditionally, a proof to spend a coin or amount of money needed to be verified to ensure the possession of the amount that is aimed to be sent, has been done through the checking of intermediaries. For example, the verification and identification are done through logging into a bank



account. When triggering a transaction, the system checks the availability of funds. Now, this is embedded in the code of Bitcoin and happens automatically.

In conclusion, Bitcoin's technological advances are a decentralized P2P-Network, the block-chain technology and the PoW-algorithm in combination with consensus rules (Antonopolous 2018: 2). Due to the decentralization of the system, custody and storage does not necessarily lie in an intermediary's responsibility. Instead, users are solely responsible for their bitcoins and have different custody methods and options they can use. A common misconception is that so-called *wallets* are used to store bitcoins, but rather the private and public keys are stored to have control over the bitcoins as users prove the ownership of bitcoins through the ownership of the respective keys, which are the signature of conducted transactions.

Users can either store their cryptocurrencies or bitcoins on centralized exchanges, where private and public keys are stored and secured by the institution or decide to store it on a personal wallet. There are three main options for self-custody of cryptocurrencies and bitcoin differing in security:

*Software wallets* are web-based, desktop or mobile wallets on which various cryptocurrencies can be stored and accessed via browser or app and via a phone or computer system. *Paper wallets* are printed options to store relevant information, which is the public and private key pair, on a piece of paper. Lastly, individuals can use *hardware wallets* which are offline devices. Users must connect these devices to the internet, transact their cryptocurrencies or bitcoins to the device and eventually remove the device from the internet. Having it stored offline makes it impossible to be hacked (Bitcoin.com 2023).

In conclusion, Nakamoto has designed Bitcoin with major principles such as scarcity to protect against counterfeiting and inflation and made it open source, so that it is fully transparent and available to anyone. The built-in incentives allow for positive contribution in favor of the Bitcoin network, which grows security the bigger the network gets. The essential and key innovation, however, is that it is a decentralized technology, which avoids the misuse of power by an individual.

## 2.2 Diffusion of Innovations Theory

In his work “*Diffusion of Innovations*” Rogers developed several models and frameworks to explain the diffusion and adoption of innovations in social systems. In fact, Rogers defines diffusion as “the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers 1962: 5). In his work, he specifically focuses on the diffusion of “technologies”, as he synonymously uses the word “technology” to “innovation”. Bitcoin has been classified as an innovation in comparison to traditional forms of money, which is the reason why Roger’s frameworks on diffusion and adoption for the purpose of examining Bitcoin’s adoption are chosen.

### 2.2.1 The Innovation-Decision Process

Rogers defines diffusion to be a process in which individuals in a social system exchange information about a certain innovation and start off into the innovation-decision process. Adoption is than the potential result of the innovation-decision process, as individuals decide to either reject or accept and integrate the innovation into daily life. The definition inherits four main elements which affect the decision process:

First, the *innovation* itself, which can be anything that is perceived to be new by an individual, influences a potential adopter. The individual’s perception is the result of the reaction to the perceived novelty of the innovation and the changes to the status quo (Rogers 1962: 11). Especially with technological innovations, an innovation creates uncertainty for potential adopters who have an unawareness of potential adoption consequences which are not obvious. Therefore, a knowledge-seeking activity to figure out the potential advantages or disadvantages of adoption as well as potential opportunities or threats that would result in an adoption are essential in order to proceed in the innovation-decision process and eventually arrive at the decision of adoption or rejection.

The knowledge-seeking activity is conducted through certain *communication channels*, which is the second important factor. The knowledge-seeking activity is conducted about (1) an innovation between (2) an individual who has knowledge, (3) an individual who does not have knowledge yet (4) through a communication channel (Rogers 1962: 17). The communication

channel can either be mass media, in modern times also social media, and interpersonal exchanges.

Also, *time* is a crucial element as the potential adoption or rejection of the innovation is the result of a process which takes time. In the innovation-decision process, which can also be referred to as information-seeking and information-processing activity, an individual passes through a process of first gaining knowledge to forming an attitude, to decision and lastly adoption or rejection. (s. Figure 3). Within this process, the individual tries to reduce uncertainty about the consequences of potential adoption through obtaining enough information to form an attitude (Rogers 1962: 20).

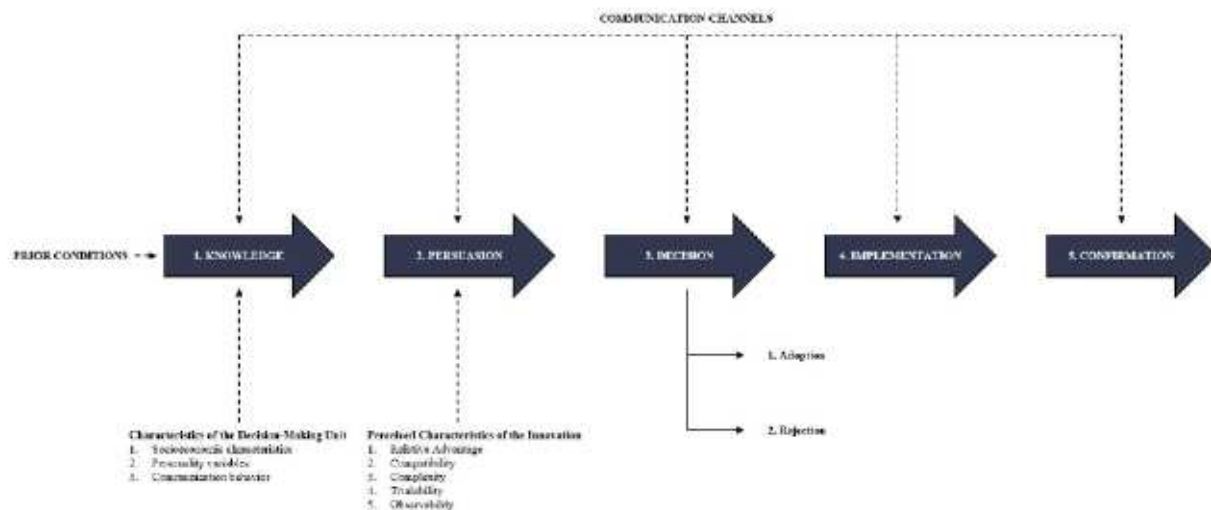


Figure 3: Innovation-Decision Process (Rogers 1962)

Lastly, individuals are affected by the norms of the *social system* they live in. The general social structure of the system affects the innovation’s diffusion and individual’s decision process in many ways: communication structure, thus, the way information is generally communicated within the system, cultural norms as well as if change agents and opinion leaders exist (Rogers 1962: 24).

All of these elements affect the innovation-decision process of an individual. The innovation-decision process itself has five major phases (s. Figure 3):

The first phase is called *knowledge*. In this phase, the individual becomes aware of the innovation and develops an understanding of how it works. There are three different forms of knowledge. *Awareness-knowledge* is the sheer knowledge about the existence of the innovation,

*Principles knowledge* is the general knowledge about functionalities and *How-To Knowledge* means that the potential adopter can correctly utilize the innovation (Rogers 1962: 167f). So, if how-to knowledge is poor and the individual does not know how to use the innovation, it can either not be considered or be rejected. With missing principles knowledge, the probability to use the innovation falsely also increases and awareness knowledge is key to learn about the innovation in the first place. Knowledge is therefore a crucial first step, which lays the foundation for a potential adoption at the end of the innovation-decision process. Knowledge and potential knowledge-seeking activities are highly affected by external effects such as prior conditions like previous practice, felt needs and problems, innovativeness and the already touched-on norms of the social system. Also, the individual's characteristics play a role such as socio-economic characteristics, personality variables and communication behavior. These factors will be tackled in 2.2.2 Adopter Categories.

The second phase is *persuasion*. In this phase the individual develops an attitude towards the innovation after having started to gain knowledge. The potential adopter weighs pros and cons and potential consequences in case of utilization or adoption. In this phase, the individual's perception of the innovation plays a crucial role. These characteristics and attributes are *relative advantage*, *compatibility*, *complexity*, *trialability* and *observability* (Rogers 1962: 210ff). Based on these attributes, the individual determines the degree to which an innovation is perceived as being relatively better as the current practice (relative advantage). Also, the potential adopter has certain values, experiences, and needs, also based on the social system, and decides based on this (compatibility). The degree to which an innovation is considered and perceived to be relatively difficult to understand and use is also a factor on potential adoption. The more complex an innovation is in terms of use, the more likely the individual is to reject the innovation (complexity) (Rogers 1962: 238f.). Lastly, the individual weighs in terms of the degree to which an innovation may be experimented with and the degree to which the results of an innovation are visible to others (trialability and observability). The higher the degree of trialability and observability, the more likely the individual is to adopt the innovation (Rogers 1962: 238f.).

After persuasion, the next steps in the innovation-decision process are *decision*, *implementation*, and *confirmation*. In these phases, the individual decides whether to adopt or reject the innovation through concrete actions. Either the innovation is adopted or actively or passively rejected. An active rejection is the result of a process of weighing pros and cons. In case of a

passive rejection, the individual did not consider the adoption in the first place (Rogers 1962: 172ff). In case of an adoption, the individual moves into implementation, thus uses the innovation actively. In the confirmation phase, the individual looks for information to confirm the decision and tries to avoid others. In case the individual finds out that information about the innovation is disharmonic after adoption, it can lead to termination of use and a rejection.

The innovation-decision process is a model, which can be used to examine the adoption journey of an individual and to identify potential factors of rejection or missing adoption by applying Bitcoin as an innovation. However, not all the phases will be referred to in this thesis. In fact, with regards to the research question, the knowledge phase, and its factors as well as the shift into persuasion will be elaborated and focused on (s. Figure 4).

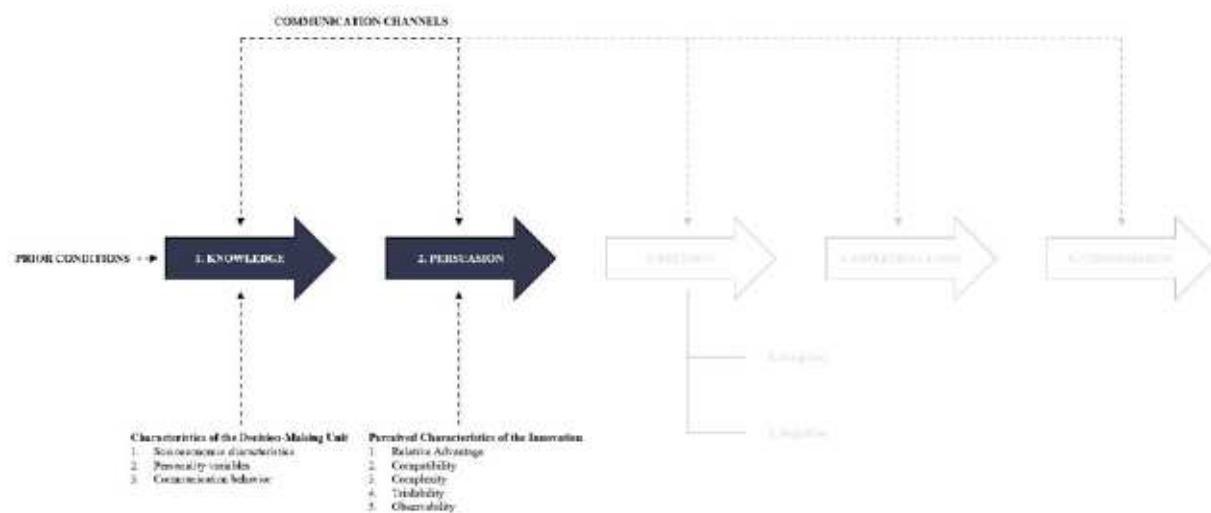


Figure 4: Innovation-Decision Process and the focus area (Rogers 1962)

## 2.2.2 Adopter Categories & S-Curve of Diffusion

To examine the development of diffusion and adoption of an innovation in a social system, Rogers uses a model with certain adopter categories, which was built based on several studies conducted in social systems (Rogers 1962: 241ff). A social system can generally be divided into certain segments of adopters as individuals differ in timing and speed of adoption (s. Table 1 & Figure 5). Also, the previously mentioned personality characteristics and attributes are considered.

Adopter Category	Characteristics & Attributes	Strategies
<b>Innovators</b>	<ul style="list-style-type: none"> <li>• Venturesome individuals</li> <li>• Interested in new technologies and innovations</li> <li>• High risk and uncertainty tolerance</li> <li>• Take own initiatives</li> <li>• Gatekeepers between social systems</li> </ul>	No strategies needed, as innovators take own initiatives to go into the innovation-decision process.
<b>Early Adopters</b>	<ul style="list-style-type: none"> <li>• respected opinion leaders</li> <li>• inherit leadership roles</li> <li>• peers refer to them for advice</li> <li>• can act as change agents<sup>3</sup></li> <li>• question the status quo and recognize the need to change and innovate</li> </ul>	How-to manuals and information sheets on implementation, no conviction regarding the need to change necessary
<b>Early Majority</b>	<ul style="list-style-type: none"> <li>• one of the largest groups</li> <li>• not opinion leaders, but adopt new innovations just before the average person</li> <li>• need evidence for relative advantage and improvements to the status quo to adopt</li> </ul>	Success stories and evidence of the innovation's effectiveness
<b>Late Majority</b>	<ul style="list-style-type: none"> <li>• one of the largest groups</li> <li>• adopts new innovations just after the average person</li> <li>• starts to consider in case of economic necessity and pressure from peers</li> <li>• low risk and uncertainty tolerance, skeptical of change</li> <li>• late movers to an innovation</li> </ul>	Success stories and evidence of how other people have tried the innovation and adopted it successfully
<b>Laggards</b>	<ul style="list-style-type: none"> <li>• conservative</li> <li>• low risk and uncertainty tolerance, skeptical of change</li> </ul>	Statistics, fear appeals, pressure from people in other adopter groups

Table 1: Adopter Categories (inspired by Rogers 1962)

The adopter categories can give an insight on who is currently adopting a certain innovation and what strategies could be taken by change agents to increase adoption. However, the innovation itself needs to always be considered as individuals might be in different adopter categories for different innovations. The curve in Figure 5 indicates the size of the respective category – based on the conducted studies. As innovators represent just 2,5% of a social system, they are the smallest part. Respectively, early majority and late majority represent the highest shares of a social system (Rogers 1962: 246). Therefore, reaching the early majority is also referred to as the “critical mass”, as a big part of society is reached and determines further potential adoptions.

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<sup>3</sup> Change agents are individuals who promote the innovation to their peers (this activity does not necessarily imply the conviction to adopt an innovation, but rather the change agent communicates his or her personal way through the innovation-decision process and own experiences to their peers)

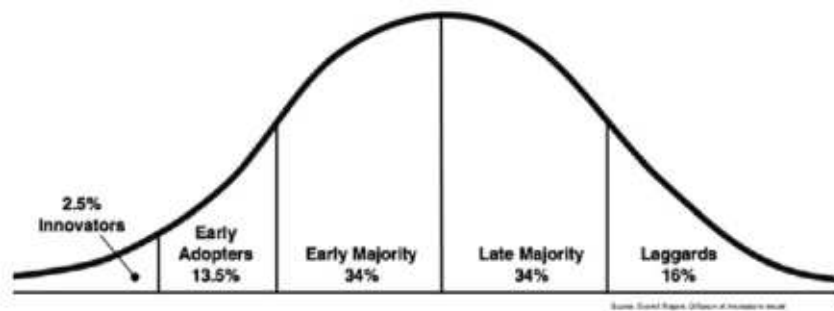


Figure 5: Adopter Categories (Rogers 1962)

As the adopter categories can give us an insight on the diffusion of innovations across a social system and at what timing and speed individuals tend to adopt an innovation, the S-Curve of Diffusion (s. Figure 6) shows us the adoption percentage distribution over time (Rogers 1962: 243). In brief, according to Rogers, innovations generally diffuse in two ways: Either in a bell-shaped frequency curve, which shows us failing adoption of innovation, or in a cumulative s-shaped curve, which depicts a successful adoption of an innovation.

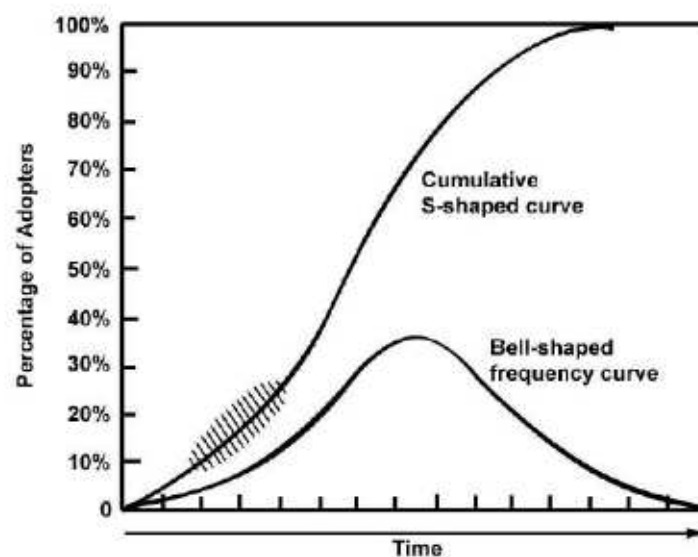


Figure 6: S-Curve of Diffusion (Rogers 1962)

These models will be used in addition to the innovation-decision process to first identify and map individuals to certain adopter categories, which disclose certain factors for adoption. Secondly, on the s-curve of diffusion the status quo of percentage adoption can be identified and seen and at what stage of adoption a social system and the innovation is located.

### 3 Status Quo Adoption & Analysis of Factors for Missing Adoption in Germany by applying the Innovation-Decision Process

Bitcoin, like other innovations, only lives when it is owned and adopted by individuals. However, it needs to be considered that the adoption of bitcoin is of a two-sided nature as individuals play a role by holding bitcoins and making payments, but also businesses such as merchants who accept or enable the purchase or payment play a crucial role. When talking about the adoption of bitcoin, it is specifically referred to user adoption, but in the context of ownership only, as payments are only enabled for individuals in case of business adoption.

In the following chapter, an examination of the general status quo regarding the adoption of cryptocurrencies and especially Bitcoin, as well as the analysis of factors for missing Bitcoin adoption in Germany will be conducted.

#### 3.1 Cryptocurrency & Bitcoin Adoption in Germany & Worldwide

Bitcoin as a technology has already reached worldwide attention (Block 2022: 17). There are multiple organizations analyzing different blockchains and tracing the paths of cryptocurrencies to compare adoption and activity across countries. Chainalysis is one of these companies, which depicts the status quo and the different developments with regards to cryptocurrency and bitcoin activity with yearly editions of the *Geography of Cryptocurrency Report* (Chainalysis 2022).



Figure 7: Share of all value received and sent in 2020 (inspired by Chainalysis 2020)

As Figure 8 indicates, the highest share of all value received and sent in 2020 was in East Asia (31%) and next in Northern & Western Europe (17%). However, this has changed, and North



America surpassed Northern & Western Europe in the last two years (Chainalysis 2022). In 2020, Germany ranked 33<sup>rd</sup> out of 154 countries in the Global Cryptocurrency Adoption Index, which is based on estimated total cryptocurrency received weighted by wealth per resident, activity of individual cryptocurrency users, ratio of cryptocurrency deposits and internet users and peer-to-peer trade volume (Chainalysis 2020). In 2021, even though worldwide adoption increased by 880%, Germany ranked even lower by placing 49<sup>th</sup>. Central, Northern & Western Europe amount for 25% of the total value received, however, most of the transactions are connected to large institutional (> \$10 m) and institutional (\$1 m - \$10 m) investments. Consequently, a missing engagement and adoption from private persons and investors can be observed. In the 2022 Geography Report, Germany was then ranked higher, just missing out on the Top 20, on rank 21. In this report, however, Chainalysis also added DeFi transactions, including NFTs, which results in a distortion of the results when aiming to consider cryptocurrencies and bitcoin in particular (Chainalysis 2022).

Nevertheless, it can be observed that in the recent years the adoption and acceptance of cryptocurrencies in general has increased – also in Germany as they developed from rank 49 in 2021 to rank 21 in 2022 in just one year. Germany's activity grew by 47% which is due to progressive developments and adjustments of regulations which shows the opening towards the crypto world also from the government. An enforcement of a 0% long-term capital gains tax as well as the allowance to invest in cryptocurrencies for different asset managers and institutions led to more on-chain cryptocurrency activity in Germany (Fulton 2022; JDSUPRA 2022). Also, Germany is referred to as “one of the world's top crypto safe-havens” (Fulton 2022) and is considered as one of the crypto-friendliest countries as more and more Bitcoin nodes locate themselves in the country due to the regulatory eases (Ozelli 2022). As one of the largest crypto exchanges *Binance* moved to Germany, this fact was reinforced.

However, as mentioned, most of the value depicted in the index is referred to DeFi activities mostly conducted by institutions (Chainalysis 2022: 33) and does therefore not represent the bitcoin activity by individuals specifically. When hiding the DeFi activities, Germany's share of crypto and bitcoin owners is relatively low in comparison to other countries – as indicated

by Triple-A<sup>4</sup>. As of January 2023, Germany has 4,2% (approx. 3,5m) crypto owners and bitcoin remains the most popular choice (Triple-A 2023). In comparison with other countries, the relative ownership of bitcoin is quite low (s. Figure 8). As indicated in the Geography of Cryptocurrency Report by Chainalysis, most of the top ranked countries are developing countries (Chainalysis 2022: 4). In fact, the World Bank classifies countries in terms of income in four major categories: Low income, lower middle income, upper middle income, and high income. In the TOP 20, ten<sup>5</sup> are classified as lower middle income, eight<sup>6</sup> as upper middle income and only the United States and the United Kingdom are included as high-income countries.

Vietnam is ranked first with 26% (approx. 28.8m) and India has the highest absolute users with approx. 158m (Triple-A 2023). Nigeria, as a developing country representing the African continent in this case, also has a relatively high share of crypto owners and 35% of Nigerian adults, aged 18 to 60, are said to own or have owned cryptocurrencies at some point (Kucoin 2022). The reasons for higher adoption in developing countries are higher reliance on cryptocurrencies “to send remittances, preserve their savings in times of fiat currency volatility, and fulfill other financial needs unique to their economies.” (Chainalysis 2022: 9).

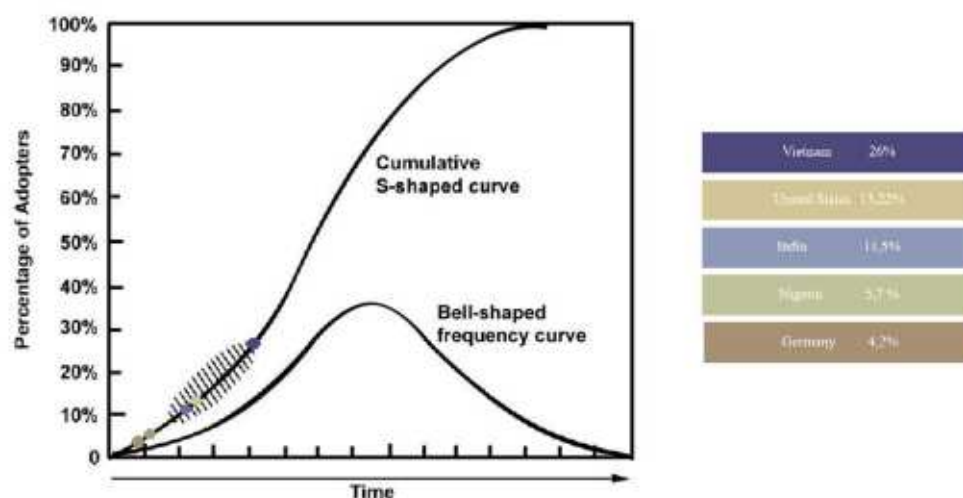


Figure 8: Crypto Adoption (percentage based on total population) (inspired by Rogers 1962)

<sup>4</sup> Triple-A derives the on-chain data from Chainalysis and weights the scoring according to the same dimensions – however, without DeFi and other developments. “As a leading cryptocurrency payments company” (Triple-A 2023), they strive to provide statistics to ease the entrance into the market and make it more tangible and understandable for businesses.

<sup>5</sup> Vietnam, Philippines, Ukraine, India, Pakistan, Nigeria, Morocco, Nepal, Kenya, and Indonesia (Chainalysis 2022)

<sup>6</sup> Brazil, Thailand, Russia, China, Turkey, Argentina, Colombia, and Ecuador (Chainalysis 2022)

Figure 8 shows the crypto adoption based on the relative crypto ownership. It needs to be pointed out that crypto ownership is highlighted here and not filtered by bitcoin as there is no reliable source indicating bitcoin ownership as such. However, consulting this information can give a hint on bitcoin ownership as survey results from respective countries show that bitcoin has the highest popularity (Triple-A 2022). Displaying the ownership levels on the s-curve of diffusion depicts that adoption of crypto and bitcoin from the user perspective is still relatively low, is in its early stages and did not reach the critical mass yet – irrespective of the country and whether displaying it on the s-curve (potentially successful adoption) or the bell-shaped curve (potentially failed adoption). Focusing on Germany, however, it can be stated that relative ownership is low in comparison with other countries in the top 20.

### **3.2 Positioning towards Bitcoin in Germany**

As already pointed out, Germany has opened towards cryptocurrencies in general and the government has eased trading and investing activities with new regulations. Also, there is now an initiative on the blockchain subject, which reinforces this fact. The BaFin<sup>7</sup> published a paper on a federal blockchain strategy which depicts measures that will be taken to innovate the financial sector on the basis of the blockchain technology (Bundesministerium Wirtschaft und Energie 2022). In the following, the general positioning in Germany towards Bitcoin in particular will be examined.

#### **3.2.1 Bank's Offerings & Services around Bitcoin**

Bitcoin can generally be bought on so-called crypto exchanges and brokers. CoinMarketCap can give an insight on crypto exchanges and brokers, where individuals would be able to exchange their fiat money for bitcoin. As of January 13<sup>th</sup>, 2023, there are 536 spot exchanges (CoinMarketCap 2023). As there is a lot of competition and therefore potential confusion for an individual with regards to exchanges and where to buy bitcoin, individuals may be hesitant to purchase bitcoin. Historically and recently there have been some exchange scandals and

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<sup>7</sup> Abbreviation for „Bundesanstalt für Finanzdienstleistungsaufsicht“, which is the Federal Financial Supervisory Authority in Germany

bankruptcies which further reinforced fear and confusion. A recent example from November 2022 is the exchange FTX (Yaffe-Bellany 2022).

Surveys from the Bankenverband (s. Figure 9) show German investor’s preferred as well as desired investment products in 2021 and 2022. It can be observed that cryptocurrencies, including bitcoin, are not preferable investment products yet. However, investors desire to invest in cryptocurrencies in the future.

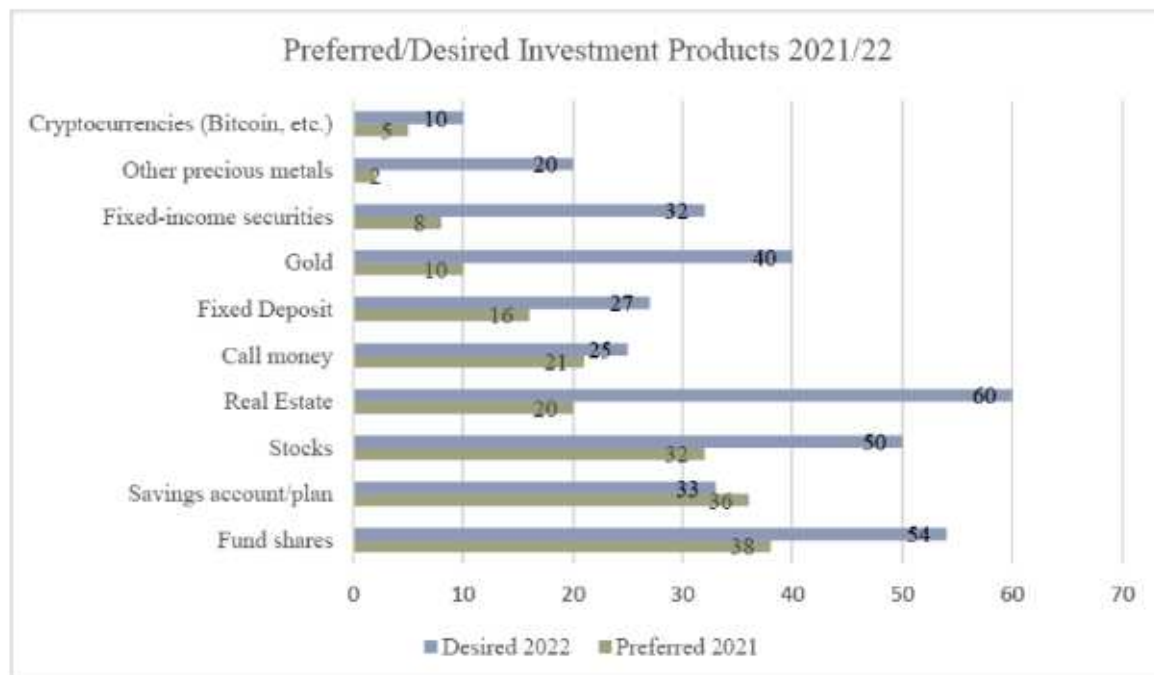


Figure 9: Investing in 2021/22: Annual Review and Trends (inspired by Jung 2021)

Traditionally, banks have been a point of contact for private investors in case of traditional investments. In case of cryptocurrencies and bitcoin, traditional banks have still been cautious. Table 2 shows some banks which have been progressive in terms of enabling products and services around bitcoin, which are mostly related to custody and trading. However, these are either recently founded banks, privately held banks, online or fintech banks. Also, some of the banks are just starting to build offerings and services around crypto and bitcoin. Such as the Commerzbank, which managed to acquire a BaFin license for custody purposes but did not start to offer these services yet (Commerzbank 2022). Next to this example, there are cooperative banks, such as the Volksbank Kurpfalz, which invite to informative consultation and provide information about cryptocurrencies with a link to a partnership with the Börse Stuttgart, where individuals can buy and trade cryptocurrencies (Volksbank Kurpfalz 2022). It can also

generally be observed that almost all of the banks are privately held. The most progressive banks in this field are new startups, online banks or fintech companies. The larger and more trusted banks are still lacking offerings in this regard or are just starting to build these, like in the example of the Commerzbank.

Name	Bank Type	Location	Foundation	Offerings
<b>Bankhaus Scheich</b>	Securities Trading Bank	Frankfurt	1985	Trading, Crypto lending, crypto securities issuance, tokenization
<b>Bankhaus von der Heydt</b>	Private Bank	Munich	1860	Tokenization, Custody, Stablecoins
<b>Commerzbank</b>	Universal bank	Nationwide	1870	Custody of cryptocurrencies, crypto venture investments.
<b>Donner &amp; Reuschel</b>	Private bank	Hamburg	1798	Trading cryptocurrencies, custody, funds services
<b>Fidor Bank</b>	Online bank	Munich	2009	Express trading via Bitcoin.de and Kraken.com
<b>Futurum Bank</b>	Securities Trading Bank	Frankfurt	1983	Trading, payment office
<b>Hauck Aufhäuser Lampe (former Hauck &amp; Aufhäuser)</b>	Private Bank	Frankfurt	1796	Crypto funds, Custody
<b>M.M. Warburg</b>	Private Bank	Hamburg	1798	Custody, Tokenization
<b>Solaris Bank</b>	FinTech Bank	Berlin	2016	Payment office, KYC, Pooling Accounts (APIs), Custody
<b>Spot9</b>	Full Service Crypto Bank	Berlin	2017	Trading, Crypto-ATM, STO
<b>Sutor Bank</b>	Private Bank	Hamburg	1921	Trading, Crypto-ATM, business account
<b>TEN31 (formerly WEG Bank)</b>	Real Estate & Digital Bank	Ottobrunn (Munich)	N/A	Crypto-ATM, Trading, Custody, Business Account
<b>Volksbank Bayern Mitte</b>	Cooperative Bank	Ingolstadt	1895	Consulting on buying/selling cryptocurrencies
<b>Volksbank Kurpfalz</b>	Cooperative Bank	Heidelberg	1858	Trading cryptocurrencies
<b>Volksbank Mittweida</b>	Cooperative Bank	Mittweida	1923	Business account for crypto projects (ICOs, STOs, crypto companies)
<b>V-Bank</b>	Asset bank	Munich	2008	Trading cryptocurrencies, custody, token-emissions in B2B context

Table 2: Progressive Crypto Banks in Germany (inspired by Doehnert-Breyer 2022)

The lack of bank offerings in this regard can therefore also be a factor for missing adoption. In a decentralized context, such as Bitcoin, individuals must take own initiatives in order to dive

into the sphere, if they are indeed interested. Traditionally, banks have been a point of contact. Now, in the case of bitcoin and other cryptocurrencies, individuals are – exaggeratedly stated - left on their own if they do not take own initiatives.

### **3.2.2 Media Coverage and Reporting on Bitcoin**

Next to banks, which are a point of contact and communication channel for individuals, media is obviously another central communication channel providing information about the topic to an entire social system. Reporting in newspapers has a major influence on the formation of public opinion (Riedl et al. 2019). German speaking newspapers have been studied on the topic of Bitcoin throughout the years. From 2011 to 2018, German speaking newspapers, perceived as quality newspapers and easily accessible with low costs, have been majorly providing negative reporting on the topic of Bitcoin (Riedl et al. 2019: 106). In fact, out of 1498 studied articles, 53% have been negatively afflicted, 24% were neutral and 23% have been positive (Riedl et al. 2019: 106). Also, a correlation between strongly increasing price trends, thus high volatility, and the number of articles has been identified. It can be noted that the relative share of neutral and positive articles increases with increasing price developments, however, negative articles have always been predominating in the studied periods (Riedl et al. 2019: 106). Most negatively afflicted articles depict bitcoin as an object of speculation, outline high volatility, unsuitability as a means of payment, sustainability issues and criminal activities. When investigating recent media articles in the most trusted general news source in Germany, which is the *Tagesschau*, negatively afflicted reporting and the subjects have not changed in this time (Statista 2022; Tagesschau 2023).

As social media has become a major information-seeking platform and communication channel, individuals tend to gather information on the internet and social media as well. Research shows the correlation between social media sentiment by individuals on twitter and reddit and price developments of bitcoin (Sohag et al. 2022). Elon Musk has also been a major proof for the impact influencers can have on the sentiment and also on the price developments through spreading information on social media.

Based on these results and the fact that newspapers generally have a major impact on the formation of public opinion and affect people's attitude and behavior, the newspapers' opinion

can potentially be mapped to individuals' opinions, which is a negative perception towards Bitcoin (Riedl et al. 2019: 113).

### 3.2.3 Other Bitcoin Developments in Germany

Despite the lack of bank offerings and negative media coverage on the topic, there have been some developments that drive adoption in Germany. However, the drivers are limited to innovators and early adopters. There are plenty of tech meetups where enthusiasts and interested persons meet up to discuss the sphere.

An exemplary community called *EINUNDZWANZIG* has grown all over the German-speaking area. The community also promotes and shares different courses and events to connect and gather knowledge. However, it cannot be guaranteed that the information provided here is critically discussed, it solely indicates that there is movement in the sphere (s. Appendix 7.2 Figures, Figure 21).

Next to community build-ups, there are multiple companies and startups developing ATMs and technologies. Crypto ATM installations have been growing rapidly in the last years with 38,305 ATMs worldwide – as of January 18<sup>th</sup>, 2023 (Coin ATM Radar 2023). However, 87% of ATMs are located in the US and only 3,8% in Europe (Coin ATM Radar 2023). This briefly highlights the lack of business adoption in Europe, including Germany, as a potential factor for missing user adoption in terms of ownership.

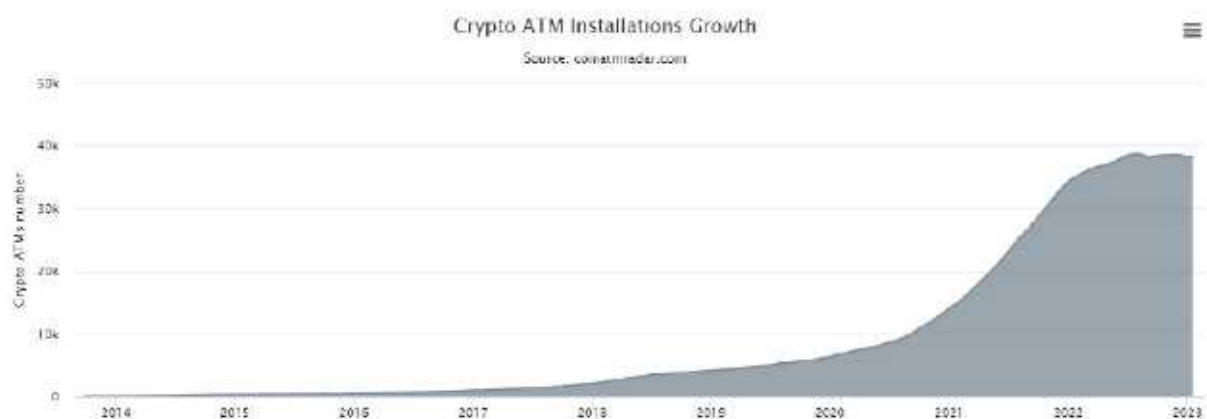


Figure 10: Crypto ATM Installations Growth (Coin ATM Radar 2022)

### **3.3 Factors and Influences on Missing Bitcoin Adoption in Germany**

In the following chapter the previously discussed circumstances on Bitcoin and its adoption in Germany will be taken up for discussion and modelling by using the discussed DOI theory and its underlying innovation-decision process framework. However, the framework will not be focused on fully, but rather the first phases of knowledge and the shift towards persuasion will be examined. The model is adapted to outline external effects as well as internal effects. However, the internal effects, especially knowledge, depict the focus point.

Figure 11 shows a modified version of the innovation-decision process to outline the factors from the user perspective. The individual adopter is at the center of interest, as he or she is exposed to external as well as to internal effects. External effects are general circumstances in the social system as well as prior conditions like previous practice with regards to the financial system. Also, the innovation itself and its characteristics influence behavior and attitude. Internal effects are socio-demographic and characteristic attributes of the individual. These internal as well as the external effects have an impact on the knowledge of the individual, which, moreover, determines the perception on the innovation or particularly Bitcoin in this case.



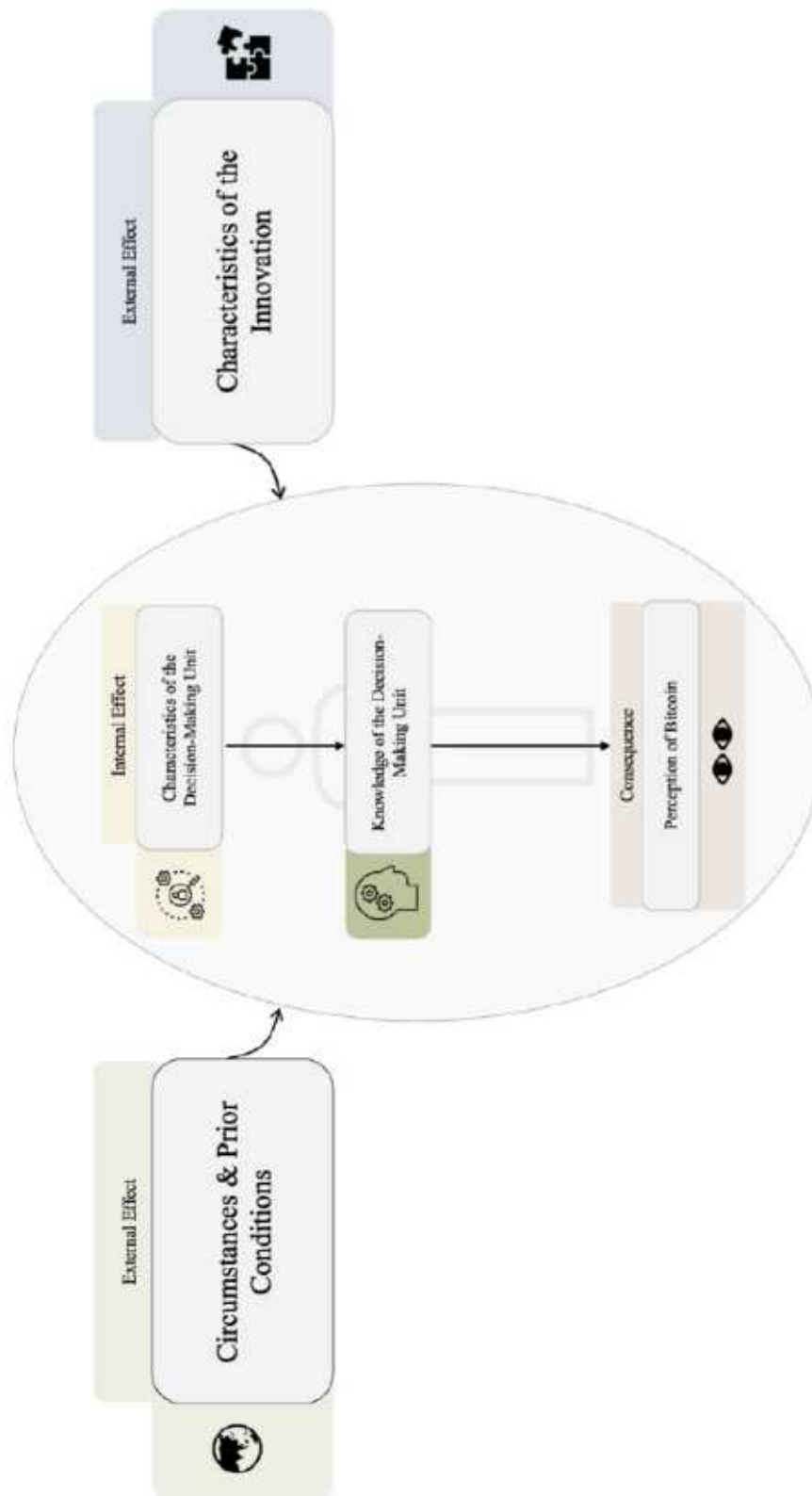


Figure 11: Factors Model (inspired by Rogers 1962)

### 3.3.1 External Factors

An individual is majorly influenced by its surroundings and the circumstances in the social system, behaves a certain way, and is, as indicated in the innovation-decision process, influenced by peers and other adopters or rejectors through a certain communication channel when it comes to the decision to adopt or not. These external effects are both the overall circumstances and prior conditions as well as the innovation itself which influences the innovation-decision process through its characteristics. In the following, an examination of external factors regarding the decision-process to adopt bitcoin will be conducted.

A major influence on an individual's innovation-decision process are the circumstances and prior conditions. These are composed of the individual's previous practice, felt needs and problems, and the norms of the social system.

Germany's adoption and ownership levels, in comparison with other countries, are relatively low, as was indicated in chapter 3. The top 20 is mostly comprised of developing countries categorized as low income or lower middle income countries by the World Bank. This is grounded in the fact that individuals from developing countries have a higher need to adopt bitcoin than developed countries. As developing countries feel the need to adopt bitcoin since they do not have as established financial systems as developed countries, the adoption of bitcoin is higher. Chainalysis indicates higher ownership and volume transacted due to less access to centralized exchanges and money in general. Next to this, corruption is a major issue in several developing countries and inflation rates are relatively high, which are reasons to engage in a solution such as bitcoin that is an independent and decentralized alternative, which is not managed by a central authority (Chainalysis 2022). This means that individuals in a developing country, who suffer from economic and societal issues and problems, such as inflation and corruption, might seek a way into Bitcoin as they are forced to and feel a need. Contrastingly, in Germany individuals do not feel such an urge as the financial system, the value of money and overall circumstances are relatively reliable and stable.

Generally, a correlation between crypto adoption and inflation rates can be observed (Block 2022: 7). Turkey is an example which shows the inflationary pressure that individuals must overcome with alternatives. Turkey's inflation rate surpassed over 83% and usage of bitcoin and crypto has increased since (Trading Economics 2023; Triple-A 2023). As there is mistrust

regarding the Turkish Lira, individuals try to escape inflation and volatility through alternatives such as bitcoin.

In addition, remittances are a major use case in developing countries. Individuals use bitcoin as a means to receive and send money as few options exist when conducting transactions at great distance in case there is no access to money. As intermediaries must be outmaneuvered, a decentralized currency is useful. The remittances use case may also be useful for developed countries such as Germany but is less necessary due to the lack of external pressure.

Although bitcoin is a store of value and adoption in this case equals ownership and not potential use, it can be identified that developing countries have found use cases for bitcoin, which are based on needs, urge and pressure and drive adoption. In a developed country such as Germany, bitcoin is still an alternative, thus an individual, on the one hand, has time to evaluate and decide whether to adopt, on the other hand, can afford to ignore it as the circumstances do not create a need.

In conclusion, external effects and the overall circumstances depict the starting point and build the foundation for a potential adoption. If external effects apply high pressure on the decision-making unit, an adoption of bitcoin is more likely to happen (Ibrahim 2022: 16). As awareness-knowledge is crucial to first get in contact with bitcoin, external effects can apply additional pressure which pushes the individual towards acquiring further principles and how-to knowledge to proceed in the innovation-decision process.

The innovation itself also influences the individual in the decision-process. The characteristics of Bitcoin in this regard in combination with the circumstances and prior conditions, form the main external effects and how it is processed by the individual during the process.

The technology and its innovativeness have been depicted in the classification and technology part, which nevertheless, objectively viewed, is relatively complex as it involves at least a bit of research or exchange with another party to understand the underlying technologies. The innovativeness of Bitcoin determines the potential perception an individual has in the innovation-decision process. If the innovation is not perceived as relatively advantageous, a rejection of Bitcoin is more likely happen, or the adoption might not be considered in the first place as no use case is found. The perceived characteristics of an individual are based on the actual characteristics of the innovation and what it has to offer. The following aspects, as already described

in the DOI theory, eventually play a role on the perception towards Bitcoin when it comes to persuasion and potential adoption.

Advantageous aspects and characteristics of Bitcoin, such as the decentralized network, higher security and faster transaction processes, can be potential perceptions a decision-making unit can have when comparing the status quo with Bitcoin. A potential perception that Bitcoin is advantageous pushes an individual in the innovation-decision process towards an adoption. As the perception of relative advantage has “a significant positive effect on bitcoin use intention” (Lensky 2017: 1285). *Compatibility* as an aspect of how Bitcoin might be compatible with the individual’s current situation and lifestyle as well as experiences and values is also a favorable factor if it is identified. However, the influence is much lower than the perception of relative advantage (Lensky 2017: 1286). Next to these perceived characteristics, *complexity* has a strong influence. Especially in the case of Bitcoin, which involves complex underlying technology, some effort needs to be taken to understand it. The more complex an innovation is the more effort needs to be taken. Consequently, the more effort needs to be taken to increase principles and how-to knowledge the more likely it is that an individual will not take up the effort or postpone it if external effects are not forcing and creating a need to do so. In addition, *trialability* and *observability* can be supporting factors if individuals are able to try bitcoin before adoption or at least act as a silent observer and watch others try it. This creates a synergy, as an innovation which has a high degree of trialability and observability can reduce complexity which in conclusion increases the probability of adoption.

Also, the perceived characteristics of Bitcoin and any other innovation are transmitted to an individual through certain communication channels, be it through word of mouth or media. As indicated in the description of the status quo, reporting on Bitcoin is currently negatively afflicted, which might result in a non-consideration to engage and adopt. As no neutral reporting is given, own knowledge-seeking, thus effort, needs to be taken in order to neutrally assess, evaluate and eventually decide. As media has a major influence on the behavior and perception of individuals, the transmitted judgement is taken over by individuals without questioning and neutral knowledge-seeking. Consequently, a neutral innovation-decision process in which the decision-making unit assesses and evaluates a potential adoption is disturbed through biased communication channels. Especially the early majority, which is highly influenced by the information transmitted through communication channels where innovators and early adopters

are involved. If these are lacking and overall circumstances do not show the relevance to engage, the innovation-decision process is extended, ignorance might occur, and the decision is postponed.

External effects build the overall framework in which the individual is brought into the innovation-decision process, becomes aware of the innovation and advances into the decision-process. Needs and problems are essential factors why individuals begin the innovation-decision process (Rogers 1962: 167).

### 3.3.2 Internal Factors

The external effects determine the individual's starting point into the decision-process. However, the characteristics of the decision-making unit also have a major impact. As described through the adopter categories, individuals differ in innovativeness, in speed and in timing of potentially adopting an innovation. In the following, an examination of the decision-making unit's characteristics in Germany as well as the shift towards knowledge will be conducted. Also, the knowledge factor as the starting point in the innovation-decision process will be elaborated.

When Nakamoto published the Bitcoin whitepaper in 2008, it was shared through a mailing list to cryptographers, developers, and technologists. Based on these innovative heads, Bitcoin eventually diffused over time. Nakamoto intentionally involved technologists as experts in this specific field to evaluate and examine the solution. These technologists can be referred to as the *innovators* in the adoption process. Innovators only represent a small part of society, however, through own knowledge-seeking they realize the potential of an innovation due to high risk and uncertainty tolerance. As innovators have been the first to own and adopt bitcoin, they served as gatekeepers to involve more people through communicating their perceptions. A survey conducted in 2013 found the socio-demographics of former bitcoin users, which were on average 32.1 years old, typically male (95,2%) and mostly libertarian and non-religious (Prethus 2017: 91).

Next to the spreading of the paper through innovators, Nakamoto adopted an adoption cycle into Bitcoin itself. As every four years a halving occurs which reduces the reward for miners by half, Nakamoto built a system which self-controls inflation. In fact, after every halving

which took place until now in 2012, 2016 and 2020, the consequence was a massive price acceleration. In 2012 the bitcoin price increased to approx. 1,000 USD, after the halving in 2016 to almost 20,000 USD and after the halving in 2020 to over 65,000 USD. These built-in hype cycles and temporary bubbles attract new adopters which enter the sphere (Huber 2020: 21). In fact, in the e-mail exchange with technologists and developers, Nakamoto wrote the following:

*As the number of users grows, the value per coin increases. It has the potential for a positive feedback loop; as users increase, the value goes up, which could attract more users to take advantage of the increasing value.*

*- Satoshi Nakamoto, 2009-02-18 20:50:00 UTC, (Satoshi Nakamoto Institute 2023)*

Nakamoto identified the potential of the adoption cycle due to the planned and predictive output of bitcoins and the awareness of the exact numbers of bitcoin available. If demand and supply of bitcoins increase at the same rate, the price would remain stable. If demand would be greater than the block reward, bitcoin would eventually increase in value and new users would be attracted (Bitcoin.com 2008).

In the last 14 years, more and more people have been attracted to Bitcoin due to the massive price increases. Therefore, also people considered to be in the early majority have been active and engaging in the field. As innovators are gatekeepers, also early adopters, which are considered as opinion leaders and inherit leadership roles, can have an impact on society. A famous example for an opinion leader in Bitcoin has been Elon Musk. Through sharing his opinion and his actions regarding Bitcoin on social media, mainly twitter, he has influenced a high number of people. The influence was visible due to sharp changes in the bitcoin price after Musk has posted on social media platforms (Otani 2021). Influencers can act as change agents to drive awareness and also more profound knowledge in order to push individuals and potential adopters into the innovation-decision process. Elon Musk is obviously no German influencer, however, due to globalization, the world's interconnectedness and as Bitcoin has no national borders, his opinion is recognized all over the world. Specifically focusing on Germany, however, such an example is difficult to find. There is no influencing unit, which promotes and leads the way as an opinion leader for the early majority and beyond. This indicates the advances the US has over Germany, for example. Bitcoin influencers indeed exist, such as the Head of the Blockchain Center at the Frankfurt School of Finance & Management Philipp

Sandner, however, he is not known to the majority of society but rather to innovators and early adopters and is still niche.

As the Geography of Cryptocurrency Report also shows in its latest edition in 2022, only two developed countries have been listed in the top 20: the USA and the UK. Latest studies have shown that cultural aspects also play a role with regards to bitcoin adoption. As bitcoin is a speculative asset which involves a significant amount of risk, a cultural determinant used to analyze financial decision-making is the cultural dimension individualism (Foley et al. 2022: 12). Hofstede (2023) has conducted the most comprehensive studies on the influence of culture. Based on his studies, he has created six dimensions of which there is one called individualism. Individualism “can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families.” (Hofstede 2023). Individualism has been linked to risk-taking behavior and is considered to be a “robust determinant of the country-level usage of Bitcoin” (Foley et al. 2022: 12). Germany is considered as a more individualistic country, however, consulting the numbers of Hofstede’s studies shows even higher rates of individualism in the US and the UK, which could be a reason for higher adoption rates as well.

As individualism means that there is a higher focus on individual success, people are taking own initiatives which can also be own knowledge-seeking activities to understand Bitcoin. Knowledge is then a crucial factor as the first step of the innovation-decision process. The external effects and the characteristics of the decision-making unit, which is also influenced by external effects, lay the foundation on which knowledge is potentially indeed built and at what speed the individual decides to start into the innovation-decision process.

Awareness knowledge is the first step in the innovation-decision process as an individual must first be aware of the innovation or particularly Bitcoin in order to adopt it. It is the sheer knowledge about the existence of the innovation which often occurs by accident (Rogers 1962: 164). Crypto awareness in Germany is growing rapidly and approx. 86% of German adults have heard something about cryptocurrencies before in 2022 (Triple-A 2023). However, lack of principles and how-to knowledge is an inhibiting factor for a lot of persons as they do not know how and where to start (Triple A 2023). Although 71% of bitcoin owners have a bachelor’s degree or higher, potentially also individuals with relatively high education levels lack knowledge and are still hindered from adoption. Next to this, consulting global development

factors, education has a strong correlation with crypto adoption, which indicates the importance of knowledge as a prerequisite (Parino et al. 2018)

Hence, effort through knowledge-seeking activities needs to be taken to gain knowledge. However, individuals will only in seldom cases expose themselves to an innovation unless external pressure creates a need (Rogers 1962: 166). If nevertheless, without need and external pressure, for example interest exists, individuals can seek different communication channels to acquire further principles and how-to knowledge. The major communication channels used are social media and the internet as well as traditional media. However, due to negative reporting regarding bitcoin, individuals are unable to seek neutral information and biased information is transmitted, which is potentially accepted due to trust towards the communication channel. In addition to that, individuals are not able to reduce uncertainty about the innovation through consulting traditional trusted intermediaries, such as banks, which are not open towards this topic. Hence, individuals must take initiatives themselves. As Bitcoin is more complex due to its technological composition, which is not self-explanatory, skilled and trusted intermediaries are necessary to gain appropriate and sustainable knowledge in order to move into the persuasion phase. Consulting the internet, however, can be confusing at times as it is unstructured due to the sheer mass of information and information can also be contradictory.

A persuasion in favor of the innovation can only take place if the individual has sufficient knowledge to do so or if external effects are applying additional and decisive pressure. As Germans live in relatively stable circumstances, compared to countries with higher bitcoin adoption rates, external effects are not as strong, and bitcoin solely represents an alternative to the status quo. Eventually, as individuals tend to be conventional and wait, the innovation-decision process is extended as individuals wait – which is not necessarily a conscious decision – for the right communication channel to acquire sufficient knowledge.

If an adoption takes place without sufficient knowledge, a rejection could potentially take place. As Bitcoin is complex and price is highly volatile, individuals are potentially not able to cope with it. The described halving affects the price development heavily. Historically, there have been good investment times, however, only if the individuals are aware of them. Otherwise, individuals engage in hype phases where price rises heavily, however, involves a lot of volatility which bares the risk of high investment losses.



The process to potential adoption in the first two phases could potentially look like the following: The individual becomes aware of Bitcoin through a certain communication channel. If external pressure is high, the individual will move forward in the decision-process at a higher speed and acquire at least minimal principles and how-to knowledge to evaluate and decide upon rejection or adoption. If external pressure is low, the individual's advancement into the decision-process is dependent on the communication channel's information and own interest as well as internal effects regarding characteristics and adopter category affiliation.

Germany is considered to have relatively low external pressure, which means that bitcoin depicts an alternative and a speculative asset, which is not a must-have but an optional investment. If media and social media, as major communication channels, provide a negatively afflicted image, the individual is also more likely to form a negatively afflicted attitude, which results in non-consideration of adoption. However, individuals can also get in contact with innovators or early adopters who have experience and provide information over word of mouth and articulate their opinion about bitcoin based on the perceived characteristics.

Most of the individuals that become aware of an innovation first are the ones who have more interpersonal channels of communication than later knowers, are more in contact with change agents, and have more social participation. Shifting towards the persuasion phase, the individual determines where to seek information, what messages he or she consequently receives and how he or she interprets them (Rogers 1962: 169). In this phase, the individual tries to minimize the level of uncertainty as the individual is unsure about the consequences as well as advantages and disadvantages of a potential adoption. In most cases, mass media information is considered but it is "too general to provide the specific kind of reinforcement that the individual needs to confirm his or her beliefs" (Rogers 1962: 170). The individual seeks innovation-evaluation information through exchange and communication with nearest peers to gather their feedback and attitude towards the topic. If an individual is therefore in contact with change agents and innovators, a potential attitude in favor of bitcoin might be created (Rogers 1962: 171).

## **4 Empirical Study: Factors for Missing Bitcoin Adoption using the example of Alumni at the Faculty of Economics at the University of Applied Sciences in Bremen**

### **4.1 Survey**

A survey has been conducted to investigate bitcoin adoption, knowledge about and general perception of Bitcoin using the example of alumni at the Faculty of Economics at the University of Applied Sciences in Bremen. In the following, a closer look will be taken on the methodology, data collection, definition of the target group and the survey structure.

#### **4.1.1 Selection of the survey method**

An online questionnaire was created through the usage of the online tool *empirio*. 20 questions in total have been send out to alumni of the Faculty of Economics at the University of Applied Sciences in Bremen. As the analysis of factors and influences on the missing adoption of Bitcoin is to be considered as market and consumer research, the survey approach was chosen to ask close-ended as well as some open-ended questions to discover and identify respondents' positions towards, perceptions of and knowledge about Bitcoin. In addition to general information about respondents' demographics and the ownership, non-ownership, or former ownership of bitcoin, it forms a broad picture of sentiment. For a more detailed look at individual perceptions and sentiments and profound individual stories, the survey answers can give a hint. A more detailed look through an interview method might be useful in the future to understand individual's perceptions more profoundly.

#### **4.1.2 Data Collection & Target Group**

The questionnaire has been sent out to various program and course directors to share within their program's alumni networks in December and January 2023. Also, alumni networks have been contacted through respective alumni networks on social media. The survey has been conducted in German language (Appendix 7.1.1). An English version is also attached (Appendix 7.1.2). A total number of 59 respondents have participated in the survey of which 53 have been qualified as alumni of the Faculty of Economics at the University of Applied Sciences in Bremen.

Alumni of the Faculty of Economics at the University of Applied Sciences in Bremen have been chosen as the target group and exemplary sample as they comply with the following criteria:

1. *Higher Level of Education*
2. *Higher Level of Economic / Financial Knowledge*
3. *Effort to acquire Knowledge*
4. *Relative higher salary*

Alumni are individuals who have graduated from a university and therefore at least have a bachelor's degree or diploma. In Germany, the university graduation rate is at approximately 21% and filtering graduates from a university ensures higher education levels. However, a university degree does not necessarily equal to higher intelligence, but to some degree shows the effort and willingness that is required to gather knowledge and accomplish a degree (University of Massachusetts Global 2023). This is a requirement and factor in the adoption of Bitcoin, as individuals currently must take own efforts to acquire knowledge.

Also, the definition and classification of Bitcoin has shown that Bitcoin is still considered as a store of value, thus an investment product. Alumni or graduates from a university usually have higher positions in companies and therefore earn higher salaries (Florida National University 2019). When it comes to investing, people are more likely to invest in case of higher salary or more disposable income (Bouchrika 2022). Consequently, a higher probability of actual bitcoin investments is given and a potential engagement with the topic exists. Through focusing on alumni, potential other factors, e.g., lack of disposable income to invest, which are not tied to Bitcoin itself, are filtered out.

Eventually, alumni are suitable to have a first glance on the claimed potential factor for missing adoption, as potential lack of knowledge is investigated among a well-educated and well-earning part of society.

During the collection of data and responses, the bitcoin price has been increasing (s. Figure 12). However, as the price has heavily decreased in the last year 2022, the overall sentiment regarding bitcoin is rather bearish and needs to be considered in the analysis and interpretation of the data.



Figure 12: Bitcoin Price Development in data collection period (CoinMarketCap 2023)

### 4.1.3 Survey structure

The survey was structured into five main sections:

1. *Qualification*
2. *Bitcoin activity*
3. *Motivations & Perceptions*
4. *Level of Knowledge & Perceived Characteristics of Bitcoin*
5. *Socio-demographics*

Firstly, the respondent is *qualified*, if indeed he or she graduated from the Faculty of Economics at the University of Applied Sciences in Bremen. If he or she did not graduate from the university, the respondent will be directed to the end of the survey and no further participation is possible.

Secondly, participants are asked about their potential *Bitcoin activity*, and if they are current owners, former owners or have never owned bitcoin. If respondents are owners, they see and answer different questions than former or non-owners.

Thirdly, *motivations* for current ownership or non-ownership are questioned. In this section, non-owners can also provide insights and answers to what changes need to happen in their opinion to potentially become a bitcoin owner. In addition, perception on buying difficulty, research intensity as well as research media are questioned.

In the fourth section, respondents assess their own *level of knowledge* regarding Bitcoin and give an insight on how they perceive the characteristics of Bitcoin as an innovation, therefore,

the earlier discussed factors of: *Relative Advantage*, *Compatibility*, *Complexity*, *Triability*, *Observability*.

In the last section, respondents' *socio-demographics* are asked to be able to categorize the responses and bring them into context.

## 4.2 Results

In the following chapter, the survey results will be depicted. First, the socio-demographics of all respondents and also differentiated in owners, former owners and non-owners is displayed to have an idea of who is currently owning, formerly owned and never owned bitcoin before. Furthermore, the positioning and perceptions as well as motivations to adopt or not are described. Lastly, a correlation analysis between ownership, knowledge and the respective perceived characteristics of Bitcoin is conducted before the results are interpreted, discussed and brought into context through picturing the limitations.

### 4.2.1 Socio-demographic description & Bitcoin Activity

Table 3 shows the socio-demographic information that was gathered from the respondents. The respondents are then also split into three groups: Owners, Former Owners, and Non-Owners. 53 participants are split into 11 owners (20,75%), 6 former owners (11,32%) and 36 non-owners (67,92%). So, over two-thirds of participants have never owned bitcoin before. Most of the respondents have a bachelor's degree (58,49%) as the highest education level. The average age of all respondents is 32,43 years. Observing the ownership differentiation, owners are slightly younger (28,00 years) and non-owners are older (34,25 years) on average. Overall, the participation distribution in terms of gender is approx. 60% male and 40% female. In terms of owners and former owners, male gender is dominating as 90% of owners and approx. 83% of former owners are male. Gender distribution regarding non-owners is approx. 50-50, with a slight tendency to the female gender.

A third of the respondents has a net income per month of 1.000 to 3.999 euros, of which 40% earn 3.000 to 3.999 euros. Most of these 40% are non-owners.

	All Respondents		Owner		Former Owner		Non-Owner	
Absolute	53		11		6		36	
%	100%		20,75%		11,32%		67,92%	
<b>Degree</b>	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%
Diploma	5	9,43%			1	16,67%	4	11,11%
Bachelor	31	58,49%	7	63,64%	4	66,67%	20	55,56%
Master	14	26,42%	4	36,36%	1	16,67%	9	25,00%
PhD	3	5,66%					3	8,33%
<b>Age</b>	<i>Absolute</i>		<i>Absolute</i>		<i>Absolute</i>		<i>Absolute</i>	
	32,43		28,00		29,67		34,25	
<b>Gender</b>	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%
Male	32	60,38%	10	90,91%	5	83,33%	17	47,22%
Female	21	39,62%	1	9,09%	1	16,67%	19	52,78%
<b>Net income per month</b>	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%
1 to 999 euros	5	9,43%	2	18,18%			3	8,33%
1.000 to 1.999 euros	10	18,87%	3	27,27%	3	50,00%	4	11,11%
2.000 to 2.999 euros	10	18,87%	2	18,18%	1	16,67%	7	19,44%
3.000 to 3.999 euros	22	41,51%	4	36,36%	1	16,67%	17	47,22%
4.000 to 4.999 euros	3	5,66%			1	16,67%	2	5,56%
5.000 to 6.999 euros	2	3,77%					2	5,56%
7.000 to 9.999 euros	1	1,89%					1	2,78%
<b>Family Status</b>	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%
Single	32	60,38%	11	100,00%	5	83,33%	16	44,44%
In a relationship	4	7,55%					4	11,11%
Married - living together	16	30,19%					16	44,44%
Divorced	1	1,89%			1	16,67%		
<b>Employment Status</b>	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%	<i>Absolute</i>	%
Trainee	1	1,89%					1	2,78%
Full-time student	11	20,75%	4	36,36%	3	50,00%	4	11,11%
Part-time student	1	1,89%					1	2,78%
Employee	34	64,15%	5	45,45%	3	50,00%	26	72,22%
Blue-collar worker	1	1,89%	1	9,09%				
Civil servant	2	3,77%					2	5,56%
Self-employed	3	5,66%	1	9,09%			2	5,56%

Table 3: Socio-demographic description of survey participants (Own Table)

In terms of family status, most respondents are single (60,38%) or married and living together (30,19%). Owners are 100% single, former owners 83,33% single and non-owners are approx. 44% single, and approx. 44% married and living together.

Lastly, most of the respondents (64,15%) are employees of which 76% are non-owners. Owners are 50% employees, 40% full-time students and 10% self-employed.

In conclusion, it can be stated that the owner's demographics resemble those of researched and analyzed demographics, as owners are younger (28 years), male-dominated (90%) and single (100%).

Also, in terms of Bitcoin activity, owners and former owners typically used the internet (92,86%) to research for Bitcoin before their first buy (s. Figure 13). Secondly, friends and family are consulted (35,71%). Books (28,57%) and traditional media (21,43%) are also infrequently consulted. Lastly, only 14,29% aimed to acquire higher levels of knowledge through course participation. In general, on a scale from 1 to 10 research intensity is on average 5,43.

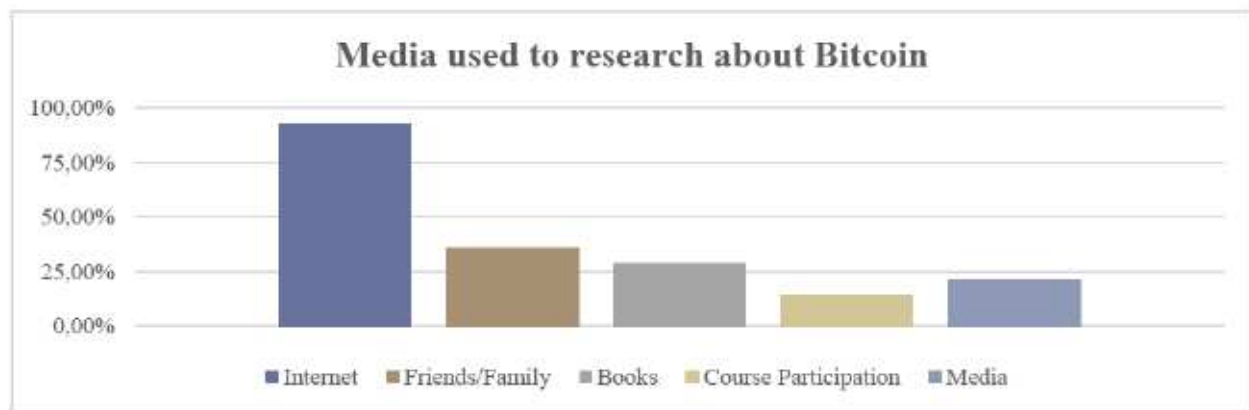


Figure 13: Media used to research about Bitcoin by Owners and Former Owners (Own Figure)

The timing of purchase from owners and former owners was either in the cycle of 2016-2019 or 2020-2022. Therefore, there are no early adopters or innovators that have purchased bitcoin before 2016.

### 4.2.2 Motivations & Perceptions

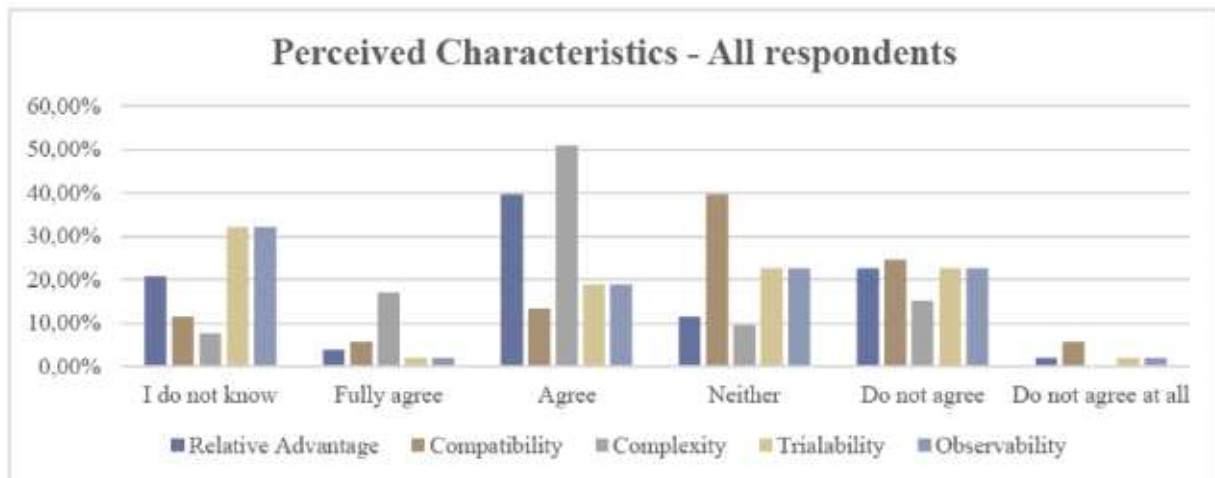


Figure 14: Perceived Characteristics of Bitcoin – All respondents (Own Figure)

Participants have been asked about the perceived characteristics of Bitcoin. They could either agree on the respective characteristic and trait or not agree, but also indicate that they do not know. As can be seen in Figure 14, respondents generally did not know much about trialability and observability. This could either be due to misunderstanding of the question or truly due to missing knowledge. However, they also agreed (approx. 18%) and disagreed (approx. 22%) or neither (approx. 22%). Most agreement comes with the fact that Bitcoin is perceived as complex (over 50%) and relatively advantageous (approx. 40%). Regarding compatibility, most respondents either neither agree or disagree or do not agree. Looking at the differentiation of owners, former owners and non-owners can give more insights.

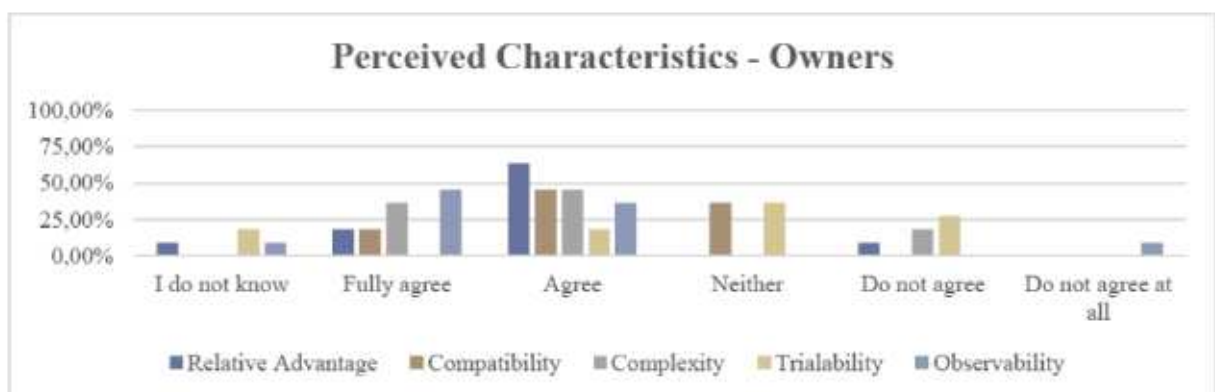


Figure 15: Perceived Characteristics of Bitcoin – Owners (Own Figure)

Most of the owners agree with the fact that Bitcoin is relatively advantageous, and it is compatible with their beliefs, experiences, and values. Owners also either fully agree or just agree with



the fact that Bitcoin is complex and trialability and observability is not agreed nor disagreed mostly. It can be identified, in comparison to the consulting of all respondents that answers of “I do not know” are just a small fraction from the owner’s side, but there are indeed owners who do not know about relative advantage, trialability and observability.

Consulting owner’s motivations to buy bitcoin (s. Figure 16) over 70% indicate that they bought bitcoin due to the technology behind it. Also, owners seek to diversify their investment portfolios and gain ROI through the ownership of bitcoin. This outlines the classification that bitcoin is considered as a store of value. Respondents also outlined this fact with free text answers “price speculation as initial motivator”.

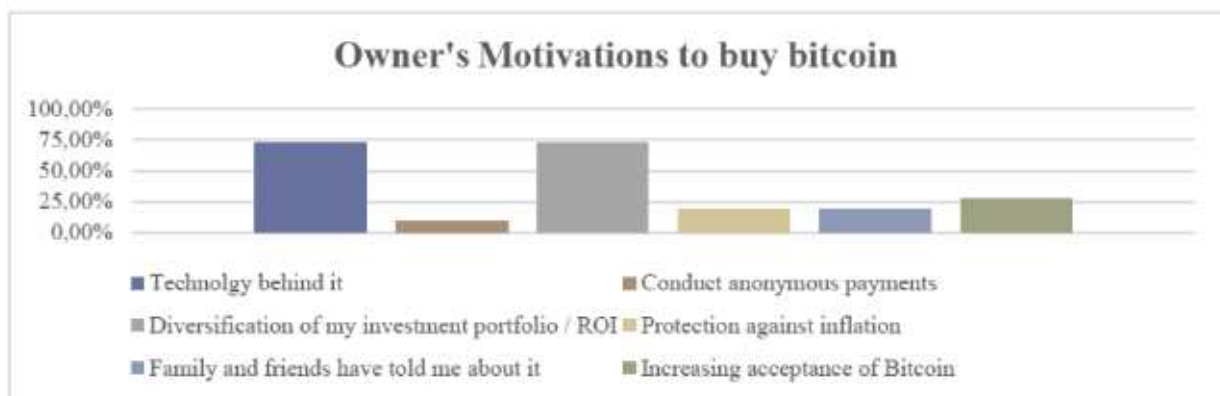


Figure 16: Owner’s motivations to buy bitcoin (Own Figure)

In Figure 17, former owners on the other hand seem to have more knowledge as none of the former owners answered with “I do not know”. Former owners agree with the fact that Bitcoin is relatively advantageous, however, they either neither agree or disagree nor do not agree with compatibility. Former owners, probably due to their experience, neither agree nor disagree with the fact of complexity. However, they mostly agree with trialability and observability.

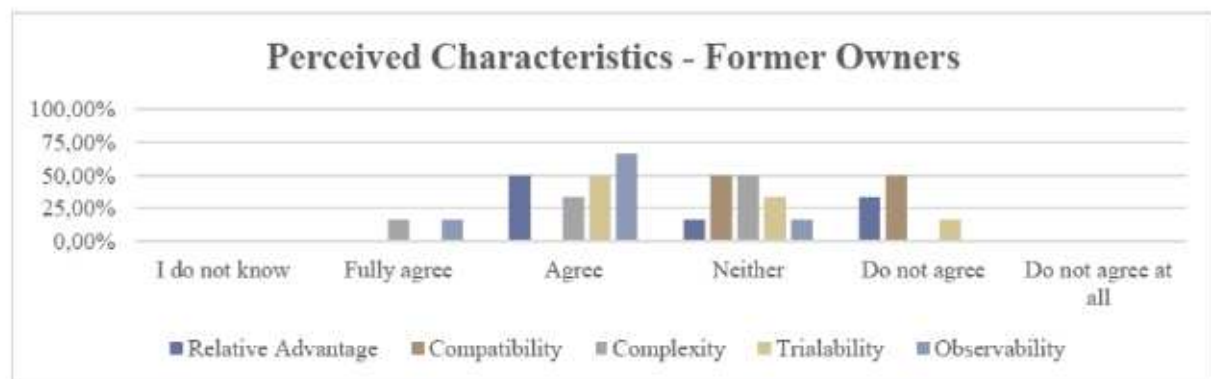


Figure 17: Perceived Characteristics of Bitcoin – Former Owners (Own Figure)

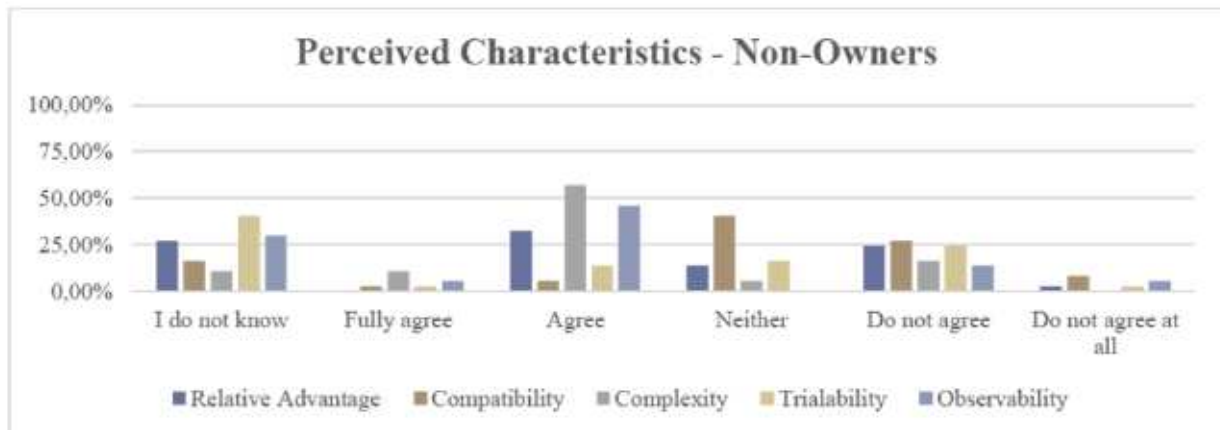


Figure 18: Perceived Characteristics of Bitcoin – Non-Owners (Own Figure)

When looking at non-owner’s perceived characteristics of Bitcoin (s. Figure 18), the group which mostly answered with “I do not know” for all the characteristics and attributes is found. Also, most of non-owners agree with complexity. In terms of compatibility, non-owners neither agree nor disagree, which is potentially also due to missing knowledge as they could not decide to agree nor to disagree. With regards to trialability and observability, non-owners mostly do not know, as this would involve at least a bit of effort to acquire knowledge.

If non-owners are then asked about the factors for non-ownership (s. Figure 19), it can be noted that volatility (approx. 57% agreement and 12% full agreement), missing trust (approx. 50% agreement, 2,5% full agreement) and the missing establishment as a legal tender (62,5% agreement, 5% full agreement) play a crucial role. Also, missing knowledge is a factor as over 20% fully agree and 30% agree to the fact that missing knowledge is a factor for not owning bitcoins. Participant’s responses also indicate that principles and how-to knowledge is lacking, as 77,50% do not agree at all and 22,5% do not agree with the factor of missing awareness knowledge.

The frequently transmitted information about the correlation between bitcoin and criminal activities and high investment losses are mostly not agreed with. Only sustainability issues seem to be a factor, however, 50% of respondents neither agree nor disagree, so are not determined.

Next to these factors, participants provided free text answers outlining the “risk to lose everything”, “uncertainties about regulations”, “no interest”, complexity and volatility, and energy and sustainability issues.

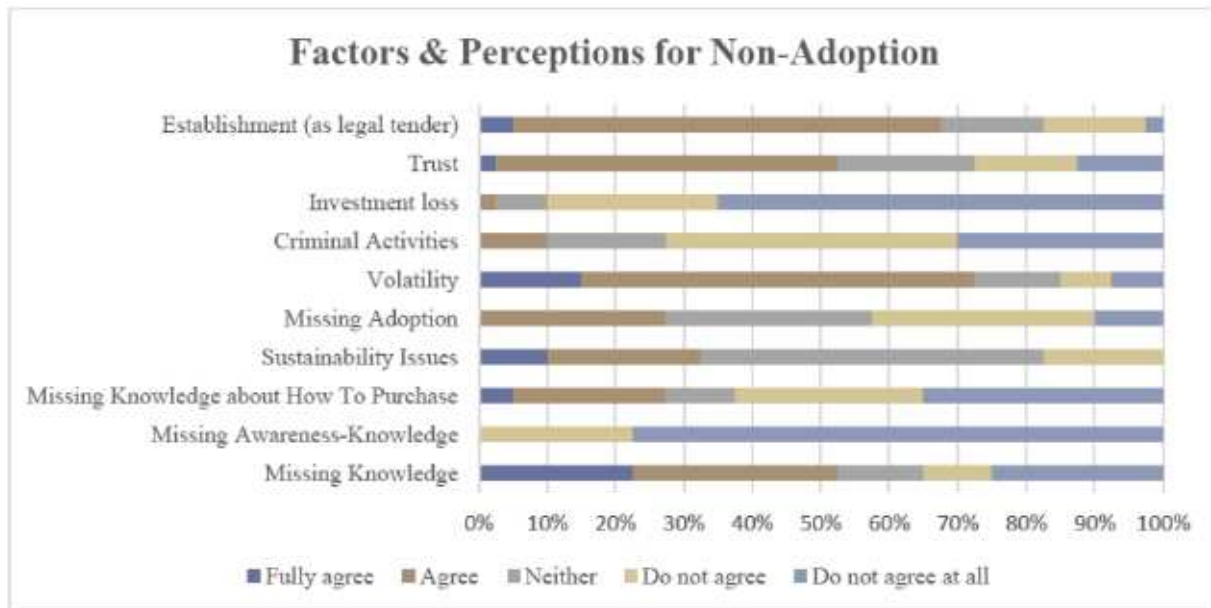


Figure 19: Factors & Perceptions for Non-Adoption – Non-Owners (Own Figure)

When former owners and non-owners are asked about what should change for them to start adopting bitcoin in the future (s. Figure 20), most of the respondents (61,54%) responded with easing of volatility, and secondly with increasing knowledge (51,28%). However, if banks would start offering services and offerings around bitcoin (approx. 43%) and payment option in stores (approx. 41%) as well as a general increase in adoption (approx. 31%) are conditions which would need to change in order to start an adoption in the future.

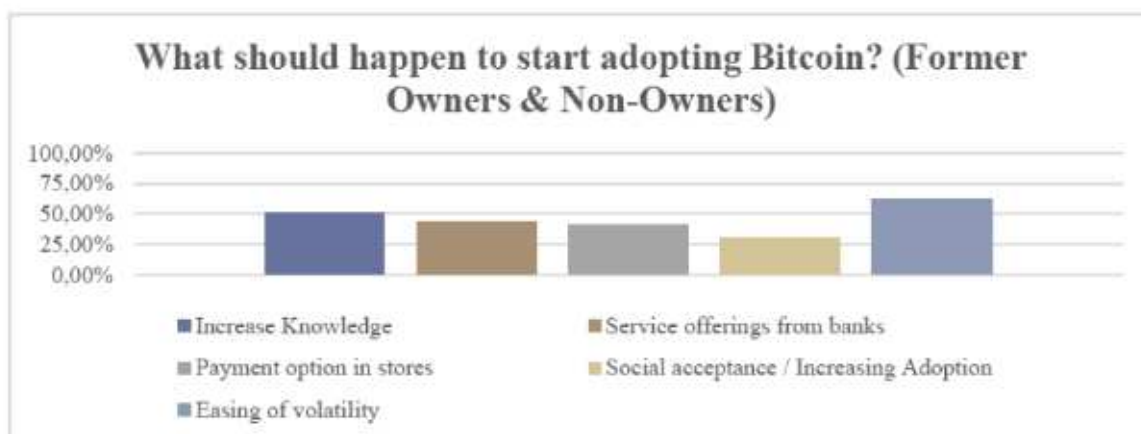


Figure 20: Conditions to adopt Bitcoin in the future (Own Figure)

Differentiating between former owners and non-owners in this regard shows that all asked former owners think that they would need to increase their knowledge (100%) and volatility would

need to ease (100%) in order to start using bitcoin again. For non-owners these factors are also dominating, but not as strong as for former owners.

On average, a knowledge level of 4,98 has been identified – on a scale from 1 to 10. Splitting this into the different ownership roles, owners have a knowledge level of 6,18, former owners of 5,17, and non-owners have a knowledge level of 4,57. Based on this, it can be identified that there is indeed a difference of knowledge and knowledge can have an impact on ownership, however, bitcoin owners did also engage more with the topic, which explains this fact of higher knowledge. Free text answers also indicate the condition of sustainability, as bitcoin would need to become more sustainable in order to engage in the future.

### 4.2.3 Correlation Analysis

To verify higher knowledge and the effect on the perception of bitcoin which would lead to an adoption is conducted through a correlation analysis. A correlation has been calculated for ownership, knowledge and the respective perceived characteristics based on the responses from participants. The Pearson-Correlation shows potential linear correlations between perceived characteristics, knowledge, and ownership.

	<i>Ownership</i>	<i>Knowledge</i>	<i>Relative Advantage</i>	<i>Compatibility</i>	<i>Complexity</i>	<i>Trialability</i>	<i>Observability</i>
<i>Ownership</i>	1,00						
<i>Knowledge</i>	0,26	1,00					
<i>Relative Advantage</i>	0,39	0,49	1,00				
<i>Compatibility</i>	0,50	0,43	0,47	1,00			
<i>Complexity</i>	0,22	0,03	0,20	0,15	1,00		
<i>Trialability</i>	0,24	0,60	0,32	0,37	0,12	1,00	
<i>Observability</i>	0,35	0,53	0,39	0,27	0,05	0,48	1,00

Table 4: Correlation Matrix All Respondents (Own Calculation)

Knowledge and ownership are positively correlating with 0,26, which indicates a weak positive correlation. In terms of ownership, the perception on compatibility (0,50) and relative advantage (0,39) has a strong and medium positive correlation. In terms of knowledge, which is the starting point in the innovation-decision process, relative advantage (0,49) and compatibility (0,43), have a medium positive correlation and trialability (0,60) and observability (0,53) have a strong positive correlation. This shows that higher knowledge has an effect on these factors and a positive perception on those. With regards to trialability and observability it can

be stated that those that perceive bitcoin to be triable and observable are more likely to have more knowledge as they find ways to gain knowledge through these attributes. Others might not be aware of attributes to try and observe bitcoin due to the general lack of knowledge which leaves them in this vicious circle.

Splitting the correlation analysis into the differentiation of owners, former owners, and non-owners again, shows that knowledge correlates strongly with relative advantage and compatibility when only considering owners. This shows that owner’s knowledge grounds the understanding of relative advantage and compatibility (s. Table 5). Surprisingly, knowledge and complexity have a very low correlation (0,05).

	<i>Knowledge</i>	<i>Relative Advantage</i>	<i>Compatibility</i>	<i>Complexity</i>	<i>Trialability</i>	<i>Observability</i>
<i>Knowledge</i>	1,00					
<i>Relative Advantage</i>	0,62	1,00				
<i>Compatibility</i>	0,63	0,49	1,00			
<i>Complexity</i>	0,05	-0,13	-0,49	1,00		
<i>Trialability</i>	0,45	0,18	0,17	0,60	1,00	
<i>Observability</i>	0,24	0,58	0,28	-0,11	-0,10	1,00

Table 5: Correlation Matrix Owners (Own Calculation)

With regards to former owners, relative advantage (-0,40) and compatibility (-0,77) has a strong negative correlation with knowledge and a strong positive correlation with trialability (0,76) and observability (0,59). This shows that the more triable and observable the respondent perceived Bitcoin to be, the higher the knowledge also is. This supports the fact again that trialability and observability help to gather knowledge, but also that a former ownership has shown that Bitcoin is not relatively advantageous and is not compatible with the respondent’s values (s. Table 6). Former owner’s knowledge and complexity has a medium negative correlation (-0,42).

	<i>Knowledge</i>	<i>Relative Advantage</i>	<i>Compatibility</i>	<i>Complexity</i>	<i>Trialability</i>	<i>Observability</i>
<i>Knowledge</i>	1,00					
<i>Relative Advantage</i>	-0,40	1,00				
<i>Compatibility</i>	-0,77	0,56	1,00			
<i>Complexity</i>	-0,42	0,58	0,89	1,00		
<i>Trialability</i>	0,76	-0,58	-0,89	-0,70	1,00	
<i>Observability</i>	0,59	0,32	0,00	0,39	0,00	1,00

Table 6: Correlation Matrix Former Owners (Own Calculation)

Lastly, considering non-owners only, relative advantage (0,46) compatibility (0,38), trialability (0,63) and observability (0,54) positively correlate with knowledge. Complexity (-0,02) surprisingly does not correlate with knowledge for non-owners (s. Table 7). This shows that also non-owners, who have a relatively lower level of knowledge, perceive Bitcoin to be relatively advantageous and to some degree find it compatible with their beliefs.

	<i>Knowledge</i>	<i>Relative Advantage</i>	<i>Compatibility</i>	<i>Complexity</i>	<i>Trialability</i>	<i>Observability</i>
<i>Knowledge</i>	1,00					
<i>Relative Advantage</i>	0,46	1,00				
<i>Compatibility</i>	0,38	0,35	1,00			
<i>Complexity</i>	-0,02	0,16	0,09	1,00		
<i>Trialability</i>	0,63	0,30	0,42	0,01	1,00	
<i>Observability</i>	0,54	0,25	0,14	-0,02	0,53	1,00

Table 7: Correlation Matrix Non-Owners (Own Calculation)

### 4.3 Interpretation & Discussion

The survey results give a comprehensive overview of the socio-demographics, the bitcoin activity, motivations, perceptions, and knowledge levels of alumni about Bitcoin.

First, in terms of socio-demographics, it is noticeable that ownership is highly dominated by the male gender. This indicates that there is still a lot of room for improvement and targeting to be done to the female gender. As bitcoin is an investment product and risk-taking behavior is a condition to engage, this could be a reason why the male gender is dominating in this regard. More knowledge-seeking activities and the enablement to acquire knowledge for the female gender would possibly be helpful. Also, owners are 100% single, which in support with

individualistic determinants, that more risk can be taken as a single person rather than with responsibility in a collective group when it comes to an investment.

As the group of participants has a relatively high education with a minimum educational qualification of a bachelor's degree, the self-perception on general knowledge levels is high. This also influences the levels of knowledge that are given when asked about the levels of knowledge regarding bitcoin in particular. As all participants have been asked about their knowledge levels on a scale from 1-10 and have also been asked on their perception regarding bitcoin with the option to indicate that they do not know, a discrepancy and mismatch can at some points be identified. Owners (6,18), former owners (5,17), and non-owners (4,57) have different levels of knowledge. Consulting the answers regarding the perceived characteristics of bitcoin, former owners did not answer any of the questions with "I do not know", non-owners have the highest share of answering "I do not know", but there are also a few owners who indicate that they do not know when asked about perceived characteristics. This can either be due to lack of knowledge or indecisiveness. Also, participants agree on the fact that Bitcoin is complex. High complexity increases the need to acquire knowledge and the likelihood of ignorance if external effects are low. However, the highest perception on complexity comes is by non-owners. Owners and former owners do not perceive Bitcoin to be as complex as non-owners do. A missing correlation of knowledge and complexity is maybe also a hint that results are just perceptions and are not reflecting the truth.

The correlation between ownership and knowledge is weakly positive, which can be due to the fact that answers regarding knowledge are self-perceptions, as alumni generally have higher level of knowledge and are more likely to perceive higher level of knowledge regarding bitcoin as well. The real figure is therefore potentially much higher.

Regarding non-owners and the factors for non-ownership and their perceptions, it can be observed that knowledge is one of the most crucial points with regards to non-ownership. As bitcoin is considered to be a store of value with regards to motivations to buy bitcoin volatility is a major issue for not adopting bitcoin as well. Knowledge is a crucial point here and is perceived as a prerequisite to a future adoption – in particular, principles and how-to knowledge, as awareness-knowledge is not a factor. More principles and how-to knowledge could also reduce the factor of volatility, as indicated in the factor analysis, because bitcoin's volatility is tied to hype cycles. Individuals who learn about these hype cycles that are occurring after

halving events, would potentially view the volatility issue not so harshly. This also outlines the need for prerequisite knowledge acquisition. As respondents also indicate low trust levels, a correlation between knowledge and trust as the next invisible step in the innovation-decision process after persuasion and decision is existent.

In addition, the factors for non-ownership correlate with those mentioned in most of media and reporting. Therefore, an influence of media on the behavior can be a factor as well. As respondents use the internet as a major knowledge acquisition source, the information provided there, can be confusing as a lot of sources can be used.

Lastly, research activities are crucial to gather knowledge. As the bitcoin activity shows, there is an average research intensity of 5,43. Former owners, however, have a lower research intensity, which could be a reason for their termination of use. As increasing knowledge is a crucial condition for future adoption and ownership, the right channels to gather the right knowledge seem to be lacking.

#### **4.4 Limitations & Recommendations**

In this survey, the knowledge levels are a self-perception of the respondents and based on a scale from 1-10. A knowledge test, which is composed of different questions regarding Bitcoin itself to assess the level of knowledge would provide a much more detailed and explicit image of respondents' levels of knowledge, as it cannot be guaranteed that individuals are able to correctly assess their own level of knowledge. Well-educated individuals are probably more likely to come to the perception of higher knowledge regarding bitcoin, also the scale of 1-10 can be interpreted differently by different respondents, although a frame is given. The results and the mismatch with the perceived characteristics in some cases can be an argument for this assumption. In addition, the correlation analysis is a pure analysis of a linear correlation between knowledge, ownership, and perceived characteristics of Bitcoin. Elaborating on the subject and correlation through investigating the significance of the results is therefore to be conducted in future research.

Also, the DOI theory, the underlying frameworks and models assume and view the process from the perspective that the innovation should be adopted. However, an adoption does not always need to be the best decision. Also, individuals as the key factor are highly influenced by external effects. External effects have been limited in this study and only a fraction of internal



effects have been investigated. Taking more precise external effects and internal effects such as cultural determinants into account is recommended in future research to form a much broader view of potential factors on adoption.

Lastly, the innovation-decision model is considering innovations and technologies which should be adopted as they are, therefore unchanged. However, as some of the respondents in the survey indicated, there are cryptocurrencies which are “better” in their opinion, which is why also potential factors regarding Bitcoin’s protocol itself would need to be focused on more. As this thesis focused on the user adoption although adoption needs to be viewed from business and user adoption, an assessment and investigation of the business adoption on the basis of these results is recommended as well.

## 5 Conclusion

Throughout this thesis, the bitcoin adoption and the factors influencing the adoption of bitcoin in Germany have been analyzed. After the classification and definition of Bitcoin, which showed the technological advances that are brought with the innovation and the perception people have of bitcoin as a store of value, laid the foundation. By using the DOI theory by Rogers, a typical adoption process from the user perspective has been analyzed. As there is indeed a missing Bitcoin adoption in developed countries such as Germany due to the lack of need, adoption is generally relatively lower as compared to developing countries where external effects are high, and form needs where individuals are forced to engage with and adopt bitcoin. This shows that the starting point is essential when it comes to analyzing an adoption process of any innovation. As Germany as a developed country has rather low external effects which force the adoption of bitcoin, the adoption is rather low, which is also visible when taking the survey results and the perception that people have on bitcoin into account. As bitcoin is an alternative rather than a must-have, individuals have a lack of interest. Again, there is no problem or effect which drives a potential engagement in the first place. As knowledge is the fundamental point in the innovation-decision process, lack of interest as well as other factors such as volatility, sustainability issues, and others which are communicated through channels like the internet and media, have a crucial effect on a potential adoption decision. As individuals do not have time constraints, can take time to evaluate, can afford to ignore, bitcoin is just an option. As human beings also tend to behave with selective perception, only the topics which are rooted in problems, innovations which provide a solution to a current need and problem are paid the most attention to.

The thesis' research question was *“What are the factors for missing Bitcoin adoption in Germany using the example of alumni at the Faculty of Economics at the University of Applied Sciences in Bremen?”* and the formulated hypothesis was *“Lack of knowledge is a major factor for missing Bitcoin adoption in Germany using the example of alumni at the Faculty of Economics at the University of Applied Sciences in Bremen.”*. The factors for missing Bitcoin adoption are multi-layered, as can be seen in the model that has been visualized, although the model is very abstract (s. Figure 11). However, in the innovation-decision process, as well as in the survey conducted, knowledge has been a crucial part. It can therefore be identified that lack of knowledge is a major factor for missing Bitcoin adoption in Germany and the hypothesis is

accepted. However, regarding alumni a concrete answer cannot be given as the knowledge levels are fully self-perceived. As individuals self-assess and self-evaluate their level of knowledge, their perception can deviate from the actual knowledge level. This is to be identified due to the fact that perceived characteristics of bitcoin are to some degree not known by owners who perceive to have higher levels of knowledge. Therefore, a detailed assessment of the level of knowledge through pre-determined questions which form a knowledge score rather than a self-perceived score would need to be taken into consideration to have a more representative and actual level of knowledge indication. Nevertheless, the self-perceived knowledge level can already give an indication that the level of knowledge is a crucial factor for missing adoption, as over 50% of the non-owners either fully agreed or agreed to lack of knowledge as a reason for non-ownership. It also needs to be highlighted that lack of knowledge is specifically principles and how-to knowledge, as awareness-knowledge is not to be considered as a factor. This means that individuals are aware of Bitcoin but lack principles and how-to knowledge to proceed into the innovation-decision process. Nevertheless, external effects determine the starting point into the innovation-decision process. As can be seen in the comparison with developing and developed countries, domestic economic issues, such as inflation, can drive the adoption of bitcoin. Assessing the levels of knowledge in a developing country and the sustainability of adoption would need to be tackled in future research. Sustainability of adoption in this context means the adoption over a longer period of time.

User's lack of knowledge also opens opportunities for change agents to link people, provide knowledge transfer and acquisition and presents business opportunities. These business opportunities could be the enablement of consulting services where individuals can reach out to experienced and qualified people, who transfer basic and simple knowledge in order to relieve and guide individuals in their innovation-decision process. Such business opportunities would need to be assessed in the future, but as the survey results showed, a high share of individuals would also start to adopt bitcoin if their bank would offer services around it. Therefore, on the one hand there is indeed potential from the user perspective, which this thesis shows, but on the other hand also from the business perspective. Businesses can enhance the innovation-decision process, act as change agents, formulate problems and needs, capitalize on current lack of knowledge causing the missing adoption and – unlike Nakamoto (*"I don't have the time to try to convince you, sorry."*) – see if they find the time to provide the neutral knowledge required.

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## **7 Appendix**

### **7.1 Survey**

#### **7.1.1 In German**

### **Fragebogen zur Umfrage "Faktoren für fehlende Bitcoin Adoption"**

#### **1. Informationsseite**

Liebe/r Teilnehmende/r,

im Rahmen meiner Bachelorarbeit zum Thema "Bitcoin Adoption" führe ich eine kurze Umfrage durch.

Ich bitte Sie, die Fragen sorgfältig durchzulesen und den Fragebogen bis zum Schluss auszufüllen, denn nur so kann eine vollständige Auswertung der Daten erfolgen. Alle von Ihnen übermittelten Informationen sind anonym, werden streng vertraulich behandelt und dienen rein wissenschaftlichen Zwecken. Ich bitte Sie, jede Frage nacheinander und ehrlich zu beantworten und nicht zu vorherigen Fragen zurückzukehren.

Die Beantwortung der Fragen dauert ca. 5 Minuten.

Vielen Dank für Ihre Teilnahme!

#### **2. Ich habe ein Studium an der Fakultät 1 (Wirtschaft) der Hochschule Bremen absolviert.**

- Ja
- Nein

#### **3. Besitzen Sie Bitcoin?**

- Ja
- Nein
- Nicht mehr

#### **4. Wann haben Sie erstmalig Bitcoin gekauft?**

- 2009-2012
- 2013-2015
- 2016-2019
- 2020-2022

#### **5. Was waren Ihre Beweggründe/Motivationen für einen Kauf von Bitcoin? (Mehrfachauswahl möglich)**

- Die Technologie dahinter.
- Anonyme Zahlungen durchführen zu können.

- Diversifikation meines Anlageportfolios / Rendite.
- Schutz vor Inflation.
- Familie und Freunde haben mir davon erzählt.
- Zunehmende Akzeptanz von Bitcoin.
- Sonstiges

**6. Der Kauf von Bitcoin ist...**

- Sehr leicht
- Einigermaßen leicht
- Einigermaßen schwierig
- Sehr schwierig
- Ich weiß es nicht.

**7. Wo haben Sie vor Ihrem ersten Kauf zum Thema Bitcoin recherchiert? (Mehrfachauswahl möglich)**

- Im Internet.
- Ich habe mich mit Freunden/Familie unterhalten.
- Ich habe Bücher gelesen.
- Ich habe an Kursen teilgenommen.
- Schau/Lese gelegentlich etwas in den Medien.
- Sonstiges

**8. Wie intensiv war Ihre Recherche vor dem ersten Kauf von Bitcoin? (1 = sehr gering, 10 = sehr hoch)**

- Skala von 1-10

**9. Ich besitze keine Bitcoins (mehr), weil...**

... ich noch zu wenig darüber weiß.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu

...ich noch nie davon gehört habe.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu

...ich nicht weiß, wo ich welche kaufen kann.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu

...es umweltschädlich und nicht nachhaltig ist.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu

...ich erstmal abwarten möchte bis es massentauglich ist.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu

...es zu volatil (preisschwankend) ist.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu

...es nur für kriminelle Zwecke genutzt wird.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu

...ich viel Geld verloren habe.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu

- Stimme überhaupt nicht zu

...ich dem Thema nicht traue.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu

...es sich noch nicht als Zahlungsmittel etabliert hat.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu

**10. Freitext-Möglichkeit: Ich besitze keine Bitcoins (mehr), weil...**

- Freitext-Antwort

**11. Ich würde mit dem Bitcoin-Handel beginnen, wenn... (Mehrfachauswahl möglich)**

- ...ich mehr darüber wüsste.
- ...meine Bank Dienstleistungen rundum Bitcoin anbieten würde.
- ...ich in Läden damit bezahlen kann.
- ...die Mehrheit der Gesellschaft anfängt Bitcoin zu nutzen.
- ...die Preisschwankungen nachlassen.
- Sonstiges

**12. Wie schätzen Sie Ihr Wissen über Bitcoin ein? (1 = ich weiß nichts darüber, 10 = ich bin Experte)**

- Skala von 1-10

**13. Bewerten Sie folgende Aussagen.**

Bitcoin hat einen relativen Vorteil zu traditionellem Fiat-Geld.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu
- Ich weiß es nicht

Bitcoin stimmt mit meinen Werten, Erfahrungen und Lebensgewohnheiten überein.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu
- Ich weiß es nicht

Bitcoin ist sehr komplex.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu
- Ich weiß es nicht

Vor dem Kauf und der Nutzung von Bitcoin, habe ich die Möglichkeit im Bereich Bitcoin zu experimentieren.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu
- Ich weiß es nicht

Vor dem Kauf und der Nutzung von Bitcoin, habe ich die Möglichkeit im Bereich Bitcoin als stiller Beobachter zu agieren.

- Stimme voll und ganz zu
- Stimme zu
- Weder noch
- Stimme nicht zu
- Stimme überhaupt nicht zu
- Ich weiß es nicht

**14. Was ist Ihr höchster Bildungsabschluss?**

- Diplom
- Bachelor
- Master
- Promotion
- Sonstiges

**15. Wie alt sind Sie?**

- Freitext

**16. Wie ist Ihr Geschlecht?**

- Männlich
- Weiblich
- Divers

**17. Wie hoch ist Ihr Nettoeinkommen pro Monat?**

- 1 bis 999 Euro
- 1.000 bis 1.999 Euro
- 2.000 bis 2.999 Euro
- 3.000 bis 3.999 Euro
- 4.000 bis 4.999 Euro
- 5.000 bis 6.999 Euro
- 7.000 bis 9.999 Euro
- 10.000 Euro oder mehr
- Kein Einkommen

**18. Was ist Ihr aktueller Erwerbsstatus?**

- Schüler\*in
- Auszubildende\*r
- Vollzeit Student\*in
- Nebenberufliche\*r Student\*in
- Duale\*r Student\*in
- Angestellte\*r
- Arbeiter\*in
- Beamte\*in
- Selbstständig
- Rentner\*in
- Erwerbslos
- Sonstiges

**19. Wie ist Ihr Familienstand?**

- Ledig
- Liiert
- Eingetragene Lebenspartnerschaft
- Verheiratet - zusammen lebend
- Verheiratet - getrennt lebend
- Geschieden
- Verwitwet

**20. Was ist Ihre Staatsangehörigkeit?**

- Freitext

**7.1.2 In English**

**Questionnaire for the survey "Factors for Missing Bitcoin Adoption"**

**1. Information page**

Dear Participant,

as part of my bachelor thesis on "Bitcoin Adoption" I am conducting a short survey.

I kindly ask you to read the questions carefully and to fill out the questionnaire until the end, because only this way a complete evaluation of the data can be done. All information you provide is anonymous, will be kept strictly confidential, and is for purely scientific purposes. I ask you to answer each question in turn and honestly, and not to return to previous questions.

It will take approximately 5 minutes to answer the questions.

Thank you for your participation!

**2. I graduated from the Faculty 1 Economics at the University of Applied Sciences in Bremen.**

- Yes
- No

**3. Do you own Bitcoin?**

- Yes
- No
- Not anymore

**4. When did you first buy Bitcoin?**

- 2009-2012
- 2013-2015
- 2016-2019
- 2020-2022

**5. What were your motivations for buying bitcoin? (Multiple choice possible)**

- The technology behind it
- Being able to make anonymous payments
- Diversification of my investment portfolio / ROI
- Protection against inflation

- Family and friends have told me about it
- Increasing acceptance of bitcoin
- Others

**6. Buying bitcoin is...**

- Very easy
- Somewhat easy
- Somewhat difficult
- Very difficult
- I don't know

**7. Where did you research about the topic bitcoin before your first purchase? (Multiple choice possible)**

- On the internet
- I talked with friends/family
- I have read books
- I have participated in courses
- Occasionally watched/read something in the media
- Others

**8. How intensive was your research before buying bitcoin for the first time? (1=very low, 10=very high)**

- Scale from 1-10

**9. I do not own bitcoin (anymore), because...**

... I still know too little about it.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all

... I have never heard of it.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all



...I do not know where I can buy some.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all

...it is harmful to the environment and not sustainable.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all

...I would like to wait until it is suitable for mass adoption.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all

...it is too volatile (fluctuating in price).

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all

...it is used for criminal purposes only.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all

...I lost a lot of money.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree

- Do not agree at all

...I do not trust the subject.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all

...it has not yet established itself as a means of payment.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all

**10. Free text option: I do not own bitcoin (anymore), because...**

- Freitext-Antwort

**11. I would start trading bitcoin if... (Multiple choice possible)**

- ...I would know more about it.
- ...my bank would offer services around Bitcoin.
- ...I can pay in stores with it.
- ...the majority of society starts to use bitcoin.
- ...volatility and price fluctuations decrease.
- Others

**12. How would you rate your knowledge about Bitcoin? (1 = I know nothing about it, 10 = I am an expert)**

- Scale from 1-10

**13. Evaluate the following statements.**

Bitcoin has a relative advantage to traditional fiat money.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all
- I do not know

Bitcoin aligns with my values, experiences, and lifestyle.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all
- I do not know

Bitcoin is very complex.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all
- I do not know

Before buying and using Bitcoin, I have the opportunity to experiment in the field.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all
- I do not know

Before buying and using Bitcoin, I have the opportunity to be a silent observer in the space.

- Fully agree
- Agree
- Neither agree nor disagree
- Disagree
- Do not agree at all
- I do not know

**14. What is your highest educational qualification?**

- Diploma
- Bachelor
- Master
- Promotion
- Other

**15. How old are you?**

- Free text

**16. What is your gender?**

- Male
- Female
- Diverse

**17. How much is your net income per month?**

- 1 to 999 euros
- 1.000 to 1.999 euros
- 2.000 to 2.999 euros
- 3.000 to 3.999 euros
- 4.000 to 4.999 euros
- 5.000 to 6.999 euros
- 7.000 to 9.999 euros
- 10.000 euros or more
- No income

**18. What is your current employment status?**

- Student
- Trainee
- Full-time student
- Part-time student
- Dual student
- Employee
- Blue-collar worker
- Civil servant
- Self-employed
- Retired
- Unemployed
- Other

**19. What is your marital status?**

- Single
- Committed
- Registered civil partnership
- Married – living together
- Married – living separately
- Divorced
- Widowed

## 20. What is your nationality?

- Free text

## 7.2 Figures



Figure 21: Bitcoin Meet-Ups in German-Speaking Area (EINUNDZWANZIG 2022)

## 8 Declaration Of Authorship

I hereby declare that I have written this thesis independently without any outside help and that I have not used any aids other than those indicated.

I have marked all verbatim or analogous copies from other works as such.

This declaration also applies to graphics, sketches, pictorial representations, and sources from the internet contained in the work.

I have not yet submitted the work in the same or similar form, even in excerpts, as part of an examination or course work.

I assure that the submitted electronic version of the paper is completely identical to the print version.

Eversen, 28.02.2023

Location, Date



Signature