



Non-Fungible Tokens (NFTs): Looking into Adoption Determinants of the Current Hype

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Abstract

After the boom in the 2010s, nowadays in 2022, nearly everyone has heard of cryptocurrencies. At present, especially starting in the last year, the next blockchain-based application, non-fungible tokens (NFTs) receive increased media attention. However, empirical research on private consumers and their motivations to buy NFTs is still scarce, and this thesis aims to enrich the mentioned research stream by providing empirical evidence. To best handle the little availability of research covering this topic, a mixed-method is chosen. First, qualitative interviews were conducted and analyzed, then a quantitative survey followed.

Considering findings from the literature review as well as from primary qualitative and quantitative research, the following results were found. The intention of customers to adopt NFTs is mainly driven by their perception of NFTs as a good investment, curiosity, and awareness as a prerequisite to adoption. Moreover, an effect of knowledge, experience, perceived complexity, and the personality trait innovativeness was found. Also, demographics play an important role when predicting adoption. Young adults as well as male people are significantly more likely to adopt, while education and income were found irrelevant, different from what was presumed.

This research provides valuable insights for different stakeholders that are active in the NFT market, related fields or consider entering it. It shows how to better market NFTs, how to use NFTs in marketing activities and it helps to predict which personas might be more likely to adopt.

Keywords: Blockchain application, non-fungible token, customer adoption, NFT, consumer behavior

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Sumário

Após o boom dos anos 2010, atualmente em 2022, quase todos ouviram falar de moedas criptográficas. Agora, especialmente a partir do ano passado, a próxima aplicação baseada na *blockchain*, os *tokens* não fungíveis (NFT) receberam uma atenção acrescida dos media. Contudo, a investigação empírica sobre consumidores privados e as suas motivações para comprar NFT é ainda escassa, e esta tese visa enriquecer a referida investigação, fornecendo provas empíricas. Para melhor lidar com a pouca investigação que cobre este tópico, escolheu-se um método misto. Primeiro, foram conduzidas e analisadas entrevistas qualitativas, e de seguida um inquérito quantitativo.

Considerando os resultados da revisão bibliográfica, da investigação primária qualitativa e quantitativa, foram encontrados os seguintes resultados. A intenção dos clientes de adoptar as NFT é principalmente motivada pela sua percepção como um bom investimento, curiosidade, e consciencialização como um pré-requisito para a adopção das mesmas. Foi também encontrado um efeito de conhecimento, experiência, percepção de complexidade, e um traço de personalidade inovador. Além disso, a demografia desempenha um papel importante quando se prevê a adopção. Os jovens adultos, bem como os homens, são significativamente mais propensos a adoptar, enquanto que a educação e os rendimentos foram considerados irrelevantes, contrariamente ao que se presumia.

Esta investigação fornece percepções valiosas para diferentes intervenientes que estão ativos no mercado de NFTs, áreas relacionadas ou que consideram entrar na mesma. Ademais, mostra como melhor comercializar as NFT, como as utilizar em atividades de marketing e ajuda a prever quais as pessoas com maior probabilidade de adoptar.

Palavras-chave: Aplicação Blockchain, token não fungível, adopção do cliente, NFT, comportamento do consumidor

Título: "Non-Fungible Tokens (NFTs)": Olhando para os Determinantes da Adopção do Hype Atual"

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Glossary

AME	Average marginal effect
APE	Average partial effect
AIC	Akaike information criterion
BAYC	Bored Ape Yacht Club (NFT project)
LMP	Linear Probability Model
NFT	Non-fungible token
OLS	Ordinary Least Square (regression analysis model)

1. Introduction

“NFTs - What started as a way to legitimize digital art has become a multi-billion-dollar industry” – Subheadline of the Economist in February 2022

Non-fungible tokens (NFTs) existed relatively silently for a few years until in March 2021 Christie’s auctioned the first purely digital and NFT-backed artwork by the digital artist known as Beeple for a record sum of 42,329 Ether (about 69.3 Million USD) (Christie’s n.d.). At the same time, celebrities such as musician Grimes (February 2021), Snoop Dogg (March 2021), Paris Hilton (April 2021) and many others started to drop NFT projects, and with that shifted media and mainstream attention to the topic (Dirchi 2022). The increased visibility and awareness for NFTs is also represented in the Google Trends of search inquiries on the platform; in late February popularity for the topic came up and kept increasing continuously until today, even topping the search term crypto (check figure 1).

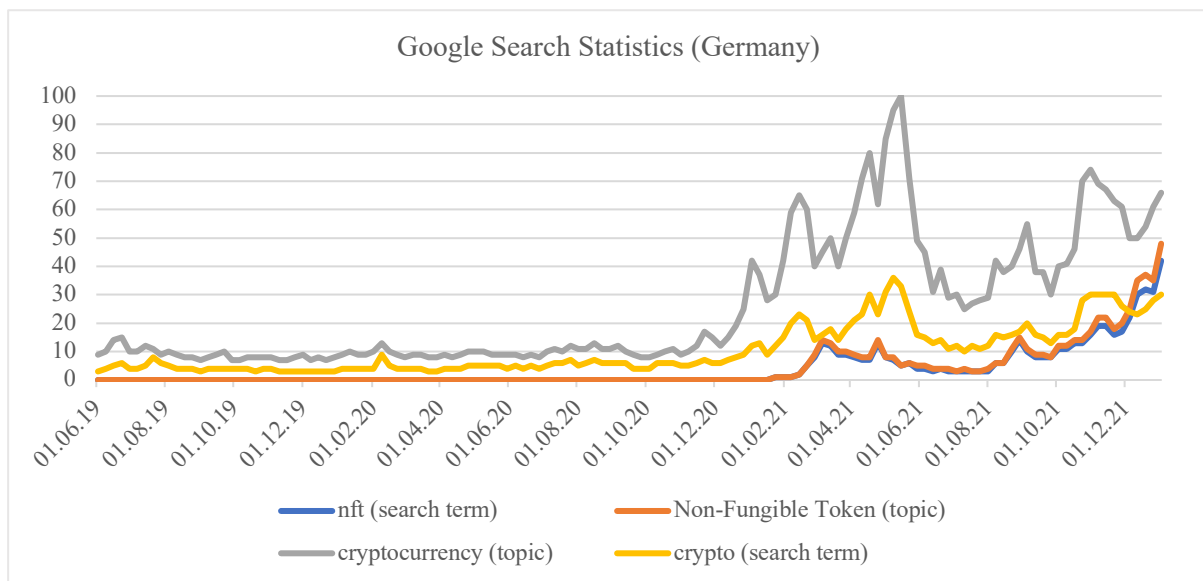


Figure 1: Google search statistics (Germany) (Google 2022)

NFT technology has the huge potential to reshape the art world with tools for provenance, authenticity, and distribution in the digital sphere (Popescu 2021). This can be seen as an opposed development to digitalization; as digitalization first diluted the worth of art, NFTs are bringing back ownership and digital scarcity. For creators of (digital) assets in form of NFTs, this is a huge chance because they can profit from the increasing value of their masterpieces when being resold. The underlying smart contract can ascribe a predefined percentage of

royalties to the creator every time the NFT changes its owner (Popescu 2021). It is important to keep in mind that NFTs are a radical innovation, meaning that the technology they build on is new to customers as well as the market for digital collectibles. Evaluating the unique technology of NFT with no established use case yet is more complex than evaluating the adoption of less radical innovations.

Innovation adoption is always influenced by (1) the factors of the innovation itself and (2) the characteristics of the (non-)adopters (Arts, Frambach, and Bijmolt 2011; Rogers 2003). This thesis focuses on the perception of NFTs, by finding adoption drivers and barriers, and adopter characteristics. Both dimensions are very important since they serve as good predictors for future diffusion of innovation. Getting in contact with the early adopter group and seeking some feedback on the product can help to refine the innovation according to user requirements (Nakandala, Hurriyet, and Perry 2020). Moreover, early adopters of an innovation are important as they trigger dissemination and imitation (Catalini and Tucker 2016; Frattini et al. 2014).

This thesis is focusing on the German market and on German adopters. The narrow geographical scope prevents biases coming from differences between countries, such as GDP, culture, or education which potentially have moderating effects.

1.1. Academic relevance and research questions

With the increased visibility and money in the market for NFTs, it is important to find out more about the innovators and current adopters of this innovation. For managerial decisions, understanding the characteristics of adopters vs. non-adopters as well as the influencing characteristics of the innovation NFT itself is important to understand the dynamics of investments into NFTs as well as their diffusion. It can help policymakers to develop better measures to deal with the cryptocurrency economy and can finally help companies to make decisions on the question of if and how they want to enter this marketplace.

Also, the academic relevance to the topic is high. Factors that influence the adoption of innovations have been the topic of research for a long time. But in the past five years, with the increased possibilities that Blockchain and web3 offer, there is a lack of academic work on this topic. Some studies and papers on early adopters of company applications based on Blockchain

Technology have been published, but way fewer on the adoption of private users on Blockchain-based innovations. This thesis aims to fill the gap by researching the adoption determinants and adopter characteristics for the Blockchain-based technique NFT.

The research questions that will be examined in this thesis are:

RQ1: What drives consumers to adopt NFT?

RQ2: What hinders customers to adopt NFT?

RQ3: What is the profile of consumers currently adopting the innovation NFT?

1.2. Outline

The following chapters of this thesis are structured in the following way: First, a literature review will be conducted. This chapter starts with a short definition of the term non-fungible token. Then an in-depth industry analysis is conducted in which important market players are introduced and the development in the country of scope Germany is distinguished from the rest of the world. Afterwards, drivers and barriers, as well as demographics influencing the adoption of innovation derived from academic concepts on the topic, will be laid out further and hypothesis developed. In chapter 3 the applied methodologies, the qualitative and quantitative research design, are described. Then, chapter 4 presents the qualitative research results and the results of the data analysis. Finally, chapter 5 discusses the research results and gives managerial implications based on the results, before limitations and future research is addressed. The interview results, survey, and further documents and information will be presented in the appendix.

2. Literature review

The following literature review provides an overview of prior research that was conducted on topics related to the research question examined in this dissertation and provides the basis for further research.

2.1. Definition of non-fungible token

A non-fungible token (NFT) can be defined as a type of unique blockchain-based token, created to represent assets, that can be sold or traded. To better understand the meaning of this it helps to understand the history of NFTs. The underlying technology of NFTs, the concept of blockchain, was introduced in 2008 through the release of the Bitcoin whitepaper which contained the blueprint that most modern cryptocurrency schemes follow. During the first years, Blockchain technology was mainly known and used as the technology behind cryptocurrencies (Yaga et al. 2019).

In 2014 with Ethereum the second generation of blockchain was introduced. It allows a great number of different use cases due to the fact that it can program and execute software, the so-called smart contracts (Ferretti and D'Angelo 2020; Stratopoulos 2018). The ERC-20 standard specifies a common interface for fungible tokens, like cryptocurrency, on the Ethereum Blockchain. This standard makes sure that each token is exactly the same. It was mutually agreed on by the developer community to ensure interoperability which enabled the success of blockchain adoption for example for ICOs (Regner, Schweizer, and Urbach 2019). With the introduction of the ERC-721 standard in 2017, which specifies every token as unique and allows that different tokens on the same smart contract can take different values, the foundation for non-fungible tokens was built. NFTs differ from earlier introduced fungible tokens in two important aspects. Every NFT is unique, and it cannot be divided or merged. They were created with the purpose to represent ownership over digital or physical assets. In contrast to that fungible tokens, like cryptocurrency are interchangeable (Voshmgir 2018). This distinct property of NFTs made various new use cases possible because it enables the tokenization of individual assets, as they can represent digital uniqueness. "CryptoKitties", the first virtual online application based on NFTs that reached widespread adoption makes this clear: in the game, you can breed, and trade digital cats and every cat is unique in some way. This makes them, exactly like other recent NFT projects, extremely popular for collectors and collecting scarce items is nothing new for people (same concept as physical coins or Pokémon cards) (Nash 2017).

2.2. Market characterization and estimation

There is a multitude of ideas on how to use NFTs ranging from proving ownership for digital goods such as digital artwork to physical assets like luxury goods (Mitchell 2021). At the time of writing this thesis (March 2022), collectibles which are mainly digital art in all forms, make up the biggest share of the NFT market. To give this market an estimated valuation, in 2020 the total addressable market for (physical and digital) collectibles was around 440 billion USD, and it is expected to grow 6,2% per year. In this huge market, NFTs are increasingly taking over market share (Market Decipher 2021). But there are also many other forms and/or functions in which NFTs appear and are traded on marketplaces like OpenSea. Other forms might be music, blockchain domain names, photography, accessories for virtual worlds, or NFTs that warrant the buyer exclusive access to some network (OpenSea). There are endless possibilities, and researchers wait to see how other experiments using NFTs in for example the tokenization of educational certificates, the enforcement of copyright, or supply chain tracking develop (Voshmgir 2018). Moreover, as issuing NFTs is getting easier and more accessible lots of new asset types appear continuously.

Also, companies are jumping on the NFT trend and find smart ways to use them for their purposes. Companies are releasing NFTs to raise brand awareness, reach new audiences or simply take advantage of new revenue streams. Just to give one example, McDonald's used NFTs to promote the comeback of its famous McRib burger. They raffled ten McRib NFTs among the retweets of their post. At the end of the raffle, the post was more than 90.000 times retweeted and had 2.3 million views. It was a huge marketing and brand image success (Birch 2022; McDonald's 2021).

2.3. Market players

There are many players in the NFT market fulfilling different functions. Since the market is still young and business models are not completely defined yet new market players are rising fast.

One pillar of the NFT market are the collections often also called "Projects". The two most valuable NFT collections by market cap are currently "CryptoPunks" and the "Bored Ape Yacht Club" (BAYC) and "CryptoPunks" (Matney 2022).

CryptoPunks is a project of 10,000 unique CryptoPunks (see figure 3). It was launched in June 2017 by Larva Labs Studio which consists of a two-person team of software developers (Larva Labs n.d.). The all-time sales volume of this project in February 2022 was 2.07 billion USD. BAYC's all-time sales volume is even higher ranging at 2.5 billion USD in February 2022 (NonFungible n.d.). The concept of BAYC is similar to the project of CryptoPunks, there are 10,000 unique digital collectibles (see figure 2). The collectibles here also serve as a club membership card and allow some benefits of being part of the community. In March 2022 the creator of BAYC Yuga Labs bought CryptoPunks (Matney 2022).



Figure 3: Example of the Bored Ape Yacht Club NFTs
(Bored Ape Yacht Club n.d.)

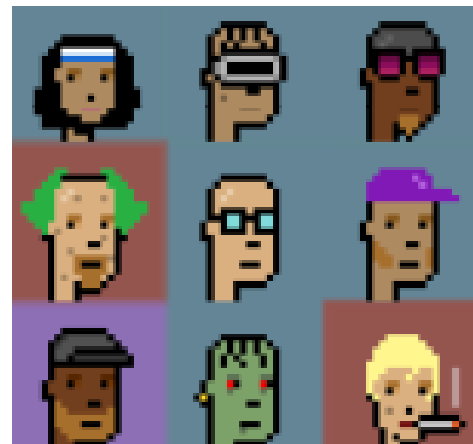


Figure 2: Example of the CryptoPunk NFTs
(Larva Labs n.d.)

Crypto assets are distributed mainly through online marketplaces. The most popular and world-leading marketplace is OpenSea, with around 10,4 billion USD of sales, which is by far higher than other platforms (Statista 2021a). In January 2022 the company was valued at 13.3 billion USD (Wilhelm 2022). Other marketplaces for example are Nifty Gateway, Rarible or Mintable. All these online marketplaces are using an auctioning system, meaning that the bidder with the highest bid gets the NFT (Abdou and Elnasr 2021). Some of the most popular NFT pieces like Beeple's "Everydays: The first 5000 days" got sold in the prestigious auction house Christie's. In December 2021 Christie's started to collaborate with OpenSea for NFT auctions. Also, the prestigious auction house Sotheby's launched its own marketplace for NFTs in October 2021 called "Sotheby's Metaverse" (Haigney n.d.).

Additionally, it is important to understand that the NFT ecosystem and market are embedded in strong communities. All relevant information and news about NFT topics are shared in (online) communities. An important tool is Discord, an instant messaging system initially

developed for gamers. On Discord, there are different groups one can join to receive the latest news about what is going on in the marketplace. Moreover, the most famous NFT creators have their own groups to update the community about what they are doing (Maganis n.d.).

Finally, wallets and applications enabling crypto trade are closely related to the NFT ecosystem, because so far you can only trade with cryptocurrency. See appendix A for a detailed overview of NFTs market players and players and closely related fields.

2.4. The global and the German NFT market

The NFT market is globally interconnected since the whole scene is online. Consumers coming from all countries are using the same infrastructure and marketplaces to trade NFTs, get in touch with the community and use the same (crypto-) currencies. However, there are regional differences in the stage of adoption.

Roger's diffusion model of innovation classifies the first 2% of people buying/ adopting an innovation as innovators, the next 13,5% are classified as early adopters. Building a bell-shaped curve early majority, late majority, and laggards follow. Estimating where exactly we are in the diffusion process is not trivial. A recent survey (April 2022) by the digital association Bitkom shows that only 7% of German respondents have a broad idea about what NFTs are (Bitkom 2022). Values for other European countries and the US look quite similar while in Southeast Asia or Latin America Adoption rates are already higher. When comparing the search interest of consumers on the term "NFT" the same trends are observed; four countries from Asia Pacific are in the top ranks. While Singapore, Hong Kong and China as the three countries with the highest search interest for NFT are not very surprising as innovative countries quickly adapting to trends, the popularity in the other countries like the Philippines (rank 4) is noticeable. Experts suppose the popularity of NFT games like Axie Infinity (from Vietnam), which became one of the world's most valuable NFT collections, is the reason for the popularity in these regions (Statista 2021b).

2.5. Innovation adoption

Since the early seventies, several researchers tried to predict consumers' buying/adoption behavior towards innovations. There are many different models that identify adoption influencing factors as well as personality traits of different adopter groups. Researchers agree

in various studies on the fact that innovation acceptance depends on both the innovation itself and on the characteristics of the individual who adopts or rejects such an innovation (Arts, Frambach, and Bijmolt 2011; Rogers 2003). However, there is no research yet on the adoption factors of NFTs.

As already introduced in section 2.4. by examining the German market we assume to see innovators or early adopters characteristics for the current adopters of NFTs (Statista 2021b). That is why the adoption determinants in this analysis are a combination of personality factors influencing early adoption as well as characteristics specific to the new product NFT.

2.6. Drivers of NFT adoption

2.6.1. Knowledge

Most studies on innovation diffusion and consumer innovativeness take knowledge about the field in which the innovation occurs as an important variable.

For example, Robertson (1971) classifies innovations based on the fact of how similar they are to already existing products. According to this classification, NFTs belong to the group of “discontinuous innovation”, because they represent a completely new product without building on already known concepts, respectively building on the Blockchain Technology which is not largely adopted yet. This kind of innovation is very knowledge-intensive, and a significant amount of learning is necessary to use it.

Gurtner and Reinhardt further lay out in their paper that a high level of knowledge increases the probability that consumers will be aware of new products/innovations in a specific domain. Further, they lay out that these people are more likely to possess knowledge about all the functions a product has and search for ways to fulfill unmet needs (Reinhardt and Gurtner 2015).

To quantify knowledge the interviews and the survey test subjective knowledge, what the consumers think they know, as well as some objective knowledge (what customers actually know). Some past studies show that subjective knowledge even has a stronger effect on purchase-related behaviors than objective knowledge. To capture the subjective knowledge

correct this research will be ajar to the subjective knowledge measurement scale of Flynn and Goldsmith (Flynn and Goldsmith 1999).

In addition to subjective knowledge, this research tests if consumers can name an NFT marketplace to also have an objective measurement of the knowledge. This should also avoid the Dunning-Kruger Effect meaning that the participants that know little overestimate their skills while really knowledgeable people know the broadness of the topic and because of that tend to entitle themselves not necessarily as experts (Dunning 2011).

H1a: Consumers with more subjective knowledge about NFT-related technologies are more likely to adopt.

H1b: Consumers with more objective knowledge about NFT-related technologies are more likely to adopt.

2.6.2. Prior experience

Analogical learning theory suggests that consumers make use of knowledge about something familiar to understand the new unfamiliar phenomena. For discontinues innovations like NFTs it is typical that they cannot be mapped in an existing knowledge category, so consumers might need knowledge from additional knowledge domains in order to adopt (Saaksjarvi 2003). Based on this approach and since cryptocurrency is used in NFT marketplaces as payment and trading option, it can be assumed that knowledge about cryptocurrencies or Blockchain technology might be an important factor influencing adoption. Getting access and trading with cryptocurrencies for the first time is a complex task. However, for the people who mastered that, trading NFTs is comparably very easy and market entry barriers are significantly reduced (Ante 2021).

H2: Consumers that already adopted NFT similar technologies like cryptocurrencies are more likely to adopt NFTs.

2.6.3. Network

As past research performed on the diffusion of innovation shows, the network of a consumer has an important influence on their buying and adoption behavior. Through their network, consumers get in touch with innovations through informal information sharing and recommendations. Without their network, they would probably have not heard of it. Moreover,

people consider their network very trustworthy which increases the probability to follow their recommendations. (Dedehayir et al. 2020)

H3: Consumers that have peers in their network that already adopted NFT are more likely to adopt NFTs.

2.6.4. Investment idea

Right now, we see an unprecedented amount of money in the NFT markets (13,9 billion U.S. dollars involving NFTs in 2021) (Statista 2022). While in the early days of NFTs the sales were mainly driven by the intention to own something to collect it, with the increased popularity and the enormous demand for some NFTs investors and speculators joined the NFT market with the desire to get wealthy. This fueled demand and ever-increasing prices even more (Abdou and Elnasr 2021). Now, this market is considered a very speculative market with high volatility (Franceschet et al. 2021).

H4: A major driver for consumers adopting NFT is the investment idea.

2.6.5. Scarcity and collection idea

Consumers that are fans of the art or the artist might buy NFTs, to support the artist. You typically get some basic user rights of the NFT you bought so that you can for example use it as your profile picture in social networks. Also, the human behavior of buying some unique, scarce things at a price way above their “normal” price isn’t new. In the past, we saw the same trends for physical collectibles like football cards etc. (Abdou and Elnasr 2021)

H5: A major driver for consumers adopting NFT is that they like collecting scarce items.

2.7. Barriers to NFT adoption

2.7.1. Complexity

Roger’s diffusion of innovation theory identifies complexity, which is closely related to prior experience and knowledge as one of the main attributes of an innovation that influences the adoption intention. Complexity relates to how difficult to understand and use consumers

perceive the innovation to be. Ideas that are simpler to understand are adopted faster than innovations that require the user to acquire new skills and knowledge (Rogers 2003). People without prior experience or extensive knowledge in the field of this innovation might find it very complex or even do not understand it which might stop them from adopting.

As already stated, the current NFT market is not very accessible, requiring consumers to have a crypto wallet and pay with cryptocurrency. However, some marketplaces are working on making NFT more accessible to everyone. (Abdou and Elnasr 2021)

H6: Consumers perceiving NFT as complex are less likely to adopt.

2.7.2. Perceived usefulness

For consumers to adopt an innovation they must perceive it as useful. They must see a clear area that is improved through the innovation, or a clear relative advantage of the new technology compared to the old one (Davis 1989; Kim, Chan, and Gupta 2007). In the case of NFT, the advantage is clearly visible for (digital) creators. As already described above through the underlying smart contract they can profit from the trade with their originally created content, while in the past a lot of digital content was just copied without any reference or participation of the creator. In the future this might also have serious advantages for consumers; they are able to prove undoubtedly ownership over an asset. Moreover, a lot of use cases are just emerging with for example the rise of the metaverse. However, unlike a physical painting that a collector can exhibit at home or in a gallery, right now an NFT is “just” a contract proving ownership over something, and the majority of current potential consumer does not have a clear usage for that (Abdou and Elnasr 2021). Also, your claim of ownership cannot control how the asset and copies of it are distributed. Because of that, it is likely to be a major barrier in their adoption process.

H7: Consumers not seeing a clear use case of NFT for themselves are less likely to adopt.

2.7.3. Lack of awareness

Even though the public awareness of NFT increased massively in the past months, as already stated in the introduction, it is still centered mainly online and in specific communities. People

who are not very active in catching up on technology trends online might not have heard about NFTs and thus might not adopt them. Even for people very interested and informed in art, it is possible that they have not heard of it yet if they stay up to date through offline sources or museums. A representative survey by Finder lays out that 83% of Germans in September 2021 still do not know about NFTs. Moreover, the survey shows a strong correlation between awareness and ownership around the world (Laycock 2021).

H8: Lack of awareness is the major reason for non-adoption.

2.8. Personality and sociodemographic variables influencing the diffusion of NFT

In 1983 Rogers already found evidence, and many other studies followed, that personality and sociodemographic variables are central in predicting consumer's adoption/rejection and intention to use (Dedehayir et al. 2020; Rogers 2003).

2.8.1. Innate consumer innovativeness

Innate Consumer Innovativeness as an indicator for adoption is often studied since the 1970s. Innate innovativeness considers innovativeness as a personality trait that remains stable over time. The large majority of existing studies predict a positive impact of consumer innovativeness on adoption/purchase intention (Pan, Wu, and Li 2021). Mixed findings in some studies are assumed to come from different and partly unprecise measurement scales (Roehrich 2004). Because of that Vandecasteele and Geuens (2021) recently developed the "motivated consumer innovativeness (MCI)" scale to precisely measure innate innovativeness. According to their model innate innovativeness comes from a functional, hedonic, social, and cognitive motivation. Functional motivation refers to attributes such as functionality, usefulness, quality and so on. Hedonic motivation refers to motivation through excitement, desire, and creativity. Social Motivation comes from the wish to differentiate, status, opinion leadership etc. The cognitive perspective is defined as motivation through knowledge, intelligence, logical thinking and so on. (Reinhardt and Gurtner 2015; Vandecasteele and Geuens 2010) Another benefit is that additional personal data can be collected. Finally, when analyzing innate consumer innovativeness, it is important to have in mind that demographic characteristics such as age or

gender as well as social factors of the given cultural environment can influence consumer innovativeness (Pan, Wu, and Li 2021).

H9: Consumers with higher innate innovativeness are more likely to adopt NFTs

2.8.2. Gender

In the past decade, many studies have been conducted about the influence of gender on the adoption of a variety of IT domains. They showed evidence that men are more likely to decide to use a new technological innovation, particularly Internet technologies, than women (Faqih and Jaradat 2015). One reason often mentioned is that men perceive online business activities as less risky compared to women (Laukkanen 2016).

H10: Male consumers are more likely to adopt NFTs.

2.8.3. Age

It is commonly understood that the older people get the more they lag in the adoption and usage of new computer-based technologies. While young people have grown up in a world embedded in information technologies it is no wonder that they are becoming technologically savvy and innovative users of IT applications. NFTs can be seen as a completely technologically innovation, there is not even a hardware part involved (Faqih and Jaradat 2015). Recent studies performed on the topic show that young people make up the biggest group among NFT investors and with an increase in age the attractiveness of NFT shrinks linearly (Butovich 2021; Statista 2021a).

H11: Younger consumers are more likely to adopt NFTs.

2.8.4. Income

As already stated earlier some of the most famous NFTs were sold for an incredibly high amount of money. NFTs like this are impossible to buy for most consumers. However, there are also more affordable NFTs. In studies conducted about innovation diffusion in different product categories, different findings on the effect of income were made (Dedehayir et al. 2020). For the case of NFT, a representative study conducted by CivicScience in 2021 finds that US citizens with a higher income are more open to investing in tech alternatives like NFT

(Butovich 2021). Finally, it needs to be said that higher income is often closely correlated with higher education, knowledge and the network a person is in.

H12: Higher-income consumers are more likely to adopt NFTs.

2.8.5. Education

Dedehayir's literature review on innovators and early adopters in the diffusion of innovation shows that education is one of the most analyzed variables in this context. There are varying results about the direction of the effect found in different studies (Dedehayir et al. 2020). As NFTs are based on the highly complex Blockchain technology we expect that a higher education can help understanding it and adopting.

H13: Consumers with a higher education level are more likely to adopt NFTs.

3. Methodology

This thesis uses a combination of qualitative and quantitative data analysis. This mixed-method approach allows to better answer the examined research question.

3.1. Qualitative research design

Even though the concept of innovation adoption is widely covered in literature, few papers cover Blockchain-related innovations and none so far NFT. Due to that, it is necessary and appropriate to carry out some exploratory research on this not yet so clear topic to verify literature results, get additional insights and find possible new hypotheses. Qualitative research helps us in contrast to quantitative research to better understand the context of the problems and ideas the interviewee brings up and allows to adapt questions more flexibly.

Questionnaire conception: To gather the qualitative data semi-structured (non-)consumer interviews were conducted, since they add depth to other, in this case, quantitative approaches. While this approach allows for a structured comparison of answers open-ended and ad-hoc questions also allow for more detailed information and can potentially lead to finds that are not directly associated with the question (Adams 2015).

The interview guideline used can be found in appendix B. This guideline was built on the findings from the literature review.

Identification of interviewees: The interviews were held across (potential) adopters in Germany with diverse demographic characteristics to get an as accurate picture as possible. In appendix C you can find a detailed, anonymized overview of the participant characteristics.

Interview conduction: Each interview lasted around 10 to 20 minutes, depending on the knowledge of the interviewee about NFTs. After a brief introduction to the project, the participants were asked about their user experience with NFTs or closely related innovations, according to the interview guideline. The individual interviews were recorded to understand them completely and to be able to again refer to them.

Interview analysis method: To analyze the qualitative research results the content analysis approach by Mayring is chosen. According to subject-based theory building, the hypotheses were already refined and linked during the data collection so that the collection and evaluation phase partly overlaps. When evaluating the interviews, induction was used in the first step to develop categories that mainly hold with the already during the literature review developed hypothesis. Afterwards, deduction was used to develop concrete examples, refine category definitions and find new coding rules. (Mayring 2000, 2016)

3.2. Quantitative research design

Quantitative research is performed to be able to use statistical methods to test the hypothesis proposed. Generally, quantitative research has the advantage that it is quantifiable and able to capture huge representative groups. Because of that, findings can be generalized. Moreover, quantitative data is more objective, reliable and comparable (Almeida, Faria, and Queirós 2017).

Survey conception: To gather quantitative data about consumers' opinions and attitudes towards NFTs an online survey was conducted. Online surveys come with a lot of advantages. They are very convenient for respondents; they can be filled out any time and from anywhere. Moreover, participants can take as much time as they want and are not influenced by the interviewer. (Evans and Mathur 2005)

To set up the online survey the professional electronic questionnaire tool “Qualtrics” was used. The survey was divided into three sections. First, it is accessed if the respondent is in the adopter or non-adopter group and if the respondent has intentions to adopt. The second section focuses on research questions one and two, the drivers and barriers to NFT adoption. Here, 5-point Likert scales ranging from “strongly agree” to “strongly disagree” were used to rate items. To do some additional tests on objective knowledge, prior experience, and network some multiple-choice questions allowing a single answer were added. Section three focuses on the personality and sociodemographic variables to get an understanding of the consumer profile. To measure innate innovativeness the survey items by Vandecasteele, and Geuens were used. Sociodemographic variables were measured in multiple-choice options. In appendix E you can find the survey.

To avoid possible misunderstandings or other problems with the survey a short pretest was run by a sample of three people on different devices.

Statistical analysis of the survey results in R: After collecting the data, R was used to test the hypothesis.

Since the dependent variable (adoption) is binary linear probability models (LMP) are used to test the hypothesis. To analyze relationships Green (1991) provides us with a minimum number of participants needed of 50, increasing with the number of independent variables (Green 1991). Every hypothesis was tested in regressions alone and with demographics (age, gender, education, income) as control variables. Since the predictive meaningfulness of the models is stronger with control variables, these models are used to test the hypothesis.

Linear probability models have a few shortcomings. Predicted probabilities must obviously be between 0 and 1, however LPMs might report other values outside of this range. Another problem is that the probability of a dependent variable cannot be linearly related to the independent variables for all their possible values. Even with these problems LPMs are very useful and often applied in economics. (Wooldridge 2013 p.248ff.)

The results of the linear probability models are interpreted using the beta value, the significance level and R-squared. R-squared measures the proportion of the variation in your dependent variable explained by your independent variables for a linear regression model. According to Wooldridge „*A small R-squared does imply that the error variance is large relative to the variance of y, which means we may have a hard time precisely estimating the beta*”

(Wooldridge 2013, p. 200ff.). An important consequence of a low R-squared is that prediction is difficult because most of the variation in y is explained by unobserved factors (or at least factors we do not include in our model). (Wooldridge 2013, p.200ff.)

To overcome the shortcoming of LMPs this thesis also uses more sophisticated binary response models, meaning Logit and Probit Models. Logit and Probit models both predict probabilities between 0 and 1, and partial effects diminish. The Logit model covers a cumulative distribution function for a standard logistic random variable. In the Probit model, G is the standard normal cumulative distribution function. Besides the advantages, Logit and Probit models come at the cost of being harder to interpret. To interpret the betas the average partial effect (APE) often also called average marginal effect (AME) must be calculated. (Wooldridge 2013)

Logit and Probit Models are set up including all potential variables influencing the adoption of NFTs. After including all variables, the number of added variables is reduced by excluding insignificant variables.

Excluding insignificant variables improves the predictive meaningfulness of the model. To find the most suitable model among the Logit and Probit models the Akaike information criterion (AIC) is used because R-squared cannot be calculated like in OLS regressions (Bartlett 2014). The AIC is a mathematical method for evaluating how well a model fits the data it was built from and in statistics it is used to find the model that best fits the data and to compare models. The AIC derives from the number of independent variables used to build the model and the maximum likelihood estimate of the model, which represents how well the model reproduces the data. According to AIC, the best-fit model is the one that explains most variation with the fewest possible independent variables. The AIC method penalizes models that use more parameters so it can be good used to compare models with the same amount of independent variables or to determine if it is worth adding another variable to the model. (Bevans 2020)

4. Data analysis and research results

4.1. Qualitative research results

In appendix D you find the comprehensive content analysis of the interviews conducted. Interviewees are quoted on the responding hypothesis supporting or invalidating them. In general, the interview sessions went very well. While participants with very deep knowledge about NFT had long and very specific remarks also people less aware of the topic brought up interesting topics.

Interviewee Characteristics: Interviewees indicating themselves as an adopter of the innovation NFT by stating that they already bought NFT were all male in the sample. Contacting 25 women in various age ranges about this, did not help. This goes along with Hypothesis 10 which already suspects males as more likely to adopt. The age range of interviewees adopting ranges from 24 to 26 years old participants. Also, here reaching out to older potential adopters did not result in finding older adopters willing to be interviewed. This holds with hypothesis 11, that younger people are more likely to adopt. Interesting is the fact that adopters are not the ones with the highest education. For two of them, the highest education is a high school diploma or an apprenticeship, which is one of the lowest education segments compared to all interviewees.

Three out of the four adopters did their first purchase in December/ January 2021/22. The fourth one was earlier, in August 2021. All adopters stated that they first heard about NFT in Spring/ Summer 2021. This goes along with the first little peek of search inquiries for NFT (compare Figure 1). Non-adopters structurally heard later about NFTs. Most of them in Winter 2021/22.

A main finding is that the barriers for non-adopters in many cases are additional drivers for adopters because of the different perceptions. While the most emphasized barrier for adoption was a lacking use case, adopters usually stated their particular interest in NFT because of the various use cases.

All participants, adopters as well as non-adopters agreed on the high initial purchasing barrier because of the complexity in the beginning. It is also worth to be stated that one adopter still perceives it as complex to buy NFT, because of the potential scams. Contradictory to that

another adopter stated how important the factor of increased trust and security through the transparency of the Blockchain is.

This leads to the often-mentioned topic of trust and perceived risk. Adopters, who usually had more knowledge about the topic often stated the increased trust in property rights, for example C1: “NFTs have the potential to replace governmental regulated property offices, like the land registry. Moreover, there is no possibility for corruption with this system.” Concerning trust and perceived risk, it is important to distinguish current NFT investments from the long-term vision of NFT. Because even though current adopters stated to perceive the investments in NFTs as risky, they have a strong trust in future applications.

All adopters stated the investment idea and potentially high profits as a main reason to buy NFTs. Even non-adopters perceive NFTs as an investment option. This holds with the literature review which already stated that after tech enthusiasts recently mainly investors joined NFT marketplaces. All adopters except for one had prior experience with cryptocurrency, which is evidence of a lower entry barrier for them.

Network, indeed, seems to be a big factor. All adopters stated that they adopted because of someone in their network talking about it. Non-adopters were in most cases not sure about NFTs in their network. They had an idea about who could be involved in the topic, but they never talked about it. An interesting finding is that non-adopters who consider adopting had more touchpoints with the topic in their network or daily life including podcasts or similar consumption.

Finally, a major driver of adoption seems to be curiosity. Adopters stated it as one main reason for their adoption and also non-adopters said that they are curious about NFT. Even though non-adopters did not show an intention to adopt they stated that they have high expectations about the future of NFT and sometimes fear missing out. This finding is added to the research as a new hypothesis. Figure 4 shows the adjusted research model with the added findings from the qualitative research.

H14: Curiosity is a major driver of NFT adoption.

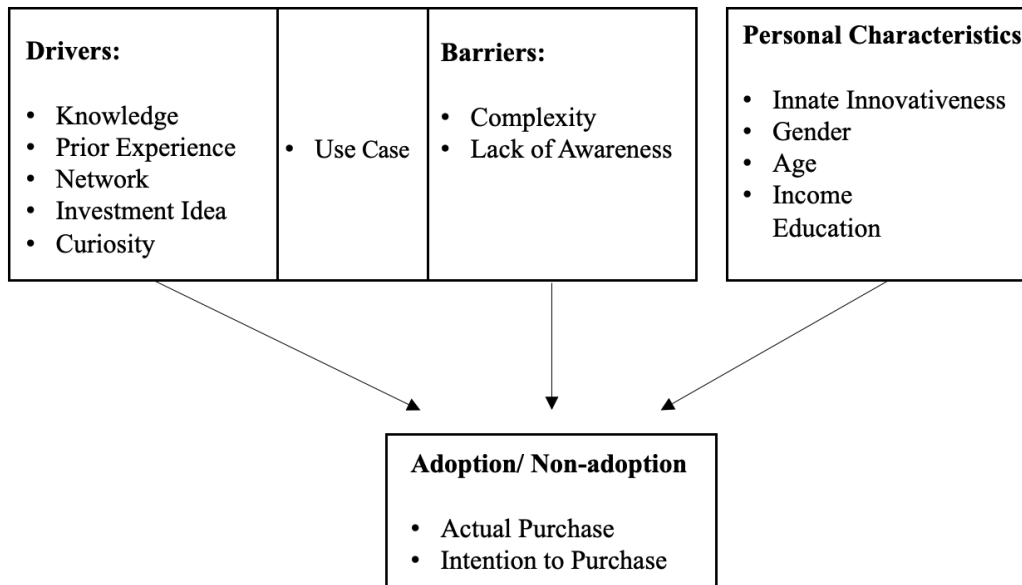


Figure 4: Adjusted research model after qualitative findings

4.2. Quantitative research results

4.2.1. Sample profile

The aim of the sample is to represent a broad part of the German population because this research is not only analyzing people that adopt NFT but rather also analyzes the group of non-adopters and their reasonings. However, it is necessary to acknowledge that it is very difficult to correctly capture a population. This survey potentially underlies the selection bias since the sampling procedure was not at random. The survey was distributed through the personal network as well as on Facebook and Discord Groups covering the topic of NFT trade to receive a bigger share of adopters.

A total sample of 175 responses was received. 29 responses were excluded from the dataset due to missing data, which results in 146 usable responses. Table 1 shows the sample characteristics.

Table 1: Survey sample characteristics

Characteristic	Frequency	Percentage
Have you ever bought an NFT?		
Yes	45	31%
No	101	69%
Living in Germany		
Yes	138	95%
No	7	5%
Gender		
Male	82	56%
Female	64	44%
Non-binary / Third Gender	0	0%
Prefer not to say	0	0%
Highest education degree		
High school graduate "Abitur"	22	15%
Apprenticeship "Berufsausbildung"	10	7%
University degree Bachelor or similar	57	39%
University degree Master or similar	49	34%
Doctorate	8	5%
Income per month		
less than 800€	12	8%
800€ to 1500€	25	17%
1500€ to 2200€	24	16%
more than 2200€	83	57%
Age		
Under 18	2	1%
18 - 24	45	31%
25 - 34	50	34%
35 - 44	21	14%
45 - 54	18	12%
55 or older	10	7%

4.2.2. Data exploration and subgroup analysis

The dataset consists of the response variable “adoption”, which is binary (adopter = 1, non-adopter = 0) and 16 potentially important covariates. Throughout the analysis following in the next chapters, meaningful covariates will be selected, and appropriate regression models will be set up. Before doing this the data is explored using summary statistics.

After checking means, medians, and distributions (see appendix F) a correlation matrix with all variables is extracted and provides the first valuable insights. Like a regression, a correlation matrix shows the direction and strength of the relationship between variables. The strongest correlation with adoption has awareness, followed by experience and expert knowledge. Education and income seem to be very irrelevant in this setting. Income does not show a correlation with items of interest and education only a very weak one. Complexity has a positive correlation even though a negative correlation was assumed. This might come from a problem with the phrasing of the question (more on that below, in the analysis).

There is multicollinearity between expert knowledge, subjective and objective knowledge which makes sense because they all measure on the same item. Also, experience and complexity are closely related to knowledge. That is important to keep in mind for regression diagnostics. Since the examined variables knowledge and innovativeness have more than one question to measure them for these items Cronbach's Alpha is evaluated. Cronbach's alpha tests items (questions) on a survey scale for internal consistency/ reliability. The analysis results in reliability for knowledge and innovativeness because for both factors Cronbach's Alpha is greater than 0.7 (Tavakol and Dennick 2011).

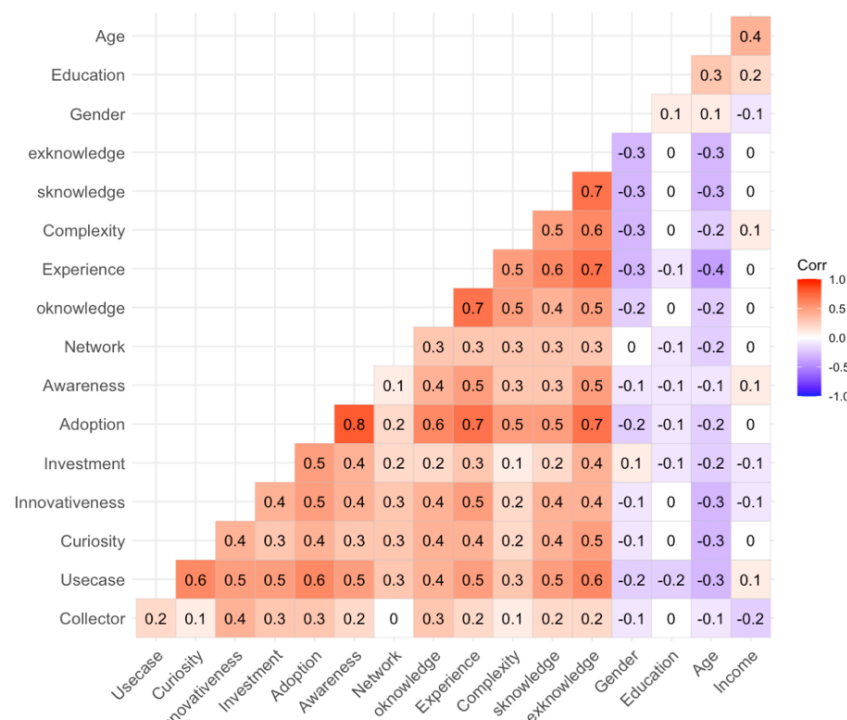


Figure 5: Correlation matrix

To better understand our data a subgroup analysis of adopters and non-adopters in the dataset is performed.

Among the adopters, the groups 18- to 34-year-old make up 84% of the sample. 72% of the adopters are male and 75% stated a Bachelor's or Master's as their highest education. In terms of income, we see that the biggest share of adopters is in the highest income group and shares decline proportionally with income, leading to the biggest group of nearly 50% earning more than 2200€.

Figure 6 shows the determinants that influence adoption according to the literature review and the qualitative interviews. The strongest consent reaches awareness, curiosity and use case. The least consent has collecting scarce items. In the following chapters, these findings will be set into context and interpreted.

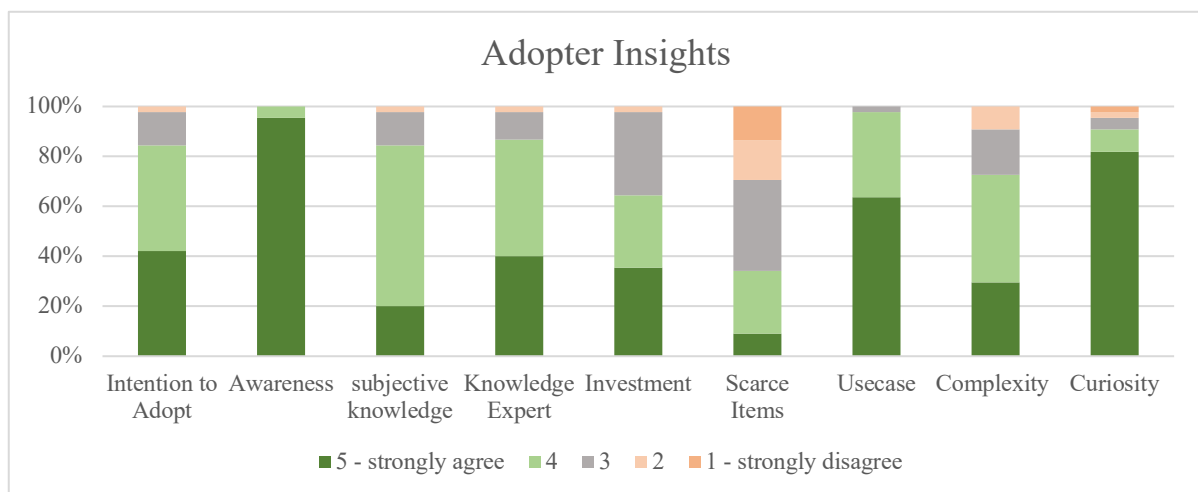


Figure 6: Adopter insights

For non-adopters, we see a quite equal distribution for age groups (slightly more people younger than 35) and gender. This is good because it means that the sample is representative in these terms. As for adopters, most respondents have a Bachelor's or Master's as the highest education. In terms of income, the majority earns more than 2200€. Comparing this against adopters we can already assume that the influence of income and education is not as strong as expected. Figure 7 shows the again how the determinates were rated. We saw the strongest disagreement for awareness, followed by considering themselves a knowledge expert in the friend's group. Also, stronger than the adopter group they disagreed with collecting scarce items. More than 60% of non-adopters said that they are curious about NFTs. In terms of adoption intention in the future, only one respondent stated strong consideration, around 20% stated that they would

probably consider buying NFTs in the future, but 50% stated that they would probably or definitely not consider buying NFTs in the future.

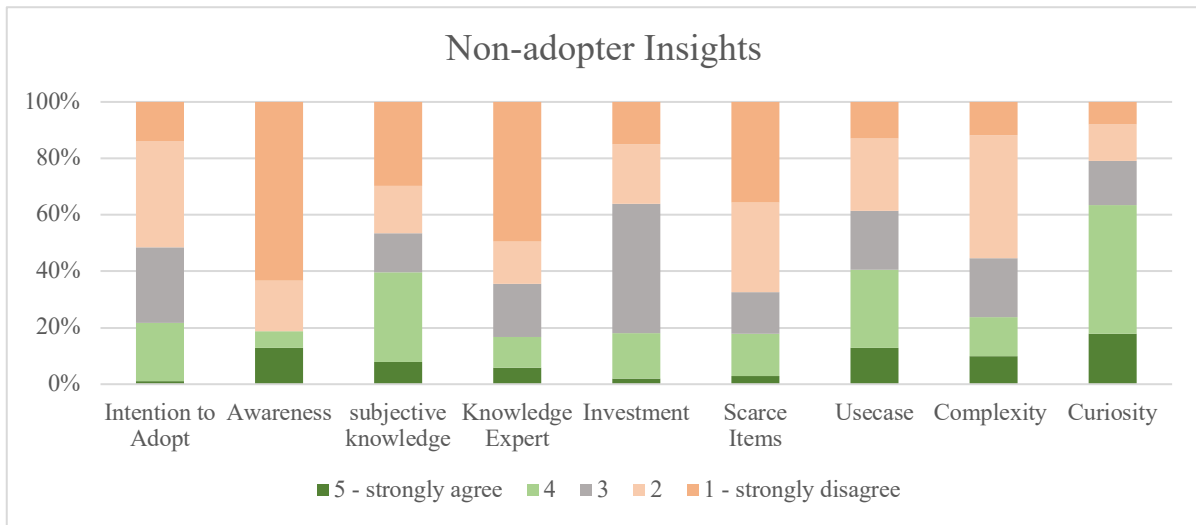


Figure 7: Non-adopter insights

4.2.3. Hypothesis testing

Testing the suggested hypothesis as described in chapter 3.2. we retrieve table 2 with the results of the linear probability models with demographics as control variables and see that all hypotheses are confirmed, besides the ones concerning complexity, income and education.

However, when drawing conclusions, we also need to consider how good the model is that tests the hypothesis. As already explained, models with a high R-squared have a high explanatory power for in this case NFT adoption. The variables that have the best explanatory power are awareness, expert knowledge, experience, and investment. The model of awareness for example explains 66% of the variation in NFT adoption.

The betas derived can be interpreted as holding everything else constant in the equation stating awareness one item higher (on the Likert scale pointing one item more in the direction strongly agree) increases the probability to adopt NFTs by 0.189. The other values can be used respectively.

All significant variables tested show a positive effect, besides age and gender. This means that being older makes it less likely that you adopt NFT. Also being female (which is coded with

the higher number 2) makes it less likely to adopt NFT. For both variables, this tendency already emerged in the interviews and when finding participants.

More surprising is the positive beta of complexity. To confirm our hypothesis, that people who perceive NFTs as complex are less likely to adopt them, we would have needed to obtain a negative beta. The reason for the obtained positive effect might be the phrasing of the question “The complexity of NFT holds me back from adopting”. Taking a closer look at the data, non-adopters often stated that they disagreed with the statement that complexity holds them back. What they probably mean by disagreeing with this statement is that it is not the complexity that holds people back from adopting NFT but rather other factors. In addition to that, people with little knowledge of NFT might underestimate the complexity, according to the Dunning-Kruger effect explained earlier.

Table 2: Hypothesis test results linear regression with demographics as control variables

Item	Hypothesis	Beta	significance level	R2	Confirmation
subjective knowledge	H1	0.129	p<0.01	0.231	yes
objective knowledge	H1	0.454	p<0.01	0.330	yes
expert knowledge	H1	0.196	p<0.01	0.449	yes
experience	H2	0.623	p<0.01	0.455	yes
network	H3	0.102	p<0.01	0.154	yes
investment	H4	0.223	p<0.01	0.393	yes
collector	H5	0.116	p<0.01	0.210	yes
use case	H7	0.181	p<0.01	0.337	yes
curiosity	H14	0.150	p<0.01	0.253	yes
complexity	H6	0.151	p<0.01	0.223	no
awareness	H8	0.186	p<0.01	0.660	yes
innovativeness	H9	0.307	p<0.01	0.350	yes
gender	H10	-0.201	p<0.01	0.120	yes
age	H11	-0.109	p<0.01	0.120	yes
income	H12	0.056	x	0.120	no
education	H13	0.017	x	0.120	no

After testing the hypothesis in linear probability models more sophisticated models for binary responses were set up, as explained before. Figure 8 gives an overview of these models. The first three models show logit models, starting from a model with all variables and then two models that were reduced by throwing out insignificant variables. Next, we see two Probit models, again one full model and the one reduced with the most explanatory variables. Finally, for comparability, we include the full linear probability model.

Dependent variable:						
	logistic			Adoption		OLS
	fullLogit (1)	ReducedLogit (2)	2ReducedLogit (3)	fullProbit (4)	2ReducedProbit (5)	FullLmp (6)
Age	2.353* (1.411)	0.400 (0.738)	0.610 (0.564)	1.323* (0.732)	0.369 (0.312)	0.025 (0.026)
Gender	-1.446 (1.945)	-2.866* (1.623)	-2.566** (1.252)	-0.852 (1.023)	-1.472** (0.690)	-0.052 (0.055)
sknowledge	-1.190 (1.081)	-0.821 (0.818)		-0.675 (0.575)		-0.023 (0.025)
exknowledge	0.926 (0.800)	0.132 (0.575)		0.523 (0.419)		0.061** (0.029)
Investment	2.326*** (0.890)	2.517*** (0.913)	2.396*** (0.782)	1.343*** (0.465)	1.300*** (0.397)	0.120*** (0.027)
Collector	0.743 (0.535)	0.299 (0.474)		0.430 (0.287)		0.018 (0.022)
Usecase	0.622 (0.835)	0.294 (0.796)	0.145 (0.603)	0.325 (0.447)	0.120 (0.322)	-0.009 (0.029)
Complexity	0.621 (0.774)	0.717 (0.651)		0.310 (0.411)		0.054** (0.027)
Curiosity	1.539** (0.776)	1.289 (0.810)	1.394** (0.632)	0.909** (0.409)	0.704** (0.341)	0.022 (0.026)
oknowledge	3.322 (2.065)	1.833 (1.293)		1.880* (1.051)		0.103 (0.067)
Experience	27.949 (3,075.089)	21.999 (2,380.038)	22.435 (2,508.106)	11.266 (546.889)	8.375 (461.979)	0.217*** (0.082)
Network	-0.672 (0.907)	-0.138 (0.628)		-0.396 (0.473)		-0.036 (0.030)
Innovativeness	1.548 (1.152)	1.011 (0.938)	1.462* (0.827)	0.925 (0.628)	0.813* (0.430)	0.124*** (0.040)
Education	-1.981* (1.051)			-1.127** (0.550)		-0.037 (0.025)
Income	-0.593 (0.950)			-0.344 (0.515)		0.024 (0.028)
Constant	-50.513 (3,075.109)	-39.173 (2,380.047)	-39.928 (2,508.115)	-24.052 (546.919)	-17.851 (461.991)	-0.922*** (0.200)
Observations	142	144	144	142	144	142
R2						0.670
Adjusted R2						0.631
Log Likelihood	-15.343	-18.264	-21.311	-15.302	-21.390	
Akaike Inf. Crit.	62.687	64.529	58.623	62.604	58.780	
Residual Std. Error						0.282 (df = 126)
F Statistic						17.061*** (df = 15; 126)

Note:

*p<0.1; **p<0.05; ***p<0.01

Figure 8: Model comparison

The AIC as well as economic intuition, based on the already performed research, was used to find the best model by comparing the values for different sets of variables. Model 3 is the best model according to the AIC because it has the lowest value. However, we need to keep in mind

that it has fewer independent variables included and the better AIC value might also come from that. Taking a closer look at model 3 we see the strongest significant effect by the variable investment. Investment is significant at a 99% (***) level for the difference between being an adopter or a non-adopter. This variable also has a strong positive significant effect in all other models in figure 8 which speaks for its high expressive power and is aligned with prior findings. Using APE, as explained earlier, the numbers get interpretable. Holding all variables constant, on average thinking NFTs are a good investment will increase the probability of being an adopter by 11,3%. Gender and curiosity are significantly different from zero at a 95% (**) level. Both variables are significant in three out of the five displayed models in figure 8. The direction of the effect is the same for all models. Gender has a strong negative effect, as already explained and curiosity has a positive effect. The percentage change in model 3 is -12.1% for gender and 6,5% for curiosity. Finally, innovativeness is significant at a 90% (*) level in both two times reduced Logit and Probit models. In the full OLS model, it is even significant at a 99% (***) level. It has a positive effect of 6.9% in model 3.

The variables use case, knowledge, network, and being interested in collecting scarce items show less importance in the regression models.

It is worth putting a remark on the negative values for the constant (being significant in the OLS models and insignificant in Logit and Probit). Since our dataset has way fewer adopters than non-adopters the negative number reflects that. Setting every variable to 0 the chance to be an adopter is very low, as reflected through the negative number.

5. Discussion and implications

This research contributes to the industry of NFT and new market players entering this field in the following aspects. It provides decision-makers with detailed insights into the current NFT adopters in Germany. It lays out what reasons drive adoption as well as barriers that need to be resolved to increase adoption rates.

In principle, literature review, qualitative customer interviews and the quantitative survey complement each other without significant contradictions.

Research questions 1 and 2: What drives/hinders people to adopt NFT?

One main finding is that it is not trivial to distinguish drivers and barriers because the perception of an item analyzed might be very different comparing adopters and non-adopters. Moreover, personal characteristics play a role in predicting if a person generally is more prompted to be in the early adopter category.

The main driver in all data gathered and also stated in the few recent papers published about NFT (e.g. Abdou and Elnasr 2021) is investment, meaning that people believing NFTs are a good investment are more likely to adopt. It is necessary to point out that the perception of whether NFTs are a good investment might be mediated by other factors such as the knowledge or experience, as well as influence from your network and which kind of media is consumed to get information. The investment intention to buy NFT might get even stronger as marketplaces for NFT get more democratized by reducing entry barriers through allowing to buy with traditional currencies. This means opening the market for tons of potential additional investors. The purchase of NFTs with the intention of investing brings importance to the often-discussed topic of regulation in this sector. So far NFTs are not subject to regulation. This has the consequence that there is no legal protection for everyone who invests, creates or sells NFT. With the great amount of money in the market, the need for regulations increases and some NFT platforms have also started to establish their own fraud security systems. (Rahman n.d.) Moreover, in the interviews it was clear that a lot of people currently lack trust in the system. One adopter stated that it is sometimes very complicated to find out if an NFT purchase is trustworthy or fraudulent. Regulations would increase the trust in the market and with that probably facilitate more adopters that are hesitating right now because they do not feel safe in the market.

Next, it was found that curiosity is an important factor. Curiosity about NFT, which was high for adopters but also for non-adopters could for example be used by companies for marketing purposes. In one interview it was stated, “I know a friend of mine bought sneakers and got an NFT with them...” (C7). From this, we see that people are interested in such ideas and share them with their network. Companies can make use of this curiosity to market their traditional products.

Seeing a clear use case was very important in the qualitative interviews but it turned out to be less important throughout the rest of the analysis. Yet, it might still be important because during

the interviews, questions were adjusted flexibly based on the reaction of the participants, whereas it might be more difficult for the participants to clearly articulate their opinions in the survey.

As already introduced, finding important use cases will be crucial for the future success of NFTs. As there are lots of interesting and valuable use cases emerging, it can be expected that adoption rates will continue to rise because many non-adopters stated that they would consider buying an NFT if they would have a use case for it. Also, the rise and spreading of the metaverse will facilitate the awareness of use cases for NFTs since the metaverse already now offers tons of possible NFT applications. To give an example, the metaverse platform Decentraland held a virtual fashion week in March 2022 with a lot of traditional brands like Dolce&Gabbana, Etro or Tommy Hilfiger joining and promoting virtual headquarters and wearables in NFT form for the metaverse (Decentraland 2022).

Knowledge is less important in the analysis than existing literature predicts. However, this might be partially caused because of the limitations of the regression models (see chapter 7). In the full model testing with all knowledge variables, multicollinearity could appear. Even after correcting for multicollinearity, the variable is not significant in the Logit and Probit models. Tested with control variables only, knowledge is significant. Knowledge is difficult to grasp because subjective self-perception will always have an influence.

Being a collector did not show much importance in the regression models. Also, the subgroup analysis does not indicate a huge difference for this adoption determinate between the groups; for non-adopters the variable collector has the third-highest level of disagreement compared to all other variables and for adopters the variable has the highest level of disagreement.

For traditional collectors, the entry barrier to collecting NFTs might currently be too high. However, the market for traditional collectibles is huge and predicted to transform more and more in the digital sphere so the impact might increase in the next years (Market Decipher 2021). The underlying concept of scarcity which is used by digital and physical collectibles is usually successful and in big parts responsible for the increased hype around NFTs and their price rallies.

The personal network is less important than we would expect after performing the quantitative analysis. The effect is not diminishable and probably closely related to word-of-mouth. It is not clear whether network might have a mediating effect and word-of-mouth an explaining effect.

Moreover, having people in your network increases your awareness about NFTs because the topic might come up in conversations (see above).

Finally, awareness can be seen as a prerequisite to adoption. How should someone adopt if the person is not aware of NFTs? The significance of this variable in the linear probability model is aligned with the truth and thereby indicates that the survey participants responded diligently, which gives more credibility to the dataset. Awareness is potentially affected by other variables such as innovativeness or network. If someone is very innovative the person is more likely to hear about NFT sooner, the same holds if people in your network are very active in NFTs.

We can derive the implication for market players in the NFT market that increasing awareness for NFTs might have a strong growing effect on the size of the customer base. Knowing more about innovators and early adopters might help decision-makers raise awareness among non-adopters because these groups trigger dissemination and imitation among others (Dedehayir et al. 2020). Companies could encourage or incentivize early adopters to share their experience and promote word-of-mouth, but they probably will not even need to offer big incentives, because people might speak about this on their own because it is a new and interesting topic (see paragraph before). Finally, on awareness it needs to be remarked that online affinity is a prerequisite for NFTs and NFT trade so raising the offline awareness might not be very effective because the parts of the audience do not fulfill the prerequisite of online affinity.

RQ3: What is the profile of consumers currently adopting the innovation NFT?

Age and Gender were already restricting factors when starting the research. It was nearly impossible to find adopters that were female or older than 25 years. Also, the subgroup analysis made the distribution of age and gender among adopters vs. non-adopters clear. Aligned with the quantitative research and the literature review the strong effect of age and gender is confirmed. From this, we can derive useful implications for marketing. Using NFTs to market products would only make sense for a young and male audience at the moment. However, it could also be interesting to reinforce women for the topic or people older than 25, because in many cases they still show a high curiosity for the topic.

Age and gender distributions might change once more people adopt NFTs. Appendix A shows that the gender gap is way smaller in countries with a generally higher adoption rate (Laycock 2021). The same seems to hold for age, looking at the Philippines. The Philippines as the

country with the highest percentage of NFT adopters show a way more balanced and even a little higher for the oldest group of 65+ years old age distribution (Laycock 2021).

Income and Education do not have a significant influence on NFT adoption in any of the data. Older literature on adoption factors pays attention to these factors. But we need to understand that the characteristics of NFTs as an internet innovation are very different compared to new product innovations often examined in earlier papers. Concerning education for NFTs, you can get all information on the internet: so far there are no or very few traditional university courses covering related topics. Moreover, tech-savvy people like for example developers, potentially interested in the topic, acquire their skills often self-taught. Developer surveys performed by Stackoverflow indicate that a high percentage learned programming self-taught (Stackoverflow 2019). For income, already prior studies on NFTs found mixed results. A representative study conducted by CivicScience in 2021 found that US citizens with an income lower than 25,000 or more than 150,000 dollars yearly income are way more interested in NFT than the middle class. (Butovich 2021)

Combining the findings of all three research questions: Throughout this chapter already many managerial implications were given for individually considered variables. Gathering all findings made for the three research questions enables decision-makers to predict how likely (parts of) their customer base are to adopt NFTs.

Around 20% of the non-adopters stated that they would probably consider buying NFTs. Applied on a large customer base, this might have a strong potential, especially because this number would go up if the use case is clear. If customers are potentially interested in NFTs an action in this direction might help the brand to get more awareness and a perception as being innovative and “cool” since they adopt to current trends. Companies can start with little initiatives to eliminate the risk and dig deeper once it is successful. Even though costs for creating an NFT vary, compared to traditional marketing campaigns it is possible to create an NFT at a quite low costs (Heidorn 2022). Just to give two ideas; selling an NFT that gives the owner the possibility to have a 5-minute chat with the founder or CEO might be a good idea, as well as selling NFTs that guarantee early access to price reductions.

More long-run initiatives could be building an exclusive brand community to which you get access with an NFT. Such communities are very valuable for companies to gain more insights into their customer base (Brogi 2014).

At the same time, it is necessary to keep in mind that 50% of the (currently way bigger) non-adopter group would not even consider buying an NFT in the future. Trying to reach this group now might not be successful or come at high costs. For this group, it makes sense to wait until the mainstream population has a higher awareness for NFTs and could acquire some knowledge on the topic.

The managerial implications need to be adjusted to the diffusion progress and future success of NFTs. Even though it is a strong new technology and the business cases look promising, it is never for sure that an innovation reaches widespread adoption.

6. Conclusion

As the topic of NFTs is raising more and more public attention, the market seems to develop as the cryptocurrency market developed; while for the first several years almost solely tech-savvy enthusiasts used NFTs, currently users are getting more diverse, and the common personality profile of users is diluting.

With the increasingly big amounts of money flowing in this market, it is important to understand the reasons why people are jumping onto this “hype”, the market itself and how it could be used by companies or other stakeholders.

This dissertation examined the adoption determinates of NFTs in terms of drivers and barriers as well as the personal characteristics of (non-)adopters. Most variables potentially influencing NFT adoption, like knowledge, experience or awareness were found in the existing literature on innovation adoption. From qualitative interviews, the variable curiosity was added.

The findings reveal that among all analyses the factors investment idea, curiosity, and awareness (as a prerequisite) were strong adoption drivers. Less importance in the statistical analysis showed knowledge, experience, network, and the interest in collecting scarce items. However, qualitative interviews indicated the importance of networks and prior experience in this field. Age and Gender are demographics with a strong impact on adoption throughout all analyses, while education and income are irrelevant.

The research provides several managerial implications that can be useful for players who are already in the market, allowing them to better understand their customers and potentially trigger them to foster dissemination and imitation. It also provides valuable implications for companies thinking of investing in an NFT campaign or entering that market. Finally, the implications might also be useful for regulators that might need to decide on new legislation touching this field throughout the next years.

7. Limitations and future research

As this is a non-experimental study, all findings presented in this thesis are correlations between variables. Causations are not verified. Moreover, the underlying data for this research was collected at a single point in time. For the analysis of new technologies like NFT it might make sense to conduct a retro perspective analysis since consumers' perceptions usually change the more popular or known something new becomes. Further, more longitudinal studies could be performed to get a more comprehensive understanding of consumers' intention toward NFTs.

The analysis itself is subject to some biases. First, the sample size is comparably small and unbalanced in terms of adopters and no-adopters. Because of that, findings might not be generalizable. The data is subject to selection bias because the sample fails to represent the German population in terms of age, location, and interests. Moreover, this study only targeted the German market, for other markets like for example the Philippines with already way higher adoption rates and other underlying economic ecosystems, the findings might not hold and the implication might not be accurate.

Finally, it is unfeasible to include all possible variables in the conceptual model to investigate. Because of that, the study might be subject to omitted variable bias. Other factors influencing consumers' adoption of new innovations like the personality trait novelty seeking (Dedehayir et al. 2020; Hirschman 1980; Rogers 2003) or the connection to real-world art could be tested. For future research, insignificant variables could be excluded and instead replaced by the above-mentioned. Furthermore, it would be interesting to test the relationships between personal characteristics and the perception of the innovation. When conducting future research, it is important to acknowledge that personality characteristics predicting adoption will change with reaching a new stage of adopters, the (early) majority.

8. References

- Abdou, Doaa Salman, and Fatma Abou Elnasr. 2021. "PROSPECTS OF INVESTMENT IN DIGITAL ART: THE CASE OF ETHEREUM AND NON-FUNGIBLE TOKEN (NFT)." *Economics and Law*.
- Adams, William C. 2015. "Conducting Semi-Structured Interviews." *Handbook of practical program evaluation* 4: 492–505.
- Almeida, Fernando, Daniel Faria, and André Queirós. 2017. "Strengths and Limitations of Qualitative and Quantitative Research Methods." *European Journal of Education Studies* 3: 369–87.
- Ante, Lennart. 2021. "The Non-Fungible Token (NFT) Market and Its Relationship with Bitcoin and Ethereum." *SSRN Electronic Journal* (20): 1–9.
- Arts, Joep W C, Ruud T Frambach, and Tammo H A Bijmolt. 2011. "Generalizations on Consumer Innovation Adoption: A Meta-Analysis on Drivers of Intention and Behavior." *International Journal of Research in Marketing* 28(2): 134–44.
- Bartlett, Jonathan. 2014. "R Squared in Logistic Regression."
<https://thestatsgeek.com/2014/02/08/r-squared-in-logistic-regression/>.
- Bevans, Rebecca. 2020. "Akaike Information Criterion | When & How to Use It." *March 26, 2020*. <https://www.scribbr.com/statistics/akaike-information-criterion/>.
- Birch, Kate. 2022. "Top 10 NFT Marketing Initiatives by Leading Brands in 2021."
<https://businesschief.com/digital-strategy/top-10-nft-marketing-initiatives-leading-brands-2021>.
- Bitkom. 2022. *NFTs Sind in Deutschland Noch Weitgehend Unbekannt*.
<https://www.bitkom.org/Presse/Presseinformation/NFTs-noch-weitgehend-unbekannt>.
- Bored Ape Yacht Club. "Bored Ape Yacht Club." <https://boredapeyachtclub.com/#/> (March 4, 2022).
- Brogi, Stefano. 2014. "Online Brand Communities: A Literature Review." *Procedia - Social and Behavioral Sciences* 109: 385–89.
<https://www.sciencedirect.com/science/article/pii/S1877042813051094>.
- Butovich, Zack. 2021. "Are NFTs the Next Wave of Collector's Items? Most Still Unsure What They Are." <https://civicscience.com/are-nfts-the-next-wave-of-collectors-items-most-still-unsure-what-they-are/>.
- Catalini, Christian, and Catherine Tucker. 2016. *Seeding the S-Curve? The Role of Early Adopters in Diffusion*. National Bureau of Economic Research.

- Christie's. "Beeple's Opus." 2021. <https://www.christies.com/features/Monumental-collage-by-Beeple-is-first-purely-digital-artwork-NFT-to-come-to-auction-11510-7.aspx>.
- Davis, Fred. 1989. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology." *MIS Quarterly* 13: 319.
- Decentraland. 2022. "Metaverse Fashion Week Is Here!" 2022. <https://decentraland.org/blog/announcements/metaverse-fashion-week-is-here/>.
- Dedehayir, Ozgur, Roland J Ortt, Carla Riverola, and Francesc Miralles. 2020. "Innovators and Early Adopters in the Diffusion of Innovations: A Literature Review." *Digital Disruptive Innovation*: 85–115.
- Dirchi, Rimme. 2022. "Hollywood Celebrities Who Have Launched NFTs."
- Dunning, David. 2011. "Chapter Five - The Dunning–Kruger Effect: On Being Ignorant of One's Own Ignorance." In eds. James M Olson and Mark P B T - *Advances in Experimental Social Psychology* Zanna. Academic Press, 247–96. <https://www.sciencedirect.com/science/article/pii/B9780123855220000056>.
- Evans, Joel R, and Anil Mathur. 2005. "The Value of Online Surveys." *Internet research*.
- Faqih, Khaled M S, and Mohammed-Issa Riad Mousa Jaradat. 2015. "Mobile Healthcare Adoption among Patients in a Developing Country Environment: Exploring the Influence of Age and Gender Differences." *International Business Research* 8(9): 142.
- Ferretti, Stefano, and Gabriele D'Angelo. 2020. "On the Ethereum Blockchain Structure: A Complex Networks Theory Perspective." *Concurrency and Computation: Practice and Experience* 32(12).
- Flynn, Leisa Reinecke, and Ronald E Goldsmith. 1999. "A Short, Reliable Measure of Subjective Knowledge." *Journal of Business Research* 46(1): 57–66. <https://www.sciencedirect.com/science/article/pii/S0148296398000575>.
- Franceschet, Massimo et al. 2021. "Crypto Art: A Decentralized View." *Leonardo* 54(4): 402–5. https://doi.org/10.1162/leon_a_02003.
- Frattini, Federico, Mattia Bianchi, Alfredo De Massis, and Uros Sikimic. 2014. "The Role of Early Adopters in the Diffusion of New Products: Differences between Platform and Nonplatform Innovations." *Journal of Product Innovation Management* 31(3): 466–88.
- Google. 2022. "Google Trends."
- Green, S B. 1991. "How Many Subjects Does It Take To Do A Regression Analysis." *Multivariate behavioral research* 26(3): 499–510.
- Haigney, Sophie. "Next Stop: The Metaverse." <https://www.sothebys.com/en/articles/next-stop-the-metaverse>.

- Heidorn, Christian. 2022. "How Much Does It Cost to Create an NFT?" <https://tokenizedhq.com/how-much-does-it-cost-to-create-an-nft/#:~:text=However%2C ever since Ethereum has,expensive as %24100-150 dollars>.
- Hirschman, Elizabeth C. 1980. "Innovativeness, Novelty Seeking, and Consumer Creativity." *Journal of consumer research* 7(3): 283–95.
- Kim, Hee-Woong, Hock Chuan Chan, and Sumeet Gupta. 2007. "Value-Based Adoption of Mobile Internet: An Empirical Investigation." *Decision Support Systems* 43(1): 111–26. <https://www.sciencedirect.com/science/article/pii/S016792360500076X>.
- Larva Labs. "CryptoPunks." <https://www.larvalabs.com/cryptopunks> (March 3, 2022).
- Laukkanen, Tommi. 2016. "Consumer Adoption versus Rejection Decisions in Seemingly Similar Service Innovations: The Case of the Internet and Mobile Banking." *Journal of Business Research* 69(7): 2432–39. <https://www.sciencedirect.com/science/article/pii/S0148296316000266>.
- Laycock, Richard. 2021. "NFT Statistics 2021." 2021. <https://www.finder.com.au/nft-statistics#how-many-people-know-what-an-nft-is>.
- Maganis, Jeffrey. "Top NFT Communities To Join." Top NFT Communities To Join.
- Market Decipher. 2021. *Collectibles Market and NFT Market Size, Statistics, Growth Trend Analysis and Forecast Report, 2021 - 2031*. <https://www.marketdecipher.com/report/collectibles-market>.
- Matney, Lucas. 2022. "Bored Apes Maker Yuga Labs Acquires CryptoPunks NFT Collection." <https://techcrunch.com/2022/03/11/bored-apes-maker-yuga-labs-acquires-cryptopunks-nft-collection/>.
- Mayring, Philipp. 2000. "Qualitative Content Analysis." *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research [On-line Journal]*, <http://qualitative-research.net/fqs/fqs-e/2-00inhalt-e.htm> 1.
- . 2016. *Einführung in Die Qualitative Sozialforschung*. Beltz.
- McDonald's. 2021. "Twitter." <https://twitter.com/mcdonalds/status/1455174998264586243?lang=de> (February 22, 2022).
- Mitchell, Kathryn. 2021. "How To Create A Physical NFT Marketplace?"
- Nakandala, Dilupa, Hilal Hurriyet, and Neil Perry. 2020. "Benefits of Early Adopter Feedback in Innovation Commercialisation."
- Nash, Gerald. 2017. "The Anatomy of ERC721." <https://medium.com/crypto-currently/the-anatomy-of-erc721-e9db77abfc24>.

- NonFungible. “NFT Market Overview.” <https://nonfungible.com/market/history> (February 3, 2022).
- Pan, Han, Xin Wu, and Yuping Li. 2021. “A Review on the Concept of Consumer Innovativeness.” In *E3S Web of Conferences*, EDP Sciences.
- Popescu, Andrei-dragos. 2021. “Non-Fungible Tokens (NFT) - Innovation beyond the Craze.”
- Rahman, Syedur. “NFT’s (Non-Fungible Tokens) - Risks, Regulation and The Law.” <https://www.rahmanravelli.co.uk/expertise/nfts-non-fungible-tokens-risks-regulation-and-the-law/#:~:text=At present%2C NFT’s are not,the identity of the seller.>
- Regner, Ferdinand, André Schweizer, and Nils Urbach. 2019. “NFTs in Practice - Non-Fungible Tokens as Core Component of a Blockchain-Based Event Ticketing Application.” *40th International Conference on Information Systems, ICIS 2019*: 1–17.
- Reinhardt, Ronny, and Sebastian Gurtner. 2015. “Differences between Early Adopters of Disruptive and Sustaining Innovations.” *Journal of Business Research* 68(1): 137–45.
- Roehrich, Gilles. 2004. “Consumer Innovativeness: Concepts and Measurements.” *Journal of Business Research* 57(6): 671–77. <https://www.sciencedirect.com/science/article/pii/S0148296302003119>.
- Rogers, Everett M. 2003. *Diffusion of Innovations*. 5th ed. New York: Free Press.
- Saaksjarvi, Maria. 2003. “Consumer Adoption of Technological Innovations.” *European Journal of Innovation Management* 6(2): 90–100.
- Stackoverflow. 2019. *Developer Survey Results 2018*. <https://insights.stackoverflow.com/survey/2018#developer-profile>.
- Statista. 2021a. *NFT*. <https://www.statista.com/study/103484/nft/>.
- . 2021b. “Percentage of Adults Who Either Own or Are Planning to Buy an NFT in Selected Countries Worldwide as of September 2021.” <https://www.statista.com/statistics/1278047/global-nft-adoption-by-country/>.
- . 2022. *Total Sales Involving a Non-Fungible Token (NFT) in Gaming, Art, Sports and Other Segments from 2018 to 2021 (in Million U.S. Dollars)*. <https://www.statista.com/statistics/1221400/nft-sales-revenue-by-segment/>.
- Stratopoulos, Theophanis C. 2018. “Blockchain Technology Adoption.” *SSRN Electronic Journal* (January 2019).
- Tavakol, Mohsen, and Reg Dennick. 2011. “Making Sense of Cronbach’s Alpha.” *International journal of medical education* 2: 53–55. <https://pubmed.ncbi.nlm.nih.gov/28029643>.

- The Nifty Crypto Nomad. 2020. "NFT Ecosystem Overview."
<https://niftycryptonomad.com/nft-ecosystem-overview/>.
- Vandecasteele, Bert, and Maggie Geuens. 2010. "Motivated Consumer Innovativeness: Concept, Measurement, and Validation." *International Journal of Research in Marketing* 27(4): 308–18.
- Voshmgir, Shermin. 2018. "What Is a Fungible Token? What Is a Non-Fungible Token?"
<https://blockchainhub.net/blog/blog/nfts-fungible-tokens-vs-non-fungible-tokens/>.
- Wilhelm, Alex. 2022. "Tech Crunch: Making Sense of OpenSea at a \$13B Valuation."
<https://techcrunch.com/2022/01/05/making-sense-of-opensea-at-a-13b-valuation/>.
- Wooldridge, Jeffrey M. 2013. *Introductory Economics - A Modern Approach*. 5th Editio.
- Yaga, Dylan, Peter Mell, Nik Roby, and Karen Scarfone. 2019. "Blockchain Technology Overview."
<http://arxiv.org/abs/1906.11078%0Ahttp://dx.doi.org/10.6028/NIST.IR.8202>.

9. Appendix

Appendix A: Illustrations

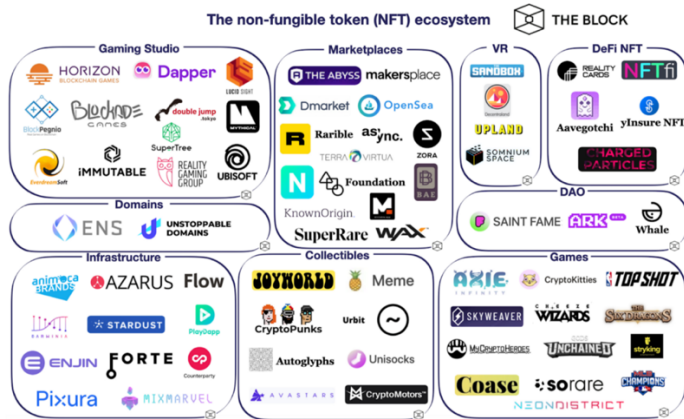
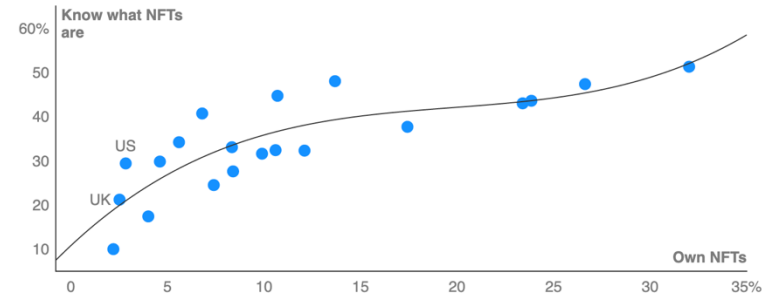


Figure 9: The non-fungible ecosystem (The Nifty Crypto Nomad 2020)

The correlation between awareness and ownership of NFTs around the world

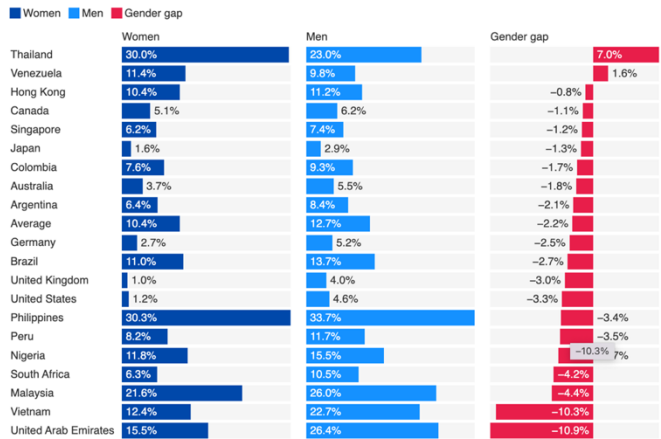


Source: Finder survey of 28,723 adults was conducted in September 2021 • Embed



Figure 10: Correlation between awareness and ownership of NFT (Laycock 2021)

NFT adoption around the world by gender

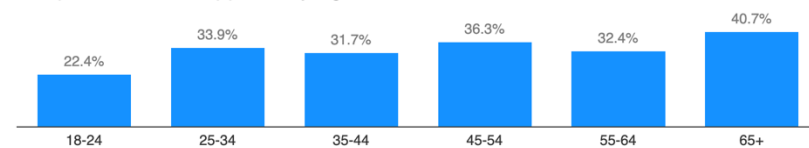


Source: Finder's survey of 28,723 adults conducted in September 2021 • Embed • Download image



Figure 10: NFT adoption around the world by gender

NFT adoption in the Philippines by age



Source: Finder's survey of 1,507 Filipino Internet users conducted in September 2021 • Embed • Download image



Figure 9: NFT adoption in the Philippines by age (Laycock 2021)

Appendix B: Interview Guideline

Table 3: Interview Guideline

Start	<ul style="list-style-type: none"> • Purpose of the Interview • Brief Introduction to the study • Confidentiality and Recording
Classify Adopter/ Non-Adopter	<ul style="list-style-type: none"> • Do you have an idea about what an NFT is? • If yes, have you ever bought one or do you think of buying one in the near future?
H8: Lack of Awareness is the major reason for non-adoption.	
H1: Consumer's with more knowledge about NFT related technologies are more likely to adopt.	
subjective knowledge	<ul style="list-style-type: none"> • How would you rate your knowledge about NFTs?
Objective knowledge	<p>Not asked if subjective knowledge is "never heard of":</p> <ul style="list-style-type: none"> • Have you ever heart of cryptocurrency such as BitCoin? • Can you name a marketplace on which you can trade NFTs?
Drivers	
H2: Consumers that already adopted NFT similar technologies like cryptocurrencies are more likely to adopt to NFTs.	<ul style="list-style-type: none"> • Do you own cryptocurrency? • If yes, have you ever bought something with it?
H3: Consumers that have peers in their network that already adopted NFT are more likely to adopt NFTs.	<ul style="list-style-type: none"> • Do you know if people in your network adopted NFT? • Are you sometimes talking about NFTs with friends/ colleagues?
H4: A major driver for consumers adopting to NFT is the investment idea.	<ul style="list-style-type: none"> • Do you think NFTs are a good investment option?

H5: A major driver for consumers adopting to NFT is that they like collecting scarce items.	<ul style="list-style-type: none"> Do you like collecting scarce items? Like for example football cards?
Barriers	
H6: Consumers perceiving NFT as complex are less likely to adopt.	<ul style="list-style-type: none"> Non Adopter: Why are you not considering to adopt to this trend? Adopter: What use cases do you see for NFTs?
H7: Consumers not seeing a clear use case of NFT for themselves are less likely to adopt.	
Characteristics	
H9: Consumers with a higher innate innovativeness are more likely to adopt to NFTs	
Functionally motivated innovativeness Hedonic motivated innovativeness Social motivated innovativeness Cognitive motivated innovativeness	<ul style="list-style-type: none"> How fast do you generally adopt to new trends? Which goal do you pursue with adopting to NFT? How does it make you feel belonging to the group of early adopters for innovation? What motivates you to trade NFTs as one of the first ones?
H10: Male consumers are more likely to adopt to NFTs.	<ul style="list-style-type: none"> What is your gender?
H11: Younger consumers are more likely to adopt to NFTs.	<ul style="list-style-type: none"> What is your age?
H12: Higher income consumers are more likely to adopt to NFTs.	<ul style="list-style-type: none"> Is your monthly income lower than 1000€, between 1000€ and 2500€ or higher?
H13: Consumers with a higher education level are more likely to adopt to NFTs.	<ul style="list-style-type: none"> What is your highest education?
End	Gratitude

Appendix C: Interview Characteristics

Table 4: Interviewee Characteristics

Adoption behavior towards on NFT	Interviewee ID	First heart of NFT	First NFT trade	Age	Gender	Income	Highest education
Bought NFT	1	April 21	December 2021	24	Male	higher than 2500	highschool
Bought NFT	2	Spring 2021	January 2022	24	Male	higher than 2500	apprenticeship
No intention to buy NFT	3	September 21		50	Male	higher than 2500	apprenticeship
No intention to buy NFT	4	December 2021		22	Female	less than 1000	Bachelor
Bought NFT	5	June 2021	August 21	26	Male		Master
No intention to buy NFT	6	December 2021		45	Female	between 1000 and 2000	apprenticeship
slightly intended to buy NFT	7	Autumn 2021		32	Female	between 1000 and 2000	Master
No intention to buy NFT	8	February 2021		27	Female	between 1000 and 2000	Master
No intention to buy NFT	9	January 2021		26	Male	between 1000 and 2000	Master
No intention to buy NFT	10	January 2021		41	Male	higher than 2500	Bachelor
Bought NFT	11	June 2021	December 2021	25	Male	between 1000 and 2000	Bachelor

Appendix D: Content Analysis Interviews

Table 5: Content Analysis Interviews

Knowledge	C3: "I have a roughly idea about what NFT are, but I would need to know more about them to estimate if they are useful"
	C1: "I already owned cryptocurrencies when I wanted to invest in NFT"
Prior experience	C2: "I have prior experience in crypto trade and this also led me to invest in NFT"
	C5: "I only got cryptocurrency to trade NFT"
Network	C2, C11: "I spend a lot of time with my network to discuss investments and especially crypto related investments"
	C3: "I never talked about NFT with anyone in my network before but I think some people might know more about it."
	C5: "A friend told me about NFT and because of that I got really interested in the topic."
	C7: "In podcasts I listen too the topic of NFT pops up a lot right now."
	C8: "The topic NFT often comes up, also in my job but the conversations always stay very broad since no one has the knowledge to dig deeper."
Investment idea	C1: "I want to earn money with NFT. I think right now they are the asset class you can get the highest returns on"
	C2: "I buy in to make profits from that."
	C5: " The extreme amount of money in the market attracted me. I heard stories from friends that also small investors can make huge profits in the market."
	C10: "I don't think investing in NFTs has potential, I think it's a bubble."
new: curiosity	C1: "I was just curious about this topic so I gathered more information about it"
	C7, C11: "I feel like this could be a next big thing and I am a bit afraid to miss out."
	C1: "Right now my only use case is earning money, but in the future, I think this mechanism is changing the way property rights are enforced. It's a mechanism everybody can trust."
	C8: "I want to know more about the underlying technology that everybody speaks about."

	C10: "I am not very curious; I think it's just a hype right now."
Use case	C1: "I don't really see the artistic value, the use case of NFT for me is more the access to specific networks/websites "
	C2: "You can use NFT in such a large variety of use cases, this really fascinates me. I think in the future we will buy houses, tickets and a lot of other things in the form of NFT"
	C3: "I don't know what I would do with an NFT. If someone could show me the benefits of it I would love to learn more about it"
	C5: "When I learned more about NFT I increasingly got fascinated by the technology and the extreme amount of use cases, while at first I was only interested in profits."
	C6: "I don't know what I should do with an NFT."
	C10: "There literally is no use case!"
Complexity	C2: "Right now there is not done enough to be sure which NFTs are trustworthy."
	C2: "You really need to have sufficient knowledge about NFT and where/ how to buy them. Right now, there are a lot of scams on the market. You first need to do extensive research about what is serious and will have a use case for you in future."
	C4: "I think I could not buy a NFT right now because I don't have sufficient knowledge about how that would work."
	C5: "I needed to invest some time to get used to the process of trading NFT, but once you understood it, it is pretty easy."
	C7: "Before I can actually think of buying NFT I need to get some cryptocurrency, and this is a barrier for me right now."
	C6: "I don't have sufficient time right now to inform myself deeply about the topic. There are other topics I prioritize"
	C8: "The topic always get very fast complex, I started often to read about it but the time was never enough to fully understand it."
	C9: "I am not even sure if I would understand it if you would explain it to me extensively."
Lack of awareness	C4: " I heard about it but I didn't dig in deeper because I didn't saw a reason for that."

new: Price	C2: "Often the price is a major hindering to invest in NFT. The things I sometimes really want to have are out of my budget"
new: Readiness	C4: "I think NFT will be a big thing in the future but so far I don't feel like I am ready for it"
new: Trust/ Risk Perception	C1: " I don't think scams are a problem of the NFT technology, it's more about a market with a lot of money in right now and this attracts scams.
	C7: "I am too risk averse to just buy something I don't really understand."
	C7: "I don't have enough money to just try something new out and worst case loose all the money."

Appendix E: Survey

Original code in brackets, then given code

Dear Respondents,

The purpose of this survey is to investigate the factors that affect the consumers' adoption of NFTs. The survey is part of a research project being conducted by Charlotte Kasper at Católica Lisbon School of Business and Economics. Participation of this survey is voluntary, and your information will remain confidential. It may take you 5-10 minutes. Please feel free to contact charlotte.kasper@gmx.de if you have any doubts or questions regarding the survey or the research performed.

Thank you very much for participating and have a nice day!

A Non-fungible token (NFT) is a type of unique blockchain-based tokens, created to represent assets, that can be sold or traded

Q12 Have you ever bought an NFT?

- Yes (1) 1
- No (2) 0

Q13 Do you consider buying NFTs in the future?

- Definitely not (1)
- Probably not (2)
- Might or might not (3)
- Probably yes (4)
- Definitely yes (5)

1 - Knowledge Please rate these statements related to your knowledge and perception about NFTs

	Strongly agree (1) 5	Slightly Agree (2) 4	Neither not (3)	Slightly disagree (4) 2	Strongly disagree (5) 1
I was aware of the existence of NFTs before this survey. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel very knowledgeable about Blockchain applications such as NFTs or cryptocurrency. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Among my circle of friends, I'm one of the "experts" on Blockchain applications such as NFTs or cryptocurrency. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think NFTs are a good investment. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q17 Please rate these statements related to your knowledge and perception about NFTs

	Strongly agree (1) 5	Slightly Agree (2) 4	Neither not (3)	Slightly disagree (4) 2	Strongly disagree (5) 1
I like collecting scarce items of all kind (e.g. scooter cards, coins, ...). (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see a clear use case for NFTs. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The complexity of NFTs holds me back from adopting. (7) *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am curious about NFTs. (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*Reversed scale

2 - Knowledge Can you name a marketplace on which you can trade NFT?

- Yes (1) 1
- No (2) 0

3 - Experience Do you own cryptocurrency?

- Yes (1) 1
- No (2) 0

4 - Network Are people in your network engaging in NFT?

- Yes (1) 2
- No (2) 1
- I don't know (3) 0

Q18 Please rate these statements related to how you feel about innovations (scale according to Vandecasteele and Geuens 2010)

	Strongly agree (1) 5	Slightly agree (2) 4	Neither nor (3)	Slightly disagree (4) 2	Strongly disagree (5) 1
If a new time-saving product is launched, I will buy it right away. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If a new product gives me more comfort than my current product, I would not hesitate to buy it. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If an innovation is more functional, then I usually buy it. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If a new product makes my work easier, then this new product is a “must” for me. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using novelties gives me a sense of personal enjoyment. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It gives me a good feeling to acquire new products. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Innovations make my life exciting and stimulating. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring an innovation makes me happier. (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The discovery of novelties makes me playful and cheerful. (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I love to use innovations that impress others (10)

Q5 Please rate these statements related to how you feel about innovations (scale according to Vandecasteele and Geuens 2010)

	Strongly agree (1) 5	Slightly agree (2) 4	Neither nor (3)	Slightly disagree (4) 2	Strongly disagree (5) 1
I like to own a new product that distinguishes me from others who do not own this new product. (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer to try new products with which I can present myself to my friends and neighbors. (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to outdo others, and I prefer to do this by buying new products which my friends do not have. (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I deliberately buy novelties that are visible to others and which command respect from others. (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I mostly buy those innovations that satisfy my analytical mind. (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find innovations that need a lot of thinking intellectually challenging and therefore I buy them instantly. (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often buy innovative products that challenge the strengths and weaknesses of my intellectual skills. (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am an intellectual thinker who buys new products because they set my brain to work. (19)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q1 How old are you?

Under 18 (1)

- 18 - 24 (2)
- 25 - 34 (3)
- 35 - 44 (4)
- 45 - 54 (5)
- 55 or older (6)

Q3 What is your gender?

- Male (1)
- Female (2)
- Non-binary / third gender (3)
- Prefer not to say (4)

Q4 What is your highest education degree?

- High school graduate "Abitur" (1)
- Apprenticeship "Berufsausbildung" (2)
- University degree Bachelor or similar (3)
- University degree Master or similar (4)
- Doctorate (5)

Q2 What is your income per month?

- less than 800€ (1)
- 800€ to 1500€ (2)
- 1500€ to 2200€ (3)
- more than 2200€ (4)

Q19 Are you German or living in Germany

- Yes (1)
- No (2) 0

Appendix F: Statistical Analysis Results

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Adoption	146	0.308	0.463	0	0	1	1
Intention to Adopt	146	3.089	1.214	1	2	4	5
Awareness	146	2.822	1.859	1	1	5	5
sknowledge	146	3.116	1.352	1	2	4	5
exknowledge	146	2.753	1.520	1	1	4	5
Investment	146	3.096	1.122	1	2,2	4	5
Collector	145	2.428	1.218	1.000	1.000	3.000	5.000
Usecase	145	3.503	1.313	1.000	2.000	5.000	5.000
Complexity	145	3.048	1.238	1.000	2.000	4.000	5.000
Curiosity	145	3.869	1.198	1.000	3.000	5.000	5.000
oknowledge	146	0.438	0.498	0	0	1	1
Experience	146	0.500	0.502	0	0	1	1
Network	146	1.199	0.884	0	0	2	2
Q18_1	145	2.669	1.161	1.000	2.000	4.000	5.000
Q18_2	145	2.234	0.979	1.000	2.000	3.000	5.000
Q18_3	145	2.090	0.957	1.000	1.000	2.000	5.000
Q18_4	145	2.310	1.017	1.000	2.000	3.000	5.000
AverageFunctional	145	2.326	0.871	1.000	1.750	2.750	5.000
non-inversQ18_5	145	2.159	0.998	1.000	1.000	3.000	5.000
non-inversQ18_6	145	2.138	0.976	1.000	1.000	3.000	5.000
non-inversQ18_7	145	2.097	1.016	1.000	1.000	3.000	5.000
non-inversQ18_8	145	2.290	1.013	1.000	2.000	3.000	5.000
non-inversQ18_9	145	2.290	1.020	1.000	2.000	3.000	5.000
non-inversAverageHedonic	145	2.194	0.820	1.000	1.600	2.800	4.800
non-inversQ18_10	145	2.862	1.240	1.000	2.000	4.000	5.000
non-inversQ5_1	145	2.883	1.320	1.000	2.000	4.000	5.000
non-inversQ5_2	145	3.248	1.278	1.000	2.000	4.000	5.000
non-inversQ5_3	145	3.662	1.340	1.000	3.000	5.000	5.000
non-inversQ5_4	145	3.593	1.341	1.000	3.000	5.000	5.000
non-inversAverageSocial	146	3.246	1.120	1.000	2.600	4.000	5.000
non-inversQ5_5	145	2.641	1.059	1.000	2.000	3.000	5.000
non-inversQ5_6	145	3.034	1.127	1.000	2.000	4.000	5.000
non-inversQ5_7	145	2.952	1.126	1.000	2.000	4.000	5.000
non-inversQ5_8	144	2.882	1.119	1.000	2.000	4.000	5.000
non-inversAverageCognitive	145	2.876	0.949	1.000	2.000	3.500	5.000
non-inversOverall Average	144	2.664	0.773	1.000	2.122	3.169	4.950
Hilfszeile	144	-3.336	0.773	-5.000	-3.878	-2.831	-1.050
Innovativeness	144	3.336	0.773	1.050	2.831	3.878	5.000
Age	146	3.260	1.249	1	2	4	6
Gender	146	1.438	0.498	1	1	2	2
Education	146	3.075	1.108	1	3	4	5
Income	144	3.236	1.017	1.000	2.000	4.000	4.000
Germany	145	0.952	0.215	0.000	1.000	1.000	1.000

Figure 11: Summary statistics

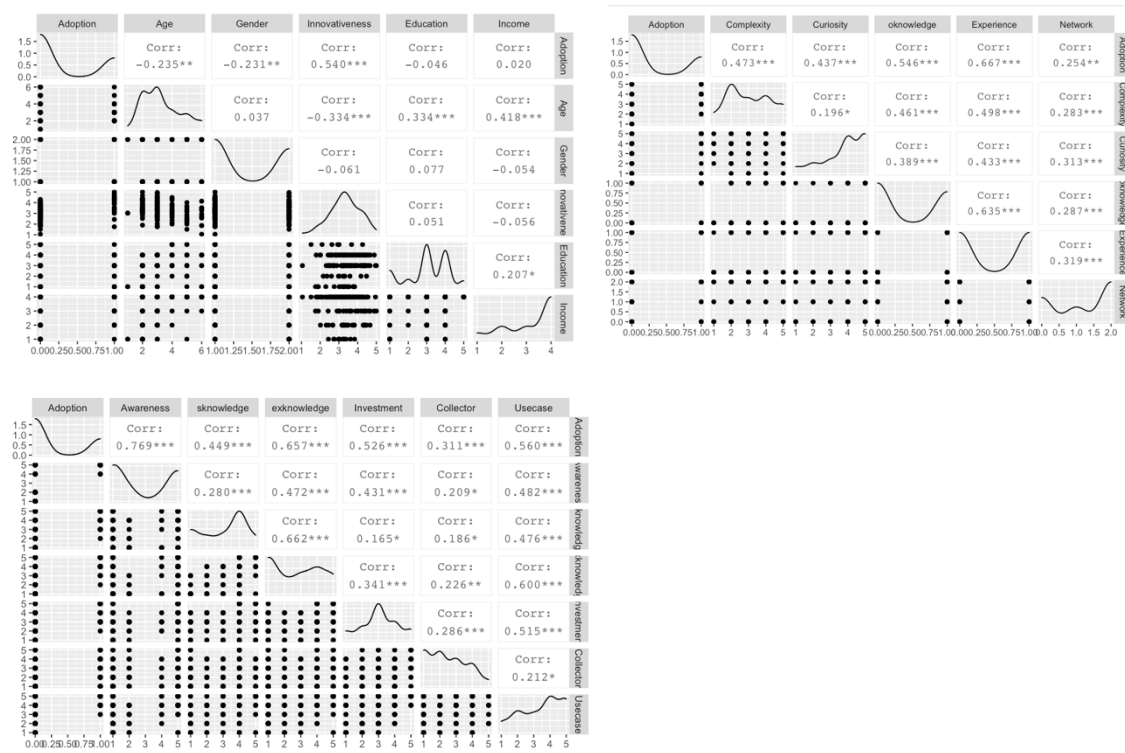


Figure 12: Distributions of analyzed variables