VALUE PROPOSITION OF NON-FUNGIBLE TOKEN BUSINESS MODELS AND THE ROLE OF SUSTAINABILITY

Lappeenranta–Lahti University of Technology LUT

Master`s Programme in International Business and Entrepreneurship, Master`s thesis

2023

Jannika Hyrkäs

Examiners: Associate Professor, Docent Mikko Pynnönen, D.Sc. (Econ. & Bus.Adm)

Senior Lecturer, Malahat Ghoreishi

ABSTRACT

Lappeenranta–Lahti University of Technology LUT

LUT School of Business and Management

Business Administration

Jannika Hyrkäs

Value proposition of non-fungible token business models and the role of sustainability

Master's thesis

2023

78 pages, 14 figures, 3 tables

Examiners: Associate Professor, Docent Mikko Pynnönen, D.Sc. (Econ. & Bus.Adm)

Senior Lecturer, Malahat Ghoreishi

Keywords: NFT, Non-Fungible tokens, blockchain, business models, value proposition, marketing mix, cryptoart, sustainability

Non-fungible tokens (NFT), and the enabling blockchain technology, is a relatively new topic as their market has exploded in recent years. The NFT market is uncertain, however NFTs have brought new innovations to business models. The value proposition of these NFT business models and how sustainability is reflected in it, is unknown in many respects. There is a limited number of studies on NFTs and therefore a lack of empirical research with more detailed examinations of combining NFTs, business models, value proposition and sustainability.

The purpose of this study was to reduce this research gap by examining the NFT value proposition and the role of sustainability in NFT business models. In this perspective the goal was to identify success factors of NFT business models. The empirical part of the research consists of three NFT digital art projects and the purpose was to compare their business models. The research used business models as a framework and the value propositions of the projects were analysed using the marketing mix.

The findings identified the success factors of NFT business models, which included the charm of the newness, the combination of virtual and real life as well as the importance of community and roadmaps. Furthermore, the findings highlight the importance of value proposition in business models. The role of sustainability is seen in the chosen blockchain as well as in financial and social responsibility.

TIIVISTELMÄ

Lappeenrannan–Lahden teknillinen yliopisto LUT

LUT-kauppakorkeakoulu

Kauppatieteet

Jannika Hyrkäs

NFT liiketoimintamallien arvolupaus ja vastuullisuuden rooli

Kauppatieteiden pro gradu -tutkielma

78 sivua, 14 kuvaa, 3 taulukkoa

Tarkastajat: Tutkijaopettaja Mikko Pynnönen

Lehtori Malahat Ghoreishi

Avainsanat: NFT, digitaalinen hallintatodistus, lohkoketju, liiketoimintamallit, arvonluominen, markkinointimix, kryptotaide, vastuullisuus

Digitaalinen hallintatodistus (Non-Fungible token, NFT), ja siihen liittyvä lohkoketjuteknologia, on verrattain uusi aiheena ja niiden markkinat ovat räjähtäneet viime vuosien aikana. Vaikka NFT-markkinat ovat suhteellisen epävarmat, ovat NFT:t tuoneet uusia innovaatioita liiketoimintamalleihin. NFT:iden liiketoimintamallit, arvolupaukset ja vastuullisuus ovat vieläkin arvoituksellisia, sillä aihetta on tutkittu verrattain vähän. Erityisesti empiirisen tutkimuksen osalta uupuu yksityiskohtaisempi tarkastelu, jossa yhdistetään liiketoimintamallit, arvolupaus ja vastuullisuus.

Tämän tutkimuksen tarkoituksena oli täydentää olemassa olevaa tutkimustietoa tutkimalla NFT-arvolupausta ja vastuullisuuden roolia NFT-liiketoimintamalleissa. Tutkimuksen empiirisessä osiossa tarkasteltiin kolmea digitaalista NFT-taideprojektia ja tarkoituksena oli löytää yhtäläisyyksiä ja eroja näiden liiketoimintamalleista. Viitekehyksenä käytettiin liiketoimintamallia, jonka lisäksi arvolupausta tarkasteltiin markkinointimixin avulla.

Tutkimuksen tulokset osoittivat NFT-liiketoimintamallien menestystekijöiksi uutuuden viehätyksen, virtuaalisen ja oikean elämän yhdistämisen sekä yhteisön ja projektien jatkuvuuden merkityksen. On tärkeää esittää arvolupaus selkeästi, jotta projektin läpinäkyvyys ja kiinnostavuus välittyvät sijoittajille. Vastuullisuuden rooli näkyi lohkoketjun valinnassa sekä projektin taloudellisessa ja sosiaalisessa vastuussa.

Abbreviations

4P	Marketing mix (Product, price, promotion and place)
7P	Marketing mix including 4P and people, processes and physical evidence
BAYC	Bored Ape Yacht Club
ETH	Ethereum
IPs	Intellectual Property
NFT	Non-Fungible token
PFP	Profile picture
PoS	Proof-of-Stake
PoW	Proof-of-Work
Web3	Decentralized world wide web
WOM	Word of mouth

Table of contents

Figures

Tables

1 Introduction

Recently the cryptocurrency industry has received increased attention, and especially the cryptoart and Non-Fungible Token (NFT) market, as there have been multi-million-dollar trades. NFTs are unique digital assets i.e., proof of the right to a digital copy where the transfer history has been verified by blockchain technology. In 2021 the market boom began with exponential growth in the trading volume due to higher cryptocurrency prices (Ante 2021a). Furthermore, the industry has been witnessing rapid innovation with new business prospects which has increased trading as well as scams. The future of NFTs is predicted to be bright as they provide a bridge to digital economies and create new possibilities for businesses. (Mukhopadhyay & Ghosh 2021) NFTs offer new innovative options as well as business models by the advanced blockchain technology behind them (Trautman 2021).

There is a lot of potential in the field of research about NFTs as there is scarce number of previous studies available. These have had a strong focus on the risks and opportunities of NFTs, how NFTs are used in different industries (Wilson, Karg & Ghaderi 2022; Wang, Li, Wang & Chen 2021), pricing of cryptocurrencies and NFTs (Zhang 2022), innovation (Popescu 2021) and the relationship between cryptocurrencies and NFTs (Ante 2021b). Few studies can be found related to business models (Lee 2021; Li & Chen 2021) and how NFTs challenge marketing (Hofstetter 2022), however the scope of the studies is low.

Due to the rapid growth of NFT market and increased problems behind it, and the lack of research, NFTs as a topic is topical and therefore this study is focusing on NFT business models. As previous literature has brought up possible future research topics such as analysing the identified relationships between NFT projects in more detail, examining a new successful projects impact on other similar projects (Ante2021a) and examine the value of NFT as a new business model (Wilson, Karg & Ghaderi 2022). In general, it is understood how NFTs empower business model innovation (Li & Chen 2022) however, there is no available business model research regarding empirical research about different NFT projects and especially with a focus on NFT art. In addition, there is no available research utilizing theories to identify value propositions. There is scarce research about sustainability in NFTs, which mainly centres on the issue of energy consumption of blockchains (Majer 2022) rather

than the whole sustainability aspect of the NFT ecosystem. This research aims to fill the research gaps by investigating three NFT art projects with the perspective of business model to get more detailed findings and analyse the role of sustainability.

Therefore, the plan for this research was to examine NFTs and the business behind them. The research was conducted from the perspective of business models and the success factors related. Value proposition and sustainability serve as a supporting point of view in the research. The value proposition is the added value that the company produces for the customers with its products and services (Osterwalder & Pigneur 2010). Sustainability can be defined in many ways, however primarily it is seen as creating value by sustaining the planet and while taking care of the people (Thiele 2016). The object of this study is NFTs, and the research will especially focus on different NFT digital art projects, as it is the most popular form of an NFT. Following successful and growing projects and their form of business model. The goal is to find differences and success factors in the NFT business models, their value proposition and is sustainability somehow involved in this. Since NFTs are innovative, business model perspective and how business models bring value, as the chosen perspective is valuable to the research and can bring interesting new information on the subject. Marketing is taken also into account as it is essential for different digital art projects as projects get more attention when consumers promote them, and there is positive outcome for consumers as well as for the project participants. The contribution of the research is to bring more information about NFT business models and how NFTs create value and by comparing the models of different projects. By comparing different projects, you can create a view of which factors create success and which projects have had the best business models.

Sustainability is considered as one of the perspectives in this research, as the cryptocurrency industry acquires a lot of energy in generating new digital tokens (mining) which has been discussed negatively. Both Bitcoin and Ether, the two most popular cryptocurrencies, have a high consumption of power which leads to growing worries of climate change. Therefore, there has been plans to develop more sustainable mining methods by decreasing the energy consumption and to make them eco-friendlier. (Livni 2021; Truby, Brown, Dahdal & Ibrahim 2022) Cryptocurrencies are used to purchase NFTs, therefore, their linkage to this research is essential (Beyer 2022). Therefore, sustainability is a supportive aspect of the

research because it cannot be ignored, and it has been a relevant topic related to NFTs. In addition, in this research, we can see if sustainability brings added value or harm for the projects. The goal of the research is to help understand NFT business better by the findings and create further research topics.

This research will be of interest for anyone planning to start an NFT project and knowing what factors are needed for success in this business, wanting to discover different ways of establishment as well as further their knowledge on the sustainability factor in this industry and what the future will bring. In addition, everyone who wants to discover the value proposition in NFTs and business model differences.

1.1 Research questions

Previous literature has mostly focused on the relationship between NFTs and Cryptocurrencies (Ante 2021b), and the opportunities and challenges of NFTs (Wilson, Karg & Ghaderi 2022) and there has been a research gap on more detailed examination of NFT projects. Therefore, there is a research gap, especially in researching NFT digital art, comparing different projects including the business model and sustainability factors. This will bring new insight on how the factors affect the success of different projects and how sustainability is linked to them. In addition, this topic is relevant as the expansion of the cryptocurrency and NFT industry has increased in recent years, and it brings new innovations and issues. Hence the main research question is:

- *What are the success factors in Non-Fungible token business models?*

As the main research question is broad there are sub questions to answer the main research question. The first sub question is related to the business models and will complement the main research question by defining the value proposition of NFTs. Hence the first sub question is:

- *How is value proposition defined in related to Non-Fungible tokens?*

The second sub question is related to sustainability as the goal is to find if sustainability is included in NFT business models and is it a value adding factor. Therefore, the second sub question is:

- *What is the role of sustainability in Non-Fungible token business models?*

1.2 Theoretical framework

Theory is necessary in qualitative research and as this research is conducted in qualitative method, the theoretical framework needs to be described. In this research, theory refers to the reference framework of the research, i.e. the theoretical part of the research. (Sarajärvi & Tuomi 2018). Theoretical framework used in this study is previous literature investigating business models, value proposition, NFTs and sustainability. In this study, business models are examined through the most important function of business models, i.e. value creation and value capture (Chesbrough 2007). Then the NFT business model is described followed by the exploration of the business models of these innovative products from the perspective of value. Value proposition in this study is defined by the value created by the offering to the buyer (Chesbrough 2007) and by NFT value proposition, how the value is created with NFTs to the buyers. By value proposition a competitive advantage can be achieved. 7P model, in other words marketing mix, is the marketing plan that includes different marketing activities to satisfy customer needs. Success factors refer to the steps that a business needs to achieve to reach their goals. (Helmold 2020) Lastly, by sustainability it is referred to the decisions made in the business operations taking environmental, social and financial factors into consideration (Viitala & Jylhä 2019).

The main framework used for this research is business models, utilizing articles “Business model innovation: it`s not just about technology anymore” (Chesbrough 2007) and “Business model generation” (Osterwalder & Pigneur 2010), since this framework worked

as the ground for the research. Business models regarding NFTs rely on articles "Decentralized collaboration via Blockchain and NFTs" by Lee 2021 and "NFT Marketplace Business Model: The ultimate guide" by Patel 2022. Business models were described, as well as NFT business models and later in empirical view analysed through NFT projects to discover if there were differences and how their business models were created. In order to understand NFT business models the literature review included a comprehensive review of NFTs and the technology behind it. To support this main framework, value proposition was examined related to business models. To help understand value proposition the 7P model was used. In the empirical review where different NFT projects were examined their value proposition was analysed by using the 7P model for each project to find differences how they created value and what is the business strategy. Sustainability was described and analysed if it was a value adding factor in NFTs and how it was related to business models and value proposition. By these the possible success factors were defined. The theoretical framework of this research is presented below Figure 1. Theoretical Framework.

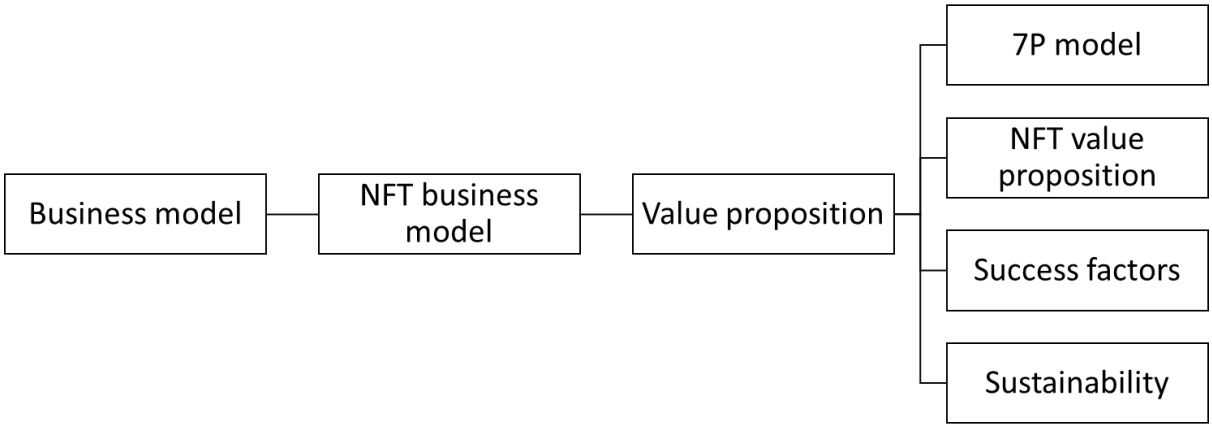

Figure 1. Theoretical Framework

1.3 Delimitations

The research has limitations as the thesis focuses on NFT digital art projects and leaves out other NFT forms from more detailed research. The study focuses on NFT digital art projects, as they are clearly the most popular form of an NFT. The research compares three different NFT art projects using case-study method, thus this excludes other projects from the review. The case projects are successful and early adopters, hence leaves newer and smaller projects out of examination. The data is gathered from publicly available sources and therefore the research is dependent on available information. However, as NFTs are still quite new phenomena the results of this study will be important for future research. In addition, the NFT art projects selected for the study are on the Ethereum blockchain therefore other blockchains are also excluded from the study. Ethereum blockchain is chosen as the blockchain for this study as is one of the most popular and it has interesting developments on the go and has linkage to sustainability. The research also focuses on the period 2017-2023. By these limitations the research has a stronger focus and gets deeper analysis of the topic. Even though there are limitations, this research is globally utilizable as NFT projects are widespread and do not focus on a certain country.

1.4 Research methodology

The research was conducted in a qualitative method as in this method the goal is to describe, understand a phenomenon and its meanings (Alasuutari 2011). In this study, the aim was to describe and understand NFTs, their business models, how they create value and what is the role of sustainability in NFT business models. Qualitative analysis consists of two steps: making observations and interpreting the results. In reducing observations, the material is examined from a certain theoretical-methodological point of view, i.e., what is essential in terms of the theoretical frame of reference and the layout of the questions. When interpreting the results, a meaning is derived of the phenomenon under investigation based on the produced and available clues. (Alasuutari 2011) As the chosen topic is relatively new and there is not mass amount of previous research this research relied on observation.

In this study, literature review served as a theoretical background with the aim to increase understanding of the researched topic as well as highlight previous study findings. To get a better understanding of the subject the material was divided into themes. Figures and tables were used to summarize important information.

The research used a case study method. Case studies are a widely used method in business economics when studying companies and organizational behaviour. The investigated cases are unique and can be investigated in their own special environment. (Aaltio-Marjosola 1999) The aim was to get a better understanding and more detailed analysis by the case study method. The empirical part of the research consists of multiple cases as it focuses on analysing three different NFT art projects. The research aim was to use as much previous research data as possible to obtain a more reliable analysis, as different sources can provide a more multifaceted view on the subject as they focus on different perspectives (Alasuutari 2011). The literature review and the empirical evidence were collected from publicly available sources, as for this research using existing documentation as a primary source was a reasonable choice due to limited options regarding NFT data collection. Mainly, these included academic articles, books, case projects' websites and their social media channels. In addition, the world`s largest NFT data resource NonFungible.com which is publicly available (NonFungible 2022a) was utilized for NFT projects statistical data. The methodology is described in more detail in following chapters.

1.5 Structure of the study

This research consists of five chapters that are presented in Figure 2. Research structure. The research begins with the introduction that gives an overview of the thesis. This includes the research problem, the background and what are the aims and objectives of the research. Moreover, the theoretical framework, delimitations and the research methodology are shortly described.

Figure 2. Research structure

Next the research continues by priming the topic with the literature review which includes discussion of the previous literature and their research results, opening of theories used and important concepts, continuing to build the theoretical framework. Important theories related to the research are also opened here and the research substantiates their importance to the research topic. After the literature review, the research design and methods are explained. This includes explanation of the research methodology, data collection, data analysis, validity, reliability and ethics. The fourth part goes through the findings of the research data in the empirical section and look at the results. The last chapter, discussion and conclusions, includes analysis and interpretation of the data by answering the research questions, and the conclusions which highlights the achieved objectives. Finally, the research discusses the challenges and outcomes of the study, limitations and future research topics uncovered by this study.

2 Literature review

The theoretical background consists of the chosen framework, key concepts, relevant theories, and previous literature. Initially, in order to gain a general understanding of the number of previous studies related to the topic and what have been studied related to NFTs, Google Scholar was used to find the most common previous studies and keywords for further searching. To search relevant previous literature about this topic certain key words were used. These keywords were “Non-Fungible Token”, “NFT value proposition”, “NFT carbon emission”, “NFT Business models” and “Non-Fungible Token and sustainability”. With these key words Google Scholar found some articles however mainly focusing on general overview rather than more detailed analysis. By this initial search, the relevant key words for further research where chosen “NFT Business models”, “NFT value proposition” and “NFT sustainability”. As for more scientific view these key words were used to find previous studies in EBSCO, Scopus and Webofscience.

With the key word “NFT Business models” articles used in this research was found a few. These articles focused on the business model behind blockchain and NFTs and decentralized and centralized collaboration models some projects have. On the other hand, NFT value proposition did not get many hits. As for sustainability there was found one article about “Blockchain, climate change and death based on NFT and Bitcoin” (Truby, Brown, Dahdal & Ibrahim 2022). Mostly, research was found about cryptocurrencies such as Bitcoin’s relation to sustainability and carbon emissions. One article “Green NFTs: A Study on the environmental impact of Cryptoart technologies” by Marro and Donno 2021, was found with the key words “NFT carbon emissions”. This article focuses on cryptoart, on-chain activity on Ethereum, the environmental impact of transactions and the greenhouse gas emissions. From the database EBSCO one journal was found related to NFT carbon emissions, by Sparkes (2021) “NFT developers call for cut in carbon emissions”.

Searching with these key words the theoretical background will consist of Business models, value proposition, NFT and sustainability. First the business models are described and explained through a business model canvas. Following to marketing mix and explaining its different activities and examining the value proposition. Then the sustainability is discussed.

After, the NFTs are discussed and to understand NFTs also the basic idea of cryptocurrencies, market platforms, blockchains and smart contract are explained. Then continuing to discuss NFT business models and NFT marketing mix, and how the value proposition is presented. Lastly, the literature review ends in NFTs sustainability.

2.1 Business models

The concept of a business model has aroused a lot of discussion and controversy as it is perceived in different ways such as a definition, an active system, a template, a framework and other similar, and it is constantly confused as the same as strategy. However, what has been agreed upon is that value creation should be added to the description. (Sund 2020; Baden Fuller 2015) A summarization of the business model construct has been made by Zott, Amit & Massa (2011) in the following words: "a new unit of analysis, offering a systematic perspective on how to do business, encompassing boundary-spanning activities, and focusing on value creation as well as on value capture". Other description by Baden Fuller (2015) inclines business model as a cluster of decisions by the organisation.

Business models have been studied recently in a growing term and it has been linked to innovation as well as strategy (Sund 2020). In every company there is a business model however not all articulate it. For business model performance, value creation and value capture are two important factors. Value creation is creating satisfaction for the consumer by producing a product/service for their needs. Business models' value capture is the process of receiving something from the creation of value. Therefore, the basic idea is that business models describe the process of creating value and capturing the value. Business models have been used by entrepreneurs and companies to commercialize new ideas to the market (Massa & Tucci 2013) and if having a successful business model, it usually beats a better idea or technology. (Chesbrough 2007)

Chesbrough and Rosenbloom have created a definition for business model by defining it as a logical scheme which links economic performance, technologies and ideas, and how a

business creates value. In addition, they have defined the functions of a business model that a complete business model should include, these six objectives are: value proposition, target market/market segment, value chain, revenue mechanism, value network or ecosystem and competitive strategy. By these points the business model can be developed. (Chesbrough 2007)

The benefits of using the business model framework is its ability to distinguish similarities and differences in the organisations way of creating value. Moreover, business model innovation has the opportunity, usually enabled by new technologies, to allow firms to innovate their value creation, value delivering, value capturing and value communication in different ways. (Andreassed, Lervik-Olsen, Snyder, Riel, Sweeney & Vaerenbergh 2018)

For making the business model more understandable Osterwalder & Pigneur (2010) have created a visual business model canvas to help innovate business models and to clarify the true value proposition, and how to make it sustainable. The business model is described by nine blocks which can be referred as a strategy that covers businesses four main areas customers, offer, infrastructure and financial viability. The nine blocks include customer segments (CS), value propositions (VP), channels (CH), customer relationships (CR), revenue streams (RS), key resources (KR), key activities (KA), key partnerships (KP) and cost structure (CS). (Osterwalder & Pigneur 2010) The business model canvas is presented in Figure 3. Business Model Canvas (Osterwalder & Pigneur 2010) below. There is also a sustainable version of the business model canvas available, which includes economic, social and environmental costs and benefits (Joyce & Paquin 2016).

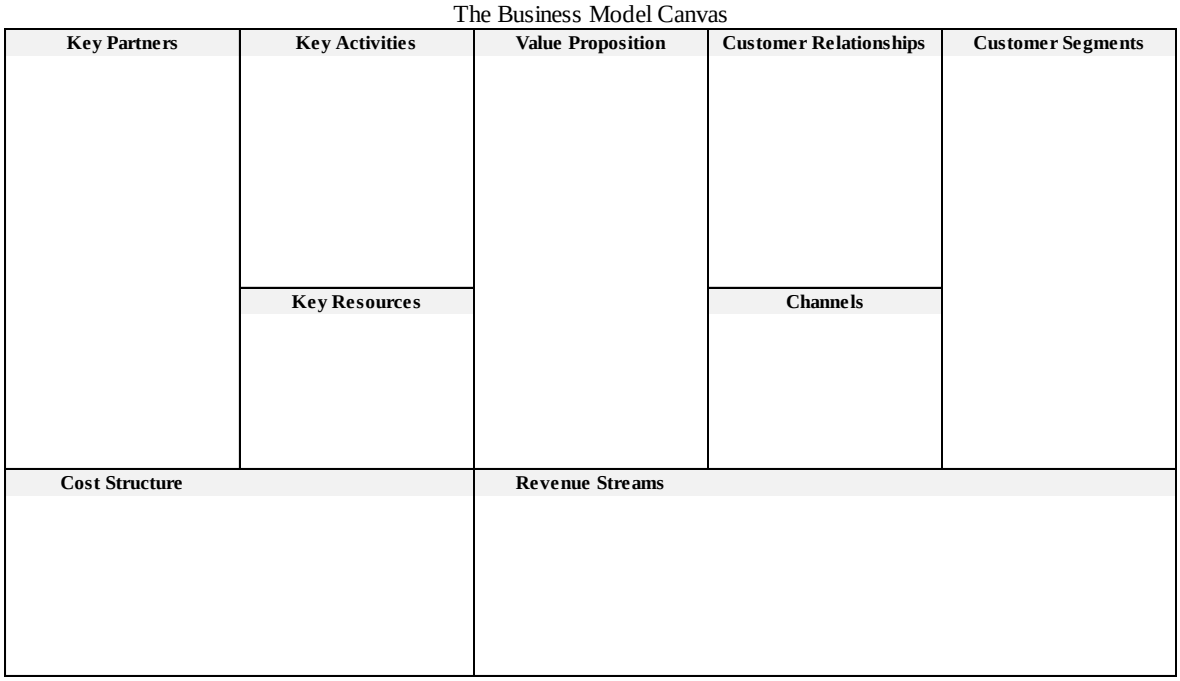

Figure 3. Business Model Canvas (Osterwalder & Pigneur 2010)

In the business model canvas customer segments mean the groups of people or companies that the business is trying to target. These segments can be grouped by common needs, behaviours or other aspects. When defining the customer segments, it is important to know whom to create value and who are the most important customers. Value propositions describe the offer that creates value to the chosen customer segment. Therefore, this block describes what value is delivered to the customer, which customer problems are helped to solve, and which customer needs are satisfied. Channels refers to how the business chooses to communicate with the customer segments aiming to deliver the value proposition. In choosing channels it is important to evaluate which channels the customer segments want to be reached, how the customers are reached now, how the channels are integrated, and which ones work best, which channels are most cost-efficient and how they are integrated with customer routines. Customer relationships refer to the established relationships with customer segments. It is good to identify what types of relationships customer segments expects, what are the costs and how are they integrated with rest of the business model. Revenue streams refers to the revenue gained from customer segments. Key question to answer regarding revenue is for what value are customers willing to pay. Key resources describe the business models required assets to make it work and these can be physical,

financial, intellectual or human. What key resources do the value propositions, channels, customer relationships and revenue streams require. Key activities refer to the actions how the business can operate successfully to offer the value proposition. Key partnerships refer to the partnerships required to make the business model work, for example strategic alliances. These partnerships can be created to optimize business models, reduce risk or acquire resources. Cost structure define the overall costs of operating the business model. This includes creating and delivering value, customer relationship maintenance costs and generating revenue costs. (Osterwalder & Pigneur 2010)

Value proposition articulates the reason why consumers buy certain businesses' products rather than others', and therefore is the core of competitive advantage (Helmold 2020). Since value creation is the prime importance of marketing, marketing mix model helps to describe businesses' decision making on how to satisfy customers' needs by their offerings. In addition, the components involved in marketing mix can shape the competitive position of the business in the market. (Londhe 2014)

2.2 Marketing mix/ 7P Model

Marketing mix, developed in 1960 by Jerome McCarthy, is a concept for pursuing desired revenue from target market by using the controllable marketing variables. First model was 4P model that includes Product, Price, Promotion and Place. Other variable developed later is 7P model that includes People, Processes and Physical Evidence, besides the previous four marketing variables. (Helmold 2020) In customer relationship thinking, relationships, networks and interaction become central. Attention is paid to people, processes and physical evidence, as we are talking about interactive marketing where value is created in cooperation with the customer. (Viitala & Jylhä 2014)

The Marketing mix variables are presented in Figure 4. Marketing Mix (Helmold 2022). The model is a way to conceptualize how to satisfy customer needs and how to create value and gain competitive advantage in the target markets. (Helmold 2020; Digimarkkinointi 2022)

Image is also an important factor. It is essential to understand that the image develops not only as a result of marketing, but as a result of all activities, and that the image is really created in the customer's mind, as experienced by them. (Viitala & Jylhä 2014)

Figure 4. Marketing Mix (Helmold 2022)

The marketing mix element product refers to the product or service or combination of both the business produces for the needs of the customers (Helmold 2022). This ensemble also includes complementary parts or ancillary products, for example the service dimension. Additional elements are attractiveness factors that affect the overall image of the product. This image creates a brand for the product. Because people do not make choices rationally, but according to what they like, brands are something that consumers buy. (Viitala & Jylhä 2014)

Pricing is an important part of the overall marketing strategy and is often an important selection criterion for the customer. Factors affecting pricing can be divided into external and internal factors. The demand and competitive situation guide the company's pricing from the outside. Internal factors affecting pricing are production and marketing costs as well as strategic and marketing goals. With low pricing the aim is to achieve large volumes while the principle of high prices is suitable for example when a new product is introduced to the

market. (Viitala & Jylhä 2014) Price is a revenue-generating element, that needs to base on a right level to generate profit and be positioned by the market demand (Helmold 2022).

Traditionally, place refers to where the purchase is made by the customer (Helmold 2022) and the distribution (Viitala & Jylhä 2014). On the other hand, when thinking customer-oriented, we also talk about availability for the customers. Availability for the customer is how easy it is to get in touch with the company and how the product is delivered to the customer. Possible places to buy are either physical or from the web, such as buying directly from the manufacturer on the company's website or an electronic marketplace, i.e. other people's products are presented on the information broker's website. (Viitala & Jylhä 2014; Helmold 2022)

Promotion relates to how the product is communicated to the customers. This promotion can happen in different buying stages and the goal can include creating awareness, interest, desire or action. (Helmold 2022) Marketing communications are a part of marketing that supports sales and customer relationship management and is an important part of a company's pursuit of a competitive advantage. Customer-oriented communication takes place digitally and on the Internet through social media community services, such as websites, social media, discussion forums, etc. Social media has shaped consumer behavior and the ways in which companies and customers communicate with each other. Consumers have great influence when social media can quickly start a discussion about a company or product. (Viitala & Jylhä 2014)

People refers to interaction as it is an important factor especially in services. Interaction includes everything on how the customer encounters the company (Viitala & Jylhä 2014). The employees of organisations' interaction towards customers and potential customers are important how perceiving the company and their credibility (Helmold 2020).

The process includes all the steps of a customer journey from the start to the purchase (Helmold 2022) as services are processes that consist of different activities (Viitala & Jylhä 2014). The last of the marketing mix, physical evidence, provides concrete evidence of the quality of the product and this is valuable for the customer, who for example does not yet

have any experience from the company in advance (Helmold 2022). Hence the customer seeks in some way get evidence from the quality of the product or service. Social networks and word of mouth (WOM) have recently received attention and new dimensions that affect the customer's perceived image of the company and its products. (Viitala & Jylhä 2014)

2.3 Sustainability

Even today sustainability is a broad concept with many definitions. There is a general understanding what it means, however, it can be seen differently. The definition must apply to different social and ecological situations. (Allen & Hoekstra 1993) The most known phrase of sustainable development definition is by World Commission on Environment and Development (WCED) (1987) and it says, “Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs”.

Today all companies are expected to be responsible, and this means for the present as well as for the future. This includes financial responsibility, social responsibility, and environmental responsibility. The future is always uncertain, but the company should be able to anticipate it by making plans and different scenarios. The sustainable growth of the company includes increasing the market share and increasing sales, so that from the investors' point of view, the growth ensures the preservation of value, strengthening and growing income in the long term. You can look at the growth by comparing the company's growth with the turnover growth of the entire industry or with the growth of the most important competitors. (Viitala & Jylhä 2019)

Financial responsibility is ensuring profitability and managing financial obligations, such as paying taxes in accordance with regulations. The purpose of responsible business is therefore to achieve financial success in ways that respect ethical values and take into account people, communities, nature and the environment. Nowadays, it is thought that responsibility and the pursuit of profit are possible at the same time, and that a responsibly operating company

produces good results in the long term. Social responsibility is related to people's well-being, i.e. personnel, product safety and consumer protection, good operating practices and cooperation, and different relationships with communities. Environmental responsibility means the sustainable use of natural resources, reducing the amount of waste and keeping environmental harm to a minimum. Environmental responsibility has become increasingly important, and this has been supported by various communities, agreements, reports and legislation. It has also become important for customers to know the load on the environment. All these areas affect the company's reputation and how customers see the company. (Viitala & Jylhä 2019)

In environmental sustainability governments have a major role as they have the ability to increase standards and regulatory frameworks to decrease the negative impacts of different factors to the environment and the future. These governmental actions depend however on the country and the supportiveness of the economic environment. Innovation has been a key element for environmental sustainability. (Wilkinson, Hill & Gollan 2001) In addition, these days stakeholders have a major role in pushing companies to behave more sustainable and reducing their environmental impact, and this is used as a strategy and even in some firms as an indicator for managements remuneration. Businesses must include sustainability factors into their business models. (Thiele 2016)

Due to environmental concerns and pressure from consumers, marketing should include sustainability factors to increase positive image of the product or service sold as well as the company selling them. Green marketing is a step towards sustainable development and can be implemented through different green marketing strategies, for example through marketing mix. (Garg & Sharma 2017) Sustainability has been added to the marketing mix with the eight P, Planet. The goal for this is to create value for the customers without harming the natural resources of the environment. Therefore, sustainable marketing respects both the environment and social aspects by marketing products that fit into these lines. Planet includes sustainability, human rights, environment, emissions, labour conditions, fair trade, supply chain, resilience, Intellectual Property (IPs) and law compliance. (Helmold 2022)

2.4 Non-Fungible Token

This chapter begins by defining cryptocurrencies, as they are linked NFTs and as they are used in NFT trading on different market platforms. Once this definition is done, the NFT concept is opened and the blockchain technology behind it. After this, we move on to look at NFT business models, how value is created with NFT and how the NFT marketing mix is determined.

2.4.1 Cryptocurrencies

Cryptocurrencies are fungible as they can be exchanged, substitute and traded (Peres, Schreier, Schweidel & Sorescu 2022). For cryptocurrencies, it is equal that; they are not issued or guaranteed by a central bank or an authority, they may not be denominated in a currency that has been legal tender, they do not have the same legal status as currency or money, they are not accepted as means of exchange by natural or legal persons, and they can be transferred, stored and sold electronically (Finanssivalvonta 2019). Different virtual currencies are not controlled by central banks and the way they work differ from normal currencies (Boolt & Oordt 2020). The first cryptocurrency, based on encryption algorithms, was Bitcoin made by the anonymous Nakamoto (Nakamoto 2008). Ether (ETH) is a cryptocurrency similar to Bitcoin (Ethereum 2023a). A study has analysed the relationship of Bitcoin and Ether pricing to the NFT market, and it concluded that the pricing of these cryptocurrencies affects the NFT market. This may be because the cryptocurrency market is currently bigger than the NFT market, and as they are also used for buying and trading. (Ante 2021b)

2.4.2 Non-Fungible tokens

Non-Fungible tokens (NFT) are non-fungible, as they are not exchangeable and therefore are unique certificates of authenticity on blockchains. These can be different digital art,

music, in-game items etc. However, the most popular form sold is digital art. (Ante 2021b) NFT can be considered as an original piece of a certain painting with authentication and value and to compare, pictures in the web can be owned by anyone and does not contain value (Dan 2021). In other words, NFTs can be created on the blockchain and can be called as custom tokens (Memo Akten 2021). NFTs and the technology used are utilized by different content creators and the Art industry as they want to be involved in this innovative industry that is offered by the blockchain technology (Popescu 2021).

NFTs were first introduced in 2014, however in 2017 they were more widely available (Schrader-Rank 2021). And in 2021 NFTs entered the mainstream when a NFT was auctioned for $69 million by a digital artist Beeple, and another NFT was auctioned for $2.9 million by Jack Dorsey and this NFT was his first ever tweet in Twitter (Zhang 2022). Worldwide brands and companies have been involved with NFTs, such as Asics, Clinique, McDonalds, Taco Bell, Coca-Cola, Microsoft and Nike, and they have increased the awareness towards NFTs. They have used NFTs in marketing by different limited-edition collections. (Dan 2021; Birch 2021) There has been steady growth in NFT market but after Covid19 the trading exploded (Memo Akten 2021). Companies have utilized NFTs also in reward-based systems and marketing, for example Starbucks to gain more interaction with the customers (Pierce 2022).

NFTs are thought of as assets, as the maximum supply of any NFT is 1, unlike Ethereum or Bitcoin (Mukhopadhyay & Ghosh 2021). This can be compared to the art industry, as an artist becomes famous, the art value rises. NFT is a token that is considered as a unique identification of the bounded digital property, and it differs from normal cryptocurrencies in that they are unique and non-fungible (Wang, Li, Wanf & Chen 2021). One of the most famous NFT project is the Bored Ape Yacht Club that provides NFT collections and has sold these to athletes, artists etc. with high prices (Boom 2022). Newcomers have an interest towards the rare items as they are more discussed, displayed and traded and therefore the rarity is seen as an important factor in the NFT business and pricing (Suchow & Ashrafimoghari 2022).

As the industry of NFTs has increased unfortunately also scams and security issues have increased. One of the most high-profile attacks occurred this year in February towards OpenSea platform. Phishing attack towards OpenSea ended up losing 32 wallets, losing 254 NFTs worth of $1.7 million, and this attack was targeted NFTs only. Increased attacks have raised concerns towards different NFT projects. (Herrera 2022) Ethereum is a software platform based on blockchain technology that can build and run smart contracts and is the basis for the cryptocurrency Ether (Ferretti & D`Angelo 2020). In addition to Ether, the platform powers other decentralized applications. In addition to security issues, the fast growth of new technology, especially NFT technology raises the issue about laws and regulations to keep up. NFTs can be characterized in the perspective of law as a security or a commodity and therefore cause problems in interpreting the law. (Trautman 2021)

2.4.3 Blockchain

Blockchain is a database that is public, and it brings new possibilities to build services and to store data. In a network, blockchain is shared with many computers. (Ethereum 2022) Nakamoto invented Bitcoin and the blockchain system as an alternative for electric transactions and to ensure these transactions safety Nakamoto developed digital signatures which saves the information of ownership. This way there is no need for financial institutions as an intermediate. In addition, the transaction timestamps are in a chain that forms a record of transactions that is the base of proof. Therefore, the basic idea is that the chain of digital signatures is an electronic coin, and the coin is transferred to another owner by digitally signing a hash of the previous transaction and this will be added to the end of the coin. For proving that there has not been double-spends of the coin there was also proposed a solution that starts with a timestamp server. (Nakamoto 2008) In other words, blockchain is a system that is decentralized and has a shared memory (TechCrunch 2017).

The data is referred as a “block” and for example, to send someone ETH (Ether) successfully, the transaction data needs to be added to a block. These blocks that contain data are chained together, therefore “chain” refers to this. Due to this, the data is hard to manipulate as it would require the whole networks consensus as every computer should agree on changes.

Proof-of-work was a consensus mechanism used by Ethereum to ensure the safety of transactions. Therefore, if someone wants to add a block to the chain, they need to do “mining”. This means, people must solve a difficult puzzle that requires a lot of computing power. (Ethereum 2022)

Currently, Ethereum is in a transition to the Proof of Stake system, which is more energy efficient and more secure consensus mechanism. In this mechanism, on Ethereum, the capital is explicitly staked into a smart contract in the form of ether by validators. Subsequently if the validator acts maliciously this staked ether can be destroyed. Therefore, it acts as collateral. (Ethereum 2023b)

Transactions

Transactions are explained in Figure 5. Transactions (Nakamoto 2008) below. The definition for an electronic coin according to Nakamoto (2008) is a chain of digital signatures. And the process is that the coin is transferred to the next owner by signing a hash of the previous transaction digitally as well as the public key of the next owner. After, these are added to the end of the coin and then to verify the chain of ownership, the signatures are verified by a payee. And to verify the coin is not double-spend by the owners, timestamp server proves the data is existing at the time. Hence, the basic idea is that a set of transactions are contained in a block and each block are linked to the previous block with a timestamp and it is identified by its hash value. (Ferretti & D`Angelo 2020)

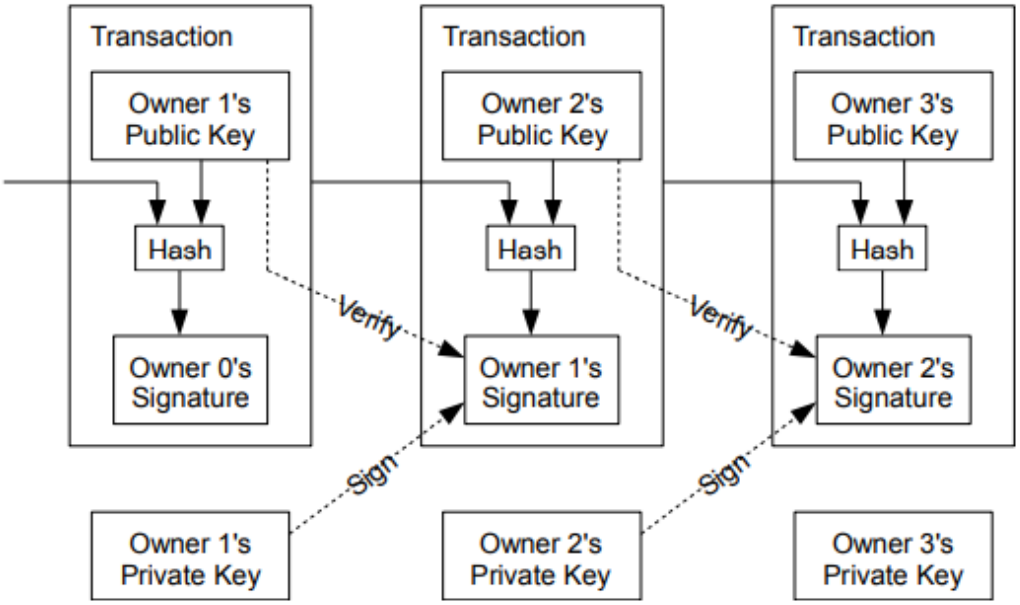

Figure 5. Transactions (Nakamoto 2008)

There are various types of blockchains, however, Bitcoin is still the most famous. Ethereum has been thought as an interesting variant due to smart contracts. (Ferretti & D`Angelo 2020) The main problem blockchain technology has solved is trust. For example, people trust banks with their money (one ledger) which is not the safest option. Blockchain technology idea is based on that it is decentralized and multiple parties are responsible of keeping record of transactions which increases the trust as every party can verify the transactions are not tampered with. (Pierro 2017) The protocol "Proof-of-work" (PoW) is used to prevent economic attacks in different blockchains, for example Bitcoin and Ethereum. Therefore, PoW is a mechanism that agrees on different things, such as transactions or account balances, and hence prevents double-spending. (Ethereum 2022)

Blockchain technology is used by NFTs to trace the authenticity of the sold good, and to secure the NFT (Mukhopadhyay & Ghosh 2021). Usually, it is utilized to see the transactions. (Ante 2021b) Also, with blockchain you can be sure that there is only a certain amount of NFTs and that they really are unique. NFTs rely on smart contracts in addition to blockchains (Ante 2021b). In addition to being the foundation of all cryptocurrencies, blockchain technology has been utilized in the traditional financial industry and has enabled new innovations such as smart contracts. (Pierro 2017)

This thesis focuses on NFT projects in the Ethereum blockchain as it is mostly used in digital art projects. Ethereum has the same idea as Bitcoin and uses the same technology with some developments. It is programmable hence it can be used for more ways than just payments. (Ethereum 2022) Ethereum was created by Vitalik Buterin to solve the problem of double-spending and knowing the current situation of money that transactions can be done. (TechCrunch 2017)

2.4.4 Smart contract

To have a solution for security issues, smart contracts were designed to control digital assets and reduce risk. Smart contracts are basically computer programs that have the ability to control the money where it goes and how it is handled, in other words digital contracts stored in blockchains. These have been used in different applications, in financial tasks that are self-executed and for example in insurances. (TechCrunch 2017; IBM 2022) Smart contracts are also used in the Ethereum blockchain (Ethereum 2022) as well as other blockchains. Blockchain based smart contracts use code that is digitally embedded on the blockchain that stores a contract between different parties. The benefit from smart contracts is the automated process that also allows the creator for shares of resales. (Trautman 2021)

Smart contracts' benefits include security, trust, transparency, speed, efficiency, accuracy and savings of time and fees. These smart contracts can automate the execution of certain agreements and the workflow. As a result, all participants can efficiently trust the process without the involvement of any intermediary. (IBM 2022)

2.5 NFT Business models

New technological innovations such as blockchain has changed the basic thinking of business models, as the transactions takes place without mediate organizations and the

ownership rights are more flexible (Andreassen et al. 2018). Before blockchain and this new decentralized business model, virtual worlds included a technological and a legal problem. Creators of virtual worlds maintained lists of different users' ownerships in single databases, for example someone bought an avatar`s feature or item and this was listed in the inventory of this avatar. However, there was not an option to take this purchased item or feature to any other virtual environment or if someone hacked this database the item or feature lose its uniqueness as it could be duplicated or stolen. The legal problem included the players prevention of legal interest in the game components by the virtual world creators. Most virtual worlds kept the standard intellectual property rights of all their creations completely to themselves in order to avoid legal problems. For example, if a player spent several thousand dollars on add-ons/items/features etc. in a virtual world and for some reason is kicked out of the world, you cannot sue for this. In this example, the player only owns a limited license for the bought item in the virtual world. (Trautman 2021)

Hence, compared to the basic business models, the blockchain technology has offered new tools and innovative features as an alternative to answer these problems. As NFTs are non-fungible it complicates the basic exchange and trade processes, as it is not equally swapped for another NFT. Previous problems of the internet and the abundance of data and its distribution has been the ability to copy and share others' work without any compensation or approvals. NFTs and the technology used have reshaped the ecosystem and brought answers to these previous problems by developing the ownership authenticity, remuneration and transactions technology. NFTs give new potentialities for entrepreneurs as they can explore new ideas that this digital technology provides. NFTs are interesting entrepreneurs as they have more trustworthy property rights and the digital record of ownership is more secure. (Popescu 2021) And to sustain competitive advantage, organisations require fundamental changes. (Andreassen et al. 2018)

NFTs has opened a new way to compensate artists, gain more from their artwork (Trautman 2021) and has brought them more control over their artwork. As an NFT is sold to a new owner, the creator is paid royalties by an automatic process that can be programmed into the digital artwork. This means that whenever a completed transaction of an artwork, the automated process pays to the creator a percentage fee of that transaction. This process cannot be altered as the creator's information is coded in the metadata of the token. (Popescu

2021) Therefore, NFTs create value for collectors as well as creators. The blockchain technology has changed the digital ownership system and brought new innovativeness and companies have utilized NFTs in their business models. As for the basic business model factor value creation, NFTs create value by proof of authenticity and digital scarcity. (Li & Chen 2022).

As in Figure 6. NFT Business Model (Patel 2022): the NFT Business Model is visualized. This model can be utilized for developing a NFT marketplace as well as NFT projects as they also need to consider these aspects. The model includes four segments: digital collectibles, robust communities, proven experience and securing personal information. This model is most commonly addressed by digital art as it the most well-known form of NFT. The digital collectibles include other forms of intellectual property in addition to the form of digital asset collection such as art, music etc. Therefore, these NFTs work as digital files that demonstrate the ownership with traceable history in the blockchain. As for the collections, the number of editions should be determined depending on the strategy, unique pieces, or several editions of the same piece (NonFungible 2022b). (Patel 2022)

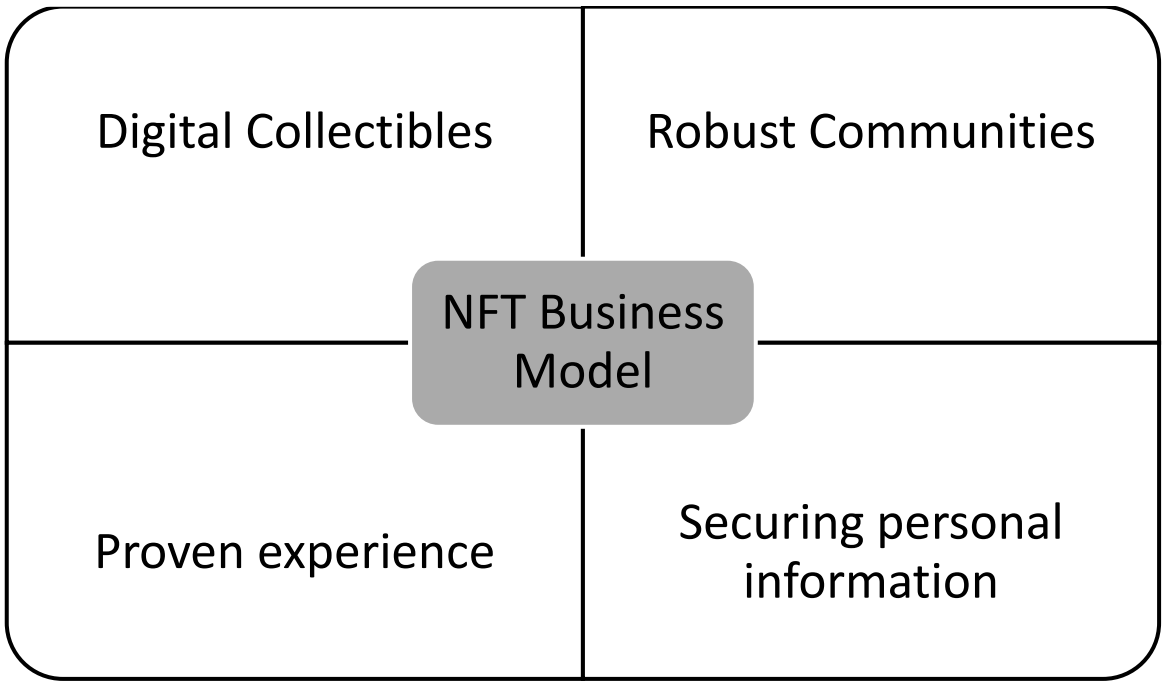

Figure 6. NFT Business Model (Patel 2022)

In the NFT marketplace business model communities are in the centre as like-minded investors and collectors create the culture and build the brand by NFT communities, and at the same time increasing the NFT projects' future potentiality and success (Patel 2022). Communities reflect to customer relationships as these online communities created allows users to communicate with each other while exchanging knowledge and also solve others' problems. In addition, communities help understanding customers. Customer relationships can be strengthened by co-creation in other words letting customers assist with developing service or the product. (Osterwalder & Pigneur 2010) In NFT business strong communities are essential for succeeding and social media is the key place to engage with communities. Moreover, identifying the target audience is important and make other choices according to the target audience preferences. Few of the most popular NFT communities are Bored Ape Yacht Club, CryptoPunks and VeeFriends. Usually, to be a member owning a community token is required. To start a community there are different platforms that can be used. Platforms recommended and most commonly used for NFT platforms are Twitter, Discord and Reddit, and it is recommended to use at least one of these. In Twitter utilizing hashtags is a great strategy to attract certain audience and it is an easy way to market your project. Discord is a platform for the community to chat about the project and engage with the supporters. Reddit is used to promote the digital artwork and discuss about different projects. (NonFungible 2022b; NonFungible 2023c; Patel 2022)

As for the proven experience NFTs provide a digital alternative for documents and lowering middleman fees. Proven experience also includes the whole NFT experience such as the brand, design etc. The last segment of the NFT business model, securing personal information, has the ability to utilize the blockchain for securing and verifying information, and therefore makes NFT solutions worth considering. (Patel 2022)

To create a successful NFT Marketplace Business strategy, the NFT business model introduced earlier helps to identify the key checkpoints. Figure 7. NFT Marketplace Business Model (Patel 2022), introduces the checklist for a successful strategy a NFT project needs to consider. First, choosing the ideal Blockchain network following elements should be balanced: security, decentralization, scalability and ecology. When choosing a blockchain

network it is good to know their statistics and how they respond to the debated topics around cryptocurrencies. And as for the ecological concerns of blockchains, it would be wise to consider the energy consumption (NonFungible 2022d). Second, selecting the token standard that suits the project/company the best. The most widely used token standard is ERC-721 in the NFT industry. All tokens created with this standard are unique and immutable. (Patel 2022)

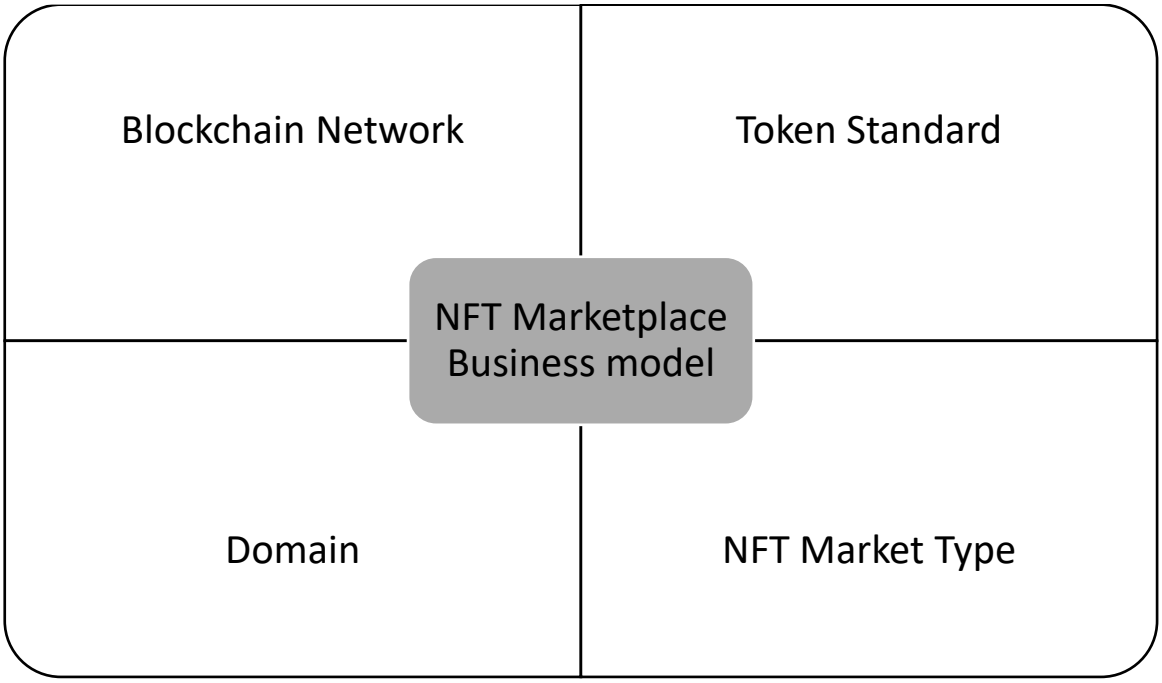

Figure 7. NFT Marketplace Business Model (Patel 2022)

Third, selecting the domain, which originally refers to online addresses of different websites that are usually licensed from third-party providers. On the other hand, NFT domains refer to domains that are based on blockchain technology, these are registered once and have only a one-off payment which gives it to the buyer permanently and these can be registered by anyone. However, .crypto or .nft addresses tend to have better pricing and are most popular. NFT domains can be traded similar as ordinary NFTs on NFT marketplaces. (Ionos 2023) Selecting the domain is important step in the strategy as it affects the NFT market, and this choice can increase the attention to the project. (Patel 2022)

Lastly, selecting the correct NFT Market type from four different types: Open, Closed, Curated and Non-Curated. Open and Closed marketplace differ that the open marketplace is accessible for any user types while in the closed marketplace trading is accessible only for approved users. In the Curated marketplace it is required to apply as an artist to sell art whereas in the non-curated anyone can sell anything. (Patel 2022) In addition to these checklist points, when starting a NFT project it is important to create a roadmap for the NFT project that the community can read. Roadmap is used to determine the projects goals, timeline, and future prospects. Investors can utilize this information as usually important dates are applied to the roadmap for different milestones. The roadmap should be realistic, easy to follow and visual. (NonFungible 2022e)

Decentralized Collaboration model

Usually, businesses rely on centralized collaboration models visualized in Figure 8. Centralized Collaboration model (Lee 2021a) as businesses appreciate their intellectual property and do not typically want consumers to monetize the IP or make derivative works. In this centralized collaboration model businesses make partnerships or deals with other businesses that comply with the permissions under the license. (Lee 2021a)

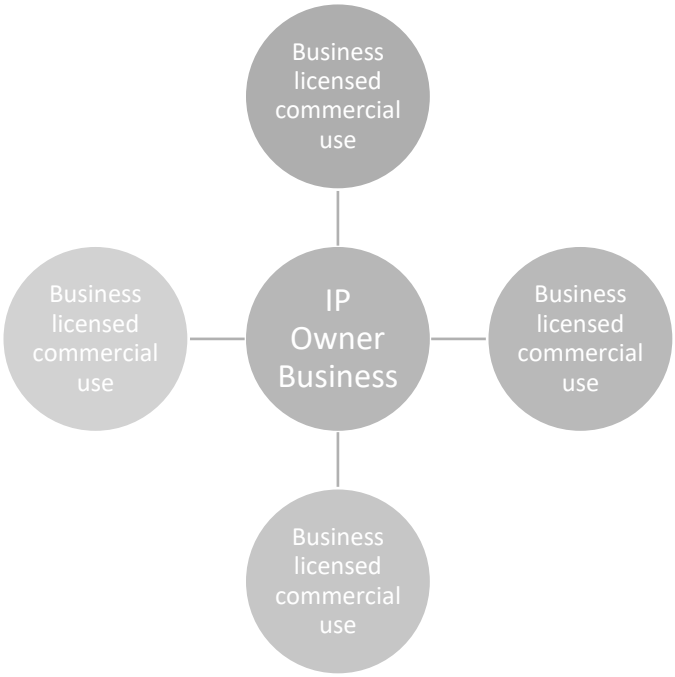

Figure 8. Centralized Collaboration model (Lee 2021a)

Inversely, NFT market has emerged an alternative model called decentralized collaboration model (Figure 9. Decentralized Collaboration model (Lee 2021a)) which is implemented by blockchain technology and the sales. Typically, the sales of NFT includes a content license that allows the consumer rights to some uses of the NFT. In the NFT market it is not typical that these rights include commercial uses. The logic is that the IP owner sells to the buyers NFTs that include the license on the blockchain. The license allows the consumers for making derivative works of the IP and allows commercial uses of the NFT without needing a separate approval as everything is decentralized. This model has been linked to innovation as giving greater chance of increased innovativeness. (Lee 2021a) This model enables decentralized branding by crowdsourcing, i.e. as customers have the ability to participate as active creators for example by branding collections or brand own products which are inspired by other NFT collections (Hofstetter 2022).

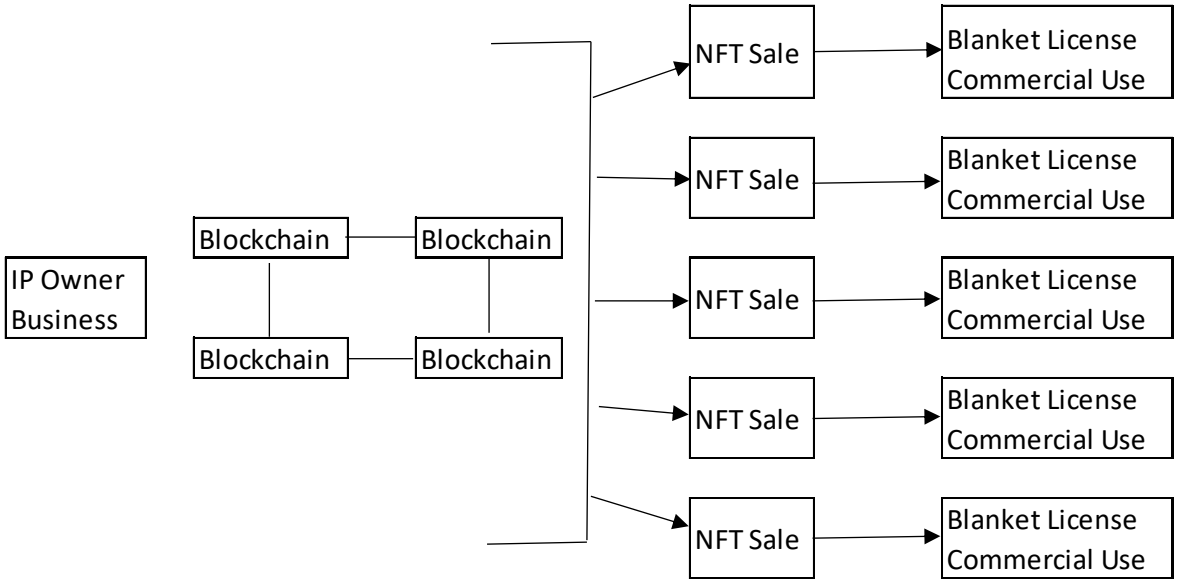

Figure 9. Decentralized Collaboration model (Lee 2021a)

The decentralized collaboration business model has offered several advantages as it does not include unnecessary transaction costs of lawyers or content license agreement negotiations and the model enables businesses to develop creative ecosystems without hiring employees. This model enables the buyers to build the ecosystem and increase sales and sale prices. (Lee 2021a)

2.6 NFT Marketing mix

NFTs have brought new business prospects as the development of technology has made it possible that customers can create brand content in addition to the company itself. There are different initiatives to utilize NFTs as part of brands and businesses marketing and other business activities. (Begiri, Sadiku-Dushi & Begiri 2022) NFTs have had an impact on marketing and especially social media marketing. NFT data has been analysed from different platforms by digital analytics firm DappRadar, and they have conducted reports that claim the market volume of NFTs to be $95 million in the year 2020. Moreover, in 2021 by the end of second quarter the volume has increased to $2.5 billion. (Dan 2021) The growth of NFT sales have increased the brand interest towards creating their own, and especially

including them in their marketing mix (Birch 2022). There seems to be a bright future for NFTs as younger audience adopt the virtual world earlier and they have more increased interest to virtual things (Zhang 2022).

NFTs have become part of the marketing and strategy of several brands, although their value fluctuates easily. Various companies with strong brands such as Coca-Cola, Gucci, Pizza Hut and several luxury brands have adopted NFT as part of their strategy. (Hofstetter, Bellis, Brandes, Clegg, Lamberton, Reibstein, Rohlfsen, Schmitt & Zhang 2022) NFTs can be utilized by different brands to give new user experience, increase brand awareness, provide new kind of ads etc. They have been utilized also for charity as the sales are donated (Dan 2021) Different brands' main objectives that are utilized in their NFT strategies include are way to generate profit, increasing brand awareness, creating brand loyalty, raising social responsibility, finding new audiences, stimulating interaction, promoting new products and a new way for event ticketing application (Begiri et al. 2022). On the other hand, there are risks in using NFTs in marketing as the technology requires self-responsibility in a high degree (Hofstetter 2022).

Referring to Figure 4. Marketing Mix (Helmold 2022), the different variables presented can help to visualize the NFT marketing mix. The model is a way to describe how the value is created for customers, how the competitive advantage is gained in the target market and how customers need is satisfied in the NFT market perspective.

Product

In the NFT market, the ensemble includes the NFT itself and the possible complementary parts that increases the attractiveness (Viitala & Jylhä 2014). NFTs are in the metaverse and can be art, event tickets or almost anything. They are unique and they have a quality ownership technology. (Colicev 2022) Moreover, as brand image affects consumer decisions (Viitala & Jylhä 2014) the overall image of the product in NFTs should be positive. From a brand perspective NFTs can represent different components of the brand such as the product design, logo, image and others. Therefore, NFTs are a way to bring value for brands as they can increase brand awareness and increase the brand communities. For businesses there is a

possibility to create besides their physical product an NFT version and by that acquire more customers. For example, different shoe brands have utilized this by selling physical shoes as well as identical virtual ones. This is a valuable choice for brand loyal consumers that want to digitally show their purchase. Other "product" versions of an NFT are membership programs that give different utilities and giving early accesses for certain product drops by NFT purchases. (Colicev 2022) Branding can also go other way, strong NFT branding increases the brand community and therefore increases sales (Casale-Brunet, Zichichi, Hutchinson, Mattavelli & Ferretti 2022).

NFTs value is highly dependent on the brand and the tokens rarity. Rarity is linked to luxury as luxury brands have used this tactic for centuries. The basic idea is to be desirable for everyone however available for the rare. This tactic is to construct as art and having scarce supply that is exceeded by demand and therefore prices increase. Virtual rarity is crucial for this strategy as to maintain the desire the brand needs to maintain communication and keep the hype. (Kapferer 2012) There are different tools produced to valuate tokens in the market that consumers utilize. For example, Rarity Tools which sorts different projects by the token's rarity. Valuating an NFT, rarity is considered as one of the most important factors. Each collectibles have a customized ranking as NFT communities value differently their NFTs. However, different tools may value tokens differently depending on the preferences. (Rarity Tools 2022a)

Besides purchasing the actual NFT, there is a social context where humans value uniqueness and rarity and therefore acquiring a one of a kind NFT provides social value (Hofstetter 2022). Social bond builds strong communities. There are few reasons behind this: the collector`s action is admired by the social audience and the digital uniqueness is worth only when the ownership is secured, everything cannot be copied and when people know and care about it. The boundaries between reality and virtual reality are fading as virtual communities and social connections affect people`s lives even more. (Trautman 2021) Hence, NFTs have been used as profile picture images (PFPs) in social networks which has been one of the biggest reasons for NFT popularity. Using NFTs as PFPs has technological and social interest, as users can create a digital persona and be anonymous which is typical for crypto world. Moreover, having a limited collection typically 10 000, gives the owners digital status symbols to show off of being economically successful especially for successful project such

as CryptoPunks and Bored Ape Yacht Club. In addition, the owners can usually benefit from owning an NFT as receiving other benefits as real- life events or getting access to restricted discussion rooms etc. (Casale-Brunet et al. 2022)

Price

The pricing of NFTs is determined by different factors and vary across different categories (Zhang 2022). In the beginning the collection can be sold in a fixed price and later as the brand has grown the prices can increase enormously when the social value is built. As evidence has shown the NFT prices are highly volatile as well as cryptocurrencies (Peres et al. 2022). However, there are certain price determinants found to predict the prices. The price determinants found are the previous sales of similar NFTs, popularity of traders and the visual features. From these different determinants the most important is the previous sales as it explains up to 50 % of the NFT prices variability. Ultimately, the economic model of supply and demand, resulting in an equilibrium, determine the pricing in such a volatile market. (Helmold 2022) Zhang (2022) proposes that the willingness to pay by consumers especially in NFT art and music, determines the pricing. Also, a study made by Loi and Tang (2022) proposes that there is a linkage between NFT pricing and the physical appearance of cryptoart, and their results apply to this hypothesis.

In NFTs the pricing is highly determined by the value of the NFT, therefore value-based pricing is a common way to set the pricing. Value can be the benefits of ownership and the cultural significance. Moreover, commonly the pricing is reflected to competitors hence the pricing of competitors with similar features determines somehow the pricing. (Helmold 2022) As in NFT purchase stage the consumers evaluate the brand, the different features, the hype and how it fits in their conception. Hence, the pricing is determined on how the NFT brings value to the consumer and how they perceive as a suitable price. (Colicev 2022)

Place

NFTs are sold in the web and they exist in the metaverse which is available globally for everyone (Colicev 2022). Places where NFTs can be purchased are NFT projects' own

website pages and market platforms such as OpenSea. NFT platforms are the places where the NFTs are usually sold and available for consumers. These platforms have increased recently, and all marketplaces can differ by their fees and the number of accepted cryptocurrencies as payment. Therefore, the distribution needs to be considered as where is the best place to sell the product as different marketplaces have different qualities and prospects. For example, OpenSea, one of the biggest NFT marketplaces, only supports six different cryptocurrencies as payment (OpenSea 2022) while Binance accepts over 50. (Zarifis & Cheng 2022) It is predicted that year 2023 the amount of NFT platforms will increase and they will include more innovative offerings besides just focusing on NFT sales. These offerings include earning points or community building. (Pierce 2022) There has been negative feedback about the high fees of certain marketplaces, however new marketplaces have been established and are on the edge of establishment to replace the expensive ones (Trautman 2021).

The most popular marketplaces for trading NFTs are currently OpenSea, Rarible, WazirX, Binance and Mintable. Popular marketplaces for selling and buying NFT digital art are OpenSea and Rarible, and both use mostly cryptocurrency Ether as a payment and trading option. (Mukhopadhyay & Ghosh 2021) OpenSea is considered the most popular marketplace with over 300 thousand users therefore being the largest (Kapoor, Guhathakurta, Mathur, Yadav, Gupta & Kumaraguru 2022) by its sales volume and user base. (White, Mahanti & Passi 2022)

Promotion

Communicating the value of the product is one of the stages of marketing (Hofstetter 2022). In respect of promotion, an important stage in increasing success in the NFT market is the NFT product launch. The strategy in this is important as if no awareness towards the project, then no customers. Promotion includes how to market the product, and how to increase brand awareness at the same time. Effective brand strategies in NFTs can be for example collaborations with already an established NFT collection and this way the brand is shown to new audiences and get credibility by the previous NFT collection. In addition, a strong element that is crucial for promoting NFTs is the brand community. When a brand

community is formed the community supports the brand by increasing awareness by promoting the collection, the brand and the NFTs. (Colinev 2022) A way to differentiate from other brands NFTs are a good solution as it seen as a modern way to promote (Begiri et al. 2022).

One of the most important factors of the marketing strategies for NFTs is to attract people to be interested in the NFT project and buy the product. When more people follow your project and talk about it to others on social media it attracts more people. And as the main goal is to sell as many NFTs as possible, building a strong community is an important strategy and a critical one. Social media is important in marketing NFTs as it attracts more younger audience of the cryptocurrency era. The best social media channels for marketing NFTs are Twitter and Discord (Casale-Brunet et al. 2022), and other places used are Medium, Facebook, Instagram, Telegram and Reddit. (Tokenminds 2022) People interested in NFTs and PFPs, Twitter and Discord are the most represented social networks (Casale-Brunet et al. 2022) and for community building Twitter, Discord and Reddit are the best platforms (NonFungible 2022e). Discord is used to communicate with your community and give giveaways, and this platform can also be utilized for Q&A sessions. The strategy includes keeping a buzz existence and increase attraction for new audience therefore utilizing many platforms is critical. Collaborations with NFTs specialists and other communities is essential to increase interest towards the project. Selecting the right marketplace, it is needed to consider if it fits into the project's goals, as some marketplaces have high fees, some requires a platform specific wallet etc. (Tokenminds 2022) Twitter is a well-known social network where the data is in a form of tweets, which are mostly text (Casale-Brunet et al. 2022). In Twitter there is daily approximately 206 million active users and is one of the world's largest social media platforms. This platform is crucial for creating and developing a community as it is very active in the NFT community. Reddit is place for research and project advertisement especially on pages r/NFT and r/NFTsMatketplace. Hence, focusing on Twitter, Discord and Reddit are recommended. (NonFungible 2022e)

The communication for the NFTs to consumers happens in different social media channels and different NFT marketplaces. Platforms that are utilized in NFTs include the highly engaging ones to interact with members and potential customers, and the social media channels for marketing and showing the product owned etc. (Colicev 2022) Virtual spaces

were built to present these digital artworks by NFT investors. The NFT collecting sites are seen as communities, where collections are displayed with the aim of admiring collectors and sustaining the social value of trading. (Trautman 2021)

People

The people behind the company are the ones that interact throughout the whole process with the customers via different channels (Helmold 2020). Creating real communities, Twitter and Discord are the best for NFTs (Casale-Brunet et al. 2022). For NFTs Discord platform is commonly used for building a community and interact with the customers by conversations. NFT creators can hire loyal people as moderators to Discord to maintain the conversation and strengthen the interaction between customers and the NFT brand to grow the community. Creators and projects awareness increases the interest towards the NFT collections. And as for the importance of communities, celebrities that have bought NFTs are seen as customers however they also promote the collection and increase the hype around the NFT project. (Colicev 2022) By a survey made by Adweek/Harris Poll, the results concluded that collectors that earn over $100 000, and millennials are most likely investing in NFTs. Most of the responders said they were aware of NFTs (81%), and familiar with them (40%). (Dan 2021)

Process

The NFT process includes the stages of production, the purchasing process and the functionality of the technology. NFTs purchasing process can change according to the marketplace, however the standard steps usually are creating an account and deposit cryptocurrencies in the wallet, accessing the marketplace, identifying the NFT wanting to purchase and lastly, making the purchase. Moreover, the blockchain technology and the chosen platforms have importance in the NFT process. (Zarifis & Cheng 2022) The process of the customer journey from pre-purchase to the post-purchase stage, in respect of NFTs starts by the pre-purchase stage which includes the brand awareness. This is affected by the NFT product launch, marketing actions and utilizing NFT communities to attract possible customers. A good strategy to increase brand awareness is communication with the NFT

communities and creating content and trying to build the hype around the collection. In addition to the pre-purchase stage, the actual purchase stage where customers considerate about making the purchase can be influenced by giving consumers value by unique perks, differ from competitors, and access in NFT communities. In addition, if the brand awareness has succeeded consumers remember the brand and therefore, more easily buy the product. This stage it is important to persuade the consumer to buy the NFT by highlighting the value of the purchase. The last stage of the process, post-purchase stage, it is important to create brand attachment. (Colicev 2022)

Physical evidence

Physical evidence includes the experience of the business and valuable physical evidence can be provided by websites as well as contracts (Helmold 2020). Physical evidence is provided by different websites that provide NFT statistical data. For example, NonFungible.com, marketplaces (OpenSea) and other websites. These data resources have valuable information about NFT projects, sales, market reports, market trackers, different rankings and useful information about NFTs. (NonFungible 2022a; OpenSea 2023) Social networks and word of mouth (WOM) have significance in this technologic era in building the physical evidence of NFTs, as people can provide fast their experiences in different social networks and talk about their feelings for others (Viitala & Jylhä 2014). Hence, the most used social networks for NFTs such as Twitter and Discord, are useful platforms to gain insight of different NFT projects (Casale-Brunet et al. 2022).

2.7 Sustainability in NFTs

As we are facing climate crisis there has been discussions about the environmental impacts of the growing digital economy, and this has led to discussions on the footprint of NFTs. Energy management is an issue in cryptocurrencies, as the energy consumption is massive when mining these crypto coins. (Fadeyi, Krejcar, Maresova, Kuca, Brida & Selamat 2020) Since cryptocurrencies are used to buy and sell NFTs, NFTs are partially responsible of these carbon dioxide emissions that cryptocurrencies generate (Calma 2021). The question about

the negative impacts of NFTs to the environment rose in 2020 after the first research about the topic were published by Memo Akten. For NFTs possibility to exist they consume electricity. Some calculations made in December 2021 estimate that the carbon emissions of NFTs, if all activity is performed in the blockchain, and the results conclude them to be 100 KgCO2 for the process of creating an NFT, 200+ KgCO2 for a NFT sale with a few offers, and 500+ KgCO2 for more offers and more sales. (NonFungible 2022f)

In 2020, Memo Akten provided research about the ecological cost of cryptoart as there was not previous research about the topic and due to the lack of transparency. The problem in cryptoart is the ecological cost and by the research, the estimated footprint of a single Ethereum (ETH) is on average 35 kWh which is the same amount as an EU resident`s four days electric power consumption. Even though this footprint is high, it is less than Bitcoin's. In addition, NFT sales on a PoW blockchain have a worse footprint. One NFT can contain many transactions such as minting, sales, transfer, ownership, bidding and cancelling. All of these transactions have different ecological cost and therefore increases a single NFT's footprint into hundreds of kWh. By calculations, the average footprint an NFT (based on PoW based blockchain) has is around 340 kWh which is the same amount of an EU resident`s electric power consumption for more than a month. (Memo Akten 2021) Some people have stated dealing with cryptoart to be environmentally unethical and therefore, some businesses have cancelled their plans to launch NFTs as the social pressure has been too strong (Calma 2021).

The technology that NFTs utilize is blockchain, and it is also used by cryptocurrencies such as Bitcoin and Ethereum. To secure the networks, these all rely on Proof of work (PoW) which means huge energy consumption, as computers perform continuously vast numbers of calculations to verify blockchain transactions and to mine new currency. For example, every year Bitcoin uses the same amount of power as Finland does, which has a habitat of 5 million people. Therefore, a change is needed to make the energy consumption more sustainable. (Sparkes 2021; Truby et al. 2022) In addition, there has been pressure for more sustainable methods of working from the art market which has in fact increased their development. (Truby et al. 2022). The impact to the environment depends on the blockchain used. In contrast to PoW, Ethereum was in a transition to Proof of Stake method to validate transactions, and this method uses energy approximately 99% less. This transition took years

for Ethereum to ensure the security and decentralization. However, to make this NFT business more eco-friendly social change is needed to improve the energy consumption. (NonFungible 2022f) Sustainability brings also new innovations as some artists have projects to be carbon neutral by utilizing renewable energy and technology that enables this (Calma 2021).

Ethereum currently uses the proof-of stake consensus mechanism which uses less energy than it used to and therefore can be called as a green blockchain. Ethereum networks yearly consumption of the entire global network is 2600 MWh (0,0026 TWh) and it corresponds 870 tonnes CO2e. For comparison, social network YouTube has an annual energy consumption estimated of 244 000 000 MWh (244TWh) yearly. (Ethereum 2023c)

Even though there has been pressure to more sustainable protocols, some have resisted this pressure to decrease their environmental impact and one of them includes Bitcoin. Annually in 2021, Bitcoin has produced emissions that will have an impact of around 19 000 deaths in the future. This has led to global policy interventions for some types of blockchain with legal or fiscal tools. On the other hand, Ethereum that is used mostly for NFT transactions has set a roadmap to focus on sustainability and change from proof of work to other protocols. It is good to be aware that not all blockchains pollute and there are different options available to choose that are more sustainable. However, the proof of work blockchain remains most used even though its high in energy consumption. (Truby et al. 2022) To perform more eco-friendly the NFTs can be sold in more sustainable platforms. Ethereum's previous energy-intensive proof-of-work method has been replaced by a low carbon method proof-of-stake. This method keeps the decentralized consensus mechanism and therefore keeps the security on a high level. (Ethereum 2023d)

Crypto miners' goal is to be profitable therefore they source inexpensive electricity and methods that consume less and are more efficient. There are problems to determine where energy production comes from as some miners use a VPN and therefore are mistakenly counted in a different country. (NonFungible 2022f)

In comparison to the negative environmental impact of NFTs they have also positive sustainable processes. NFTs have increased transparency for sellers, the market and consumers and also, made the remuneration for artists more protected. Therefore, the financial sustainability is improved by smart contracts and proof of ownership. (Bsteh & Vermeylen 2021)

3 Research design and methods

This section defines the research design of this study. First the research methodology is explained and continuing to explain the data, its collection methods and how the data is analysed. Last, validity and reliability, and the ethical considerations are presented. All of these are explained in detail to ensure good understanding of the chosen methods to get the most reliable research.

3.1 Research methodology

This research is qualitative as this approach allows to analyse in detail people`s experiences and to gain better understanding of the objectives, by using word as data (Hennink, Hutter & Bailey 2020). The most common data collection methods in qualitative research are interviews, surveys, observation and gathered information from different documents. In general, the problems of data-oriented research are seen as the research methods and concepts set by the researcher affect the results in some way. However, this problem can be solved with a theory-driven analysis, where the theory serves as an aid, but the analysis is not based directly on the theory. (Tuomi & Sarajärvi 2018) Therefore, this study was conducted as secondary research by gathering previous literature about the chosen topic and building a theoretical framework to guide the research.

To explore in-depth the chosen perspectives (Thomas 2011) and evaluate them from real-life context the research includes case studies from three NFT art projects. Thomas (2011) suggests a definition for case study “case studies are analyses of persons, events, decisions, periods, projects, policies, institutions, or other systems that are studied holistically by one or more methods.”. In this study, a disciplined configurative case study type is used, as to explain a case by using established theories. (Thomas 2011) What is important is the connection of the research setting to the earlier theory base, which forms the basis from which the analyses and interpretations are made in the conclusions (Aaltio-Marjosola 1999). Case study has an advantage as a research method when a “how” or “why” questions are

asked concerning a contemporary set of events or over something which the researcher has little or no control (Yin 2014). Therefore, this study relies on analysing projects by using case study design and explaining the cases by utilizing previous relevant theories. Three projects were chosen to analyse to get wider view of the topic and to get comparison of the models used by the projects. The research questions are related to contemporary events and over something the investigator has no control over, hence this chosen study method is relevant.

Collecting information about individual cases and trying to interpret and analyse them in depth has its own advantages. The unique nature of the research object is part of the research setting, and one does not look for general regularities, but instead tries to deeply understand the case or cases in their own unique environment. Case research is not a single method or tool that can be separated from the rest of the research context. As an approach, on the contrary, it breaks the tool-like image of the use of methods. In empirical social science research, the basic research unit consists of the researcher and the research object. The researcher collects data from the research object using different methods of observation and data collection. In a case study, it is quite common for the researcher to use several methods of data acquisition, and several research materials compiled with the help of them may also be formed. Thus, the case study is rather an approach, a special way in which the researcher approaches the research object and collects material from it. (Aaltio-Marjosola 1999)

3.2 Data collection

For case study research there have been identified six primary sources of evidence: documentation, archival records, interviews, direct observation, participant observation, and physical artifacts. Case study recommends using as many relevant sources as possible. This study uses documentation as source of evidence, as the strengths are stableness as they can be reviewed repeatedly, unobtrusive as they are not created as a result of case study, specific as they can contain exact names, references and details of an event, and broadness as they can cover a long-time span and many events. On the other hand, weaknesses of

documentation as a source of evidence include difficult retrievability, biased selectivity, reporting bias reflects to author bias and possibly blocked access. (Yin 2014) Documents should be carefully reviewed to ensure validity and therefore it is important to corroborate evidence from other sources (Tellis 1997). Interviews were considered as an additional source of evidence, however as NFT projects are usually anonymous, possible interviewees were in this time frame not possible to have. Another option was to interview a Finnish new NFT art project that was about to launch, however this candidate project was unsuccessful and was dropped out of the research. Since, in addition to focusing on prior documents this research also utilizes NFT databases to get reliable information about the success of the projects.

The process started by choosing the topic and reading the previous literature to gain an overview of what has been researched and what has not. Previous literature was first searched from LUT University digital available sources such as EBSCO, Scopus and webofscience. After there was a general understanding of the literature, the development of the conceptual framework began. Conceptual framework shows the linkage between different concepts that are further studied in the research and provides structure and clarity for the study (Hennink et al. 2020). The chosen framework to support the research, the data and to help find answers to the main research question, was business models. Framework for the study was business models and to support the business models, value proposition was analysed by using the 7P model. These both were essential for the study as they model the NFT projects strategy, project roadmaps and how they operate to create value for the customers. Other relevant concepts included NFT, blockchain and sustainability.

The NFT projects for the case studies to analyse were chosen by using NonFungible.com, the world`s largest NFT data resource, and Opensea, the world`s first and largest digital marketplace for NFTs and crypto collectibles, as finding the all-time most successful NFT art projects. These two were used as they provide the widest range of information for all NFT projects and statistical data needed for the research. By utilizing these two sites and their statistics, the selected projects were narrowed down. OpenSea collection stats filtering top project from all-time, all categories and Ethereum blockchain. And from NonFungible top sales ranking filtering all-time and all segments. By these filters the same projects in both lists included CryptoPunks as first, Bored Ape Yacht Club (BAYC) as second, and

Doodles as eighth in Opensea and tenth in NonFungible. (NonFungible 2022a; OpenSea 2022) CryptoPunks and BAYC NFT collections are the two most valuable by market cap (Matney 2022). The data for all three projects was collected from their websites and other publicly available sources. These included information from all pages available in the projects websites about the projects, different academic articles, NFT marketplaces, and different databases. Projects' websites information was utilized entirely, including the terms and conditions available. Overall, the documentation was mainly articles, books, websites and social media channels.

3.3 Data analysis

The analysis of qualitative material continues after the acquisition of the material by reading the material again and acquiring more information by reading about the subject from different sources. The aim of the analysis was to describe, interpret and understand the object of the study. (Puusa et al. 2020) When reading the material, the material was divided into different themes which are presented in Figure 10. Main themes. The main themes are business models, value proposition and sustainability. As writing the literature review the material was divided by these themes into own chapters to describe the object. The same themes were used in the empirical evidence. After the material was grouped, the material was combined to get findings and synthesis by utilizing figures.

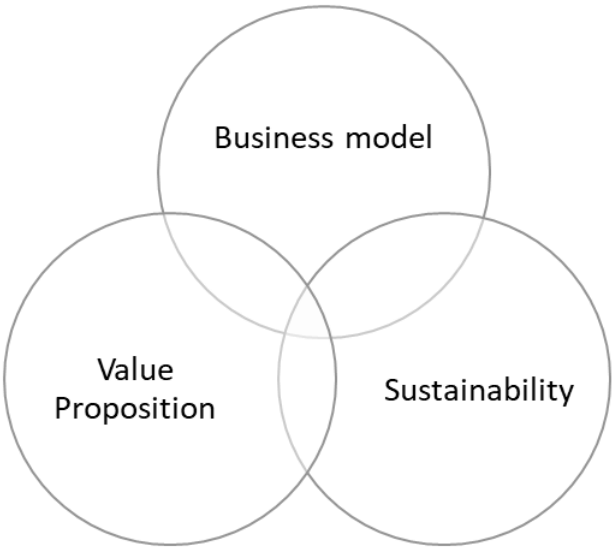

Figure 10. Main themes

Content analysis is suitable for use in many kinds of qualitative research and is one of the most common. The analysis of the content enables a versatile examination of the material and in its implementation demographic and theory-oriented features can be identified. Therefore, this research used content analysis method. The analysis is intertwined with the interpretation and is based on reasoning, where the empirical material is used towards a more conceptual understanding of the phenomenon under study. The stages of this realization include selection of the analysis unit, familiarization with the material, reduction of the material, categorization and thematization of the material, and interpretation. The goal of this method is to help organize the material in a concise and clear form without losing the central information. This method served as a way to structure the empirical data. (Puusa et al. 2020)

Data analysis procedures used in this research were analysing three different NFT digital art projects by the same perspective of business models, value proposition and sustainability. Even though the literature review discussing business models included a business model canvas this canvas was not used to analyse the chosen NFT projects as this research focus deeper on the value proposition. Therefore, to help standardize the value proposition analysis 7P model was used for each project. In addition, sustainability aspects were analysed. The goal of data analysis is to gain answers for the research questions, therefore the analysis of

the chosen projects started by discussing the projects in general, then the projects' business models and continuing analysing the project with 7P model to find the value proposition model, and lastly discussing sustainability`s involvement in the project. Statistics, tables and figures were utilized in this research to summarize the material.

After analysis, the results were interpreted and explained. Syntheses were obtained from the material, on the basis of which conclusions were drawn. These syntheses helped answer the set of research questions. (Puusa et al. 2020)

3.4 Research process

Although different methods of qualitative research have different steps, qualitative research, like any other, usually includes the following steps (Puusa, Juuti & Aaltio 2020) that this research also had:

1. Topic selection
2. Setting research goals
3. Shaping research questions
4. Presenting research limitations
5. Preparation of the theoretical framework with the help of literature
6. Selection and justification of the approach
7. Selection of research methods and samples or material, description and justification
8. Data collection
9. Data analysis and interpretation
10. Reporting the findings and results, and evaluating the reliability of the research

Research begins with the selection of the topic, and this may rise from the researcher`s observations. The researcher must familiarize themselves with the literature in order to find a research gap, i.e. a perspective for the research. When setting the goals, the topic should be clearly defined that in-depth analysis is successful. The objectives of the research are expressed in the form of research questions, and well-defined research often has two or three research questions. (Puusa et al. 2020)

The process of this research started by topic selection. The topic was chosen by own observation and reading about the topic. After reading prior studies and research gaps rise, the research goals and questions were shaped. The limitations of the research were presented according to what the research focused on and how it was implemented. With the help of literature, the theoretical framework was prepared. The research methodology was designed, and the selection of methods and their justifications were described. Moreover, the data collection, data analysis, validity, reliability and ethics were discussed. Empirical part consists of data analysis of the case projects and interpretation of results. Lastly, the steps of reporting the findings and discussion were conducted.

3.5 Validity and Reliability

Considerations regarding the reliability of qualitative research can be summarized using three concepts. These are validity, reliability and ethics. Validity refers to how readers accept the results as true and trust that the research material has been collected and analysed carefully. (Puusa et al. 2020) In case studies, construct validity is seen as a challenge as it is seen that the researcher is unable to develop the right measures and that the research only increases preconceived notions. However, validity can be met when data collection is set right. (Yin 2014)

Reliability refers to the ability to convince the reader with plausible arguments that one has been able to select, and use justified and correct approaches and methods to solve the research problem and carry out the research (Puusa et al. 2020). It is important to describe how research is conducted, how the data has been collected and analysed, and these are emphasized especially in empirical research. Describing these increases the reliability of the research and the credibility of the results. (Sarajärvi & Tuomi 2018) Hence, this research has aimed to argument the chosen research methodology and how the data is collected and analysed. Moreover, to describe the research process and limitations carefully. The reliability of the research is also dependent on the data obtained. The research used three example projects to get a broader understanding of the phenomenon. One limitation

regarding reliability is not including more projects in the research. On the other hand, if more projects had been included, such a detailed analysis would not have been possible. The goal was to conduct this research in an objective way and present the findings with argumentation.

Case study as a research methodology has received in its early stages' criticism about impossibility of replication and that the method was unscientific in nature (Tellis 1997). Yin (2014) suggested a case study protocol to follow to enhance the reliability of a case study research and especially in a multiple-case study. The protocol helps the research focus on the goals, and the protocol for case study should include the following: an overview of the case study project, data collection procedures, data collection questions and a guide for the case study report. An overview of the case study project includes the project objectives and auspices, case study issues, and relevant readings about the topic. Data collection procedures includes the reminders about procedures, data source credentials for access, and location of those sources. Data collection questions are the questions the researcher must keep in mind during data collection. And lastly, a guide for the case study report includes the outline and format for the data, use and presentation of other documentation.

3.6 Ethical considerations

Ethical means that the researcher has followed ethical principles throughout the research. This means that the methods of analysis and research methodology used in the research meet the criterion that they could serve as guidelines for any well-conducted research (Puusa et al. 2020). Good research is guided by ethical commitment and the ethics of qualitative research which includes research quality and design. This includes for example the chosen research methods, sources and argumentation. Good scientific practice, i.e., research ethics, means following ethically responsible and correct operating methods. This research followed responsible conduct of research by being honest and careful presenting the findings, using ethical research data collection methods, respecting other researchers work, carefully planned the research etc. (Tuomi & Sarajärvi 2018)

Ethical considerations for this research include using the most relevant and scientific articles and trying to find as many references as possible to back up the research and making careful research plan how to conduct the research in the best way. The previous literature and data are collected through publicly available sources and the goal is to find the original source for information. The reliability of the data provided by NonFungible and OpenSea is described. NonFungible tracks real-time transactions done on Ethereum blockchain and all sales history to provide more reliable statistics. NonFungible is one of the most trusted data resources in the NFT ecosystem. (NonFungible 2022a) OpenSea is founded in 2017 and has currently over 200 employees and strives to ne trustworthy and secure marketplace (OpenSea 2023) Moreover, there were no ethical concerns about participants as the data was gathered from secondary sources.

4 Findings

The findings investigate three different NFT art projects that were chosen by using NonFungible and OpenSea statistics. The three chosen projects are Bored Ape Yacht Club, CryptoPunks and Doodles. This section includes three upper headings based on the projects, and these include several lower headings. These lower headings are business models, marketing mix and sustainability. The projects' business models and value proposition are first analysed and to help visualize the value proposition the 7P model is used for each project. By this analysis the goal is to find differences and similarities between how these different projects create value, with what kind of business model and is sustainability their asset or does it only bring harm. The structure follows first giving the general information about the projects, then continuing analysing the business models and their value proposition by the 7P model.

4.1 Bored Ape Yacht Club

Bored Ape Yacht Club (BAYC) is one of the most popular NFT collections with a strong community and a Billion-Dollar Ecosystem (Hissong 2021) that spreads around the world. The collection is on the Ethereum blockchain and is stored as ERC-721 tokens. BAYC was invented in 2021 by Yuga Labs, by four friends, in middle of covid, and it consist of 10 000 Bored Ape NFTs. The collection is unique, and it also includes rare NFT products. The BAYC collection is available in the marketplace OpenSea and the cost of a Bored Ape is 0.08 ETH. (Bored Ape Yacht Club 2022)

4.1.1 BAYC Business model

The BAYC strategy follows Figure 6. NFT Business Model (Patel 2022) as they have digital collectibles, robust communities, proven experience and they have security for personal

information. BAYC uses blockchain technology for security and the digital collectibles are art collectibles including the intellectual property rights. Digital collectibles have a strategy of 10 000 editions. BAYC relies in their business model in the importance of communities and the uniqueness of being a member. The community is major element of the success as of a Bored Ape owner you get member-only benefits and many celebrities have been promoting this collection. Therefore, as one buys an NFT one also buys a membership access with other benefits that will increase further along such as the bathroom (graffiti board) and other benefits through roadmap activations. Roadmap activations are long-term goals and when a target is achieved a goal is realized. (Bored Ape Yacht Club 2022) One example of community benefits that BAYC organized for their members was a private yacht party with many celebrities (Colicev 2022). Besides these benefits also for BAYC holders there has been made new NFT collections such as The Mutant Ape Yacht Club (MAYC) and Bored Ape Kennel Club (BAKC). The increased market capitalization of these new projects has been positive and indicates sustainable demand for the future. In addition, the BAYC collections prices have increased through time. (CryptoSlate 2022).

BAYC also follows the NFT strategy checklist presented in Figure 7. NFT Marketplace Business Model (Patel 2022), which includes the choice of blockchain network, token standard, domain and NFT Market Type. Business model strategy for BAYC includes the choice to be in the Ethereum blockchain and selecting the widely used token standard ERC-721. This choice of blockchain and ERC-721 smart contract determines the security. BAYC uses ERC-721 smart contracts that ensures safe transactions. Moreover, BAYC has their provenance record of each Bored Ape existed that is included in their smart contract presented in their website. (Bored Ape Yacht Club 2022; Ethereum 2023a) BAYC can be traded in OpenSea, which is open marketplace for anyone to sell or mint NFTs. Hence, the chosen NFT market type is open & non-curated. (OpenSea 2022)

The business model that BAYC has adopted is the Decentralized Collaboration business model (Lee 2021a). In the terms and conditions of BAYC website it is underlined that the ownership of a NFT includes all right to the art. The ownership includes personal and commercial use rights and is more broad rights than usually in the NFT market. As a result of unlimited rights buyers have projects for derivative works of the NFTs. (Bored Ape Yacht Club 2022; Lee 2021a) This business model has advantages as consumers are ready to pay

more if the NFT artwork can be monetized and as no employees have to be hired to build the NFT ecosystem as the buyers do it instead (Nftjedi 2021a).

The adopted business model has given BAYC advantages as the community has used the license to develop the ecosystem which has led to the NFT collection being one of the most valuable. Over 1 billion dollars' worth of sales was totalled in less than a year by the BAYC NFT collection. (Lee 2021a) Since BAYC offers broad commercial rights, this has increased the awareness of the collection, and on the positive brand image as athletes and artist have made merchandise and collaborations with the NFTs they have bought. (Economist 2021)

An example of utilizing commercial rights in one`s own business is Universal Music`s deal with four Bored Ape NFTs owned by Jimmy McNelis. With the help of these NFTs, a band, called KINGSHIP, has been established in the metaverse. (Nftjedi 2021b) KINGSHIP describes itself as a supergroup supported with successful music producers, songwriters and artists behind it. It consists of rare Bored Apes and a rare Mutant Ape, which is also from Yuga Labs. This supergroup gives music, exclusive content, community, real-world benefits etc. for the holders of access-enabled Key Cards that have been released 5 000 by KINGSHIP. (KINGSHIP 2022)

4.1.2 BAYC Marketing mix

The BAYC marketing mix is summarized below in Figure 11. BAYC Marketing mix.

Product	Price	Place	Promotion	People	Process	Physical Evidence	Sustainability
10 000 NFTs	From original 0.08 ETH	Opensea	Twitter	Yuga Labs	Roadmap	Ownership	Sustainable demand
Art	flat pricing to value	Ethereum	Discord	Team of four	Business model	Brand	Roadmap/long-term
Exclusive/unique	based.	Real-life	Instagram	Strong culture	Opensea	Design	goals
Rare features	High pricing		YouTube	Community	Technology	NonFungible.com	PoS
ERC-721	Luxury		Strong community	Members		Proven experience	Financial responsibility
Ethereum blockchain			Celebrity marketing			PFP	Social responsibility
Security			Limited access			Social networks	
Branding			Utilities			Own website	
Additional parts							

Figure 11. BAYC Marketing mix

The product of BAYC is the NFT art collection, that is limited with the supply of 10 000 NFTs. The BAYC NFTs have rare features and therefore perceived as exclusive. The collection is in the Ethereum blockchain, sold in OpenSea and stored as ERC-721 tokens. There is security provided for personal information, and the technology provides proven ownership. The initial sale of BAYC has been sold out however the collection can be checked out on OpenSea on secondary market. (Bored Ape Yacht Club 2022) The value for consumers by buying a BAYC NFT are the benevolent utilities given for both the virtual and the real world. These utilities include the intellectual rights, real life exclusive events and other NFT purchase opportunities. The value of the purchase is also increased as there is a limited supply of tokens and the uniqueness of the art. Owning a BAYC NFT has become a desirable thing that is shown in the social media for example by several celebrities. Value is given also as customers find value in the BAYC brand and wants to display it. (Zhang 2022) Nicole Muniz, CEO of Yuga Labs has stated that BAYC is special as it is culture on blockchain, and the basic idea was to experiment on three dimensions, which are identity, ownership and utility. Hence, the NFT can be used as PFP and create your identity, one can monetize the NFT and you can be part of the community. The initial plan was always to have more than just art, and to have future plans, as the art is key to the club. (D3 Network 2022)

The pricing strategy for BAYC has been developed by their success. Initially in April 2021 when BAYC launched they had a 0.08 ETH flat pricing which led to a quick sell-out. BAYC brand quickly grew when the NFT boom increased, and different celebrities and athletes bought their own NFT apes. By the marketing of these NFT collections and the art sold, the brand grew, which has led to higher prices that is value based. (Economist 2021) The development to high prices has made the collection exclusive and luxurious that has created desirability towards the collection and the brand (Zhang 2022). In March 2023: highest all-time sale of an individual NFT is 3 million dollars and value of sales all time over 5 billion dollars (NonFungible 2023a)

BAYC uses different marketing channels to promote their collectibles with different goals. They also lean strongly on strong communities and celebrity marketing. In their website there are straight links to their YouTube channel, Discord and Twitter. They also have an Instagram page that they are active in. The follower amount of these channels in May 2023 is presented in Table *1*. BAYC Marketing channel followers (Bored Ape Yacht Club 2022).

Table 1. presents the follower amount in thousands and of these channels Twitter has the most followers with 1 million. Instagram has the second most followers with over 600 thousands. (Bored Ape Yacht Club [Discord] 2023; Yuga Labs [Youtube] 2023; Bored Ape Yacht Club 2023 [Instagram]; Bored Ape Yacht Club [Twitter] 2023)

Table 1. BAYC Marketing channel followers (Bored Ape Yacht Club 2022)

Bored Ape Yacht Club	Followers
Twitter	1 000 t
YouTube	17,3 t
Instagram	619 t
Discord	209 t

BAYC uses these channels in different ways, however Twitter and Discord are the mainly used channels for interaction. Discord is utilized to communicate with the community, interact between creators and owners, and build the ecosystem (Bored Ape Yacht Club [Discord] 2023). Yuga Labs has podcast with different celebrity guests and these episodes are published in YouTube. In addition, some trailers of NFTs are published in Yuga Labs YouTube channel. (Yuga Labs [Youtube] 2023) Their Instagram account has 59 posts (May 2023), and the posts include merchandise promoting, NFT collection launching, different event promoting for members etc. (Bored Ape Yacht Club 2023 [Instagram]). Twitter, which is their most active channel, has over 8600 tweets. In this channel they retweet others' tweets about their brand/NFTs/merchandise and make own announcements. This is one of the most important social networks for BAYC promotion. (Bored Ape Yacht Club [Twitter] 2023)

BAYC has a strong community and strong social impact. Different celebrities have bought BAYC NFTs as status symbols and helped the growth of the community and brand awareness. These celebrities include Post Malone, Gwyneth Paltrow, Jimmy Fallon etc. They have posted their NFTs on social media and increased the awareness scope of NFTs and specially the BAYC collection. (CryptoSlate 2022) Brand attachment is increased as BAYC offers flexible ownership rights which has been utilized by imprinting NFT on fashion, books and even movie characters. This possibility strengthens the relationship between the consumer and the brand. (Colicev 2022) In addition, it is suggested that the

value of BAYC brand is protected by the collective value BAYC owners share, and this is due to the Decentralized collaboration model license offered (Lee 2021b). BAYC success has increased as they have been popular in the PFPs and hence used as status symbols of belonging to an exclusive group. The limited access to the collection and getting exclusive access to different membership benefits increase the desire to own a BAYC. (Casale-Brunet et al. 2022)

The team behind BAYC is Yuga Labs, with four people, presented on the BAYC website with their digital personas Cargamel, Gordon Goner, Emperor Tomato Ketchup and No Sass. The team has wanted to stay anonymous, which is common in NFT and crypto world. The creators use Discord to communicate with the owners of BAYC collection. The team has successfully built a strong culture and community. (Bored Ape Yacht club 2023)

Process of BAYC includes their roadmap presented on their website and their whole business model. The business model determines their whole process how the technology is developed and structured, and how does it work. They use OpenSea as marketplace to make it easy for the end-user to get a smooth process of trading and their social networks used are for making the process more understandable for anyone. BAYC roadmap is presented on BAYC website and they have successfully achieved all previous goals. The roadmap was used for stating the long-term goals of BAYC, and this gives buyers and investors proof of the project's strategy. BAYC had originally seven roadmap goals that are realized when the percentage target sell is hit: 10% paying back moms, 20 % releasing tokens that were hold back from sale by giving them to random previous Ape owners, 40 % establishing BAYC YouTube channel, 60% unlocking own member exclusive merchandise store with limited edition products, 80% starting a treasure hunt with a price of 5 ETH and a Bored Ape, 90% The Bored Ape liquidity pool is initiated and 100% The Mutant Ape arcade machine gets fixed. (Bored Ape Yacht Club 2023)

Physical evidence includes the code available of the blockchain and smart contracts, and the proof of ownership. In addition, the successful branding increases the credibility as the community spreads awareness and wants to show off their products. And as owners use these NFTs as PFP it brings better awareness. Hence, social networks have a big part in the

physical evidence of the NFT project, for example public statistics available in Nonfungible.com and other websites (NonFungible 2022a).

As rarity is one of the value creators of NFTs, Rarity Tools has provided a ranking site for certain NFT projects. This tool works by giving each trait of an individual NFT a rarity score and the overall rarity score is calculated for all traits of that NFT. This ranking is customized for each project as communities value collectibles different. By using Rarity tools, the rarest token from BAYC collection is Bored Ape YV #7495 with a rarity score of 333.86 (Rarity Tools 2022b). However, the value of a token can be increased by branding the individual tokens (Economist 2021). Statistics in November 2022 illustrates total supply 9 998 tokens, 6412 owners, over 1 million Twitter followers, and about 160 thousand Discord members (NFT stats 2022). Year 2022 has been hard on cryptoart as the number of sales has decreased over 40 percent in a year due to the war in Ukraine. (NonFungible 2022a) In 2022, the BAYC collection is ranked as one of the largest with market capitalization (CryptoSlate 2022).

4.1.3 Sustainability

The BAYC is on the Ethereum blockchain, which has reduced their environmental impact as they have developed their blockchain technology to less energy consuming. The new proof-of-stake method is more low-carbon compared to the old PoW method, and therefore more sustainable way of working. (Ethereum 202b) For the responsibility aspect, BAYC has focused on future plans to ensure preservation of value and the growth of the income in the long term (Viitala & Jylhä 2019) by increasing its community and having new projects planned for the future. BAYC has also increased its sales throughout the years which is related to growth and ensures the value and financial responsibility for the owners. Social responsibility includes the safety, good operating practices and relationships with communities (Viitala & Jylhä 2019) and these are secured for BAYC by the secure blockchain and maintenance of relationships with communities with the help of utilities and communication. (Bored Ape Yacht Club 2022)

4.2 CryptoPunks

CryptoPunks is one of the first, and one of the most popular NFT collections and it consists of 10 000 unique collectibles in the Ethereum blockchain (NonFungible 2023b). The crypto art project was launched in 2017 and have been since then one of the inspirations of the ERC-721 standard and the modern cryptoart (NFT Stats 2022; CryptoPunks 2023). The collection was originally free for anybody that had an Ethereum wallet, and the collection was claimed fast. Currently, the collectibles must be purchased. (CryptoPunks 2023) The project has been called the cryptoart movement as two software developers tested, if a meaningful ownership feeling could be created with a code, they made that generated the characters. (Trautman 2021)

4.2.1 CryptoPunks Business model

CryptoPunks follow Figure 6. NFT Business Model (Patel 2022) which demonstrated the general idea of how NFTs work. The first segment, digital collectibles, for CryptoPunks are digital art collectible of 10 000 unique tokens with restricted commercial rights. The second segment, robust communities, as CryptoPunks are one of the first successful projects they have gained a strong community from the start. (Parmar 2023) The used platforms for communicating with the community are Twitter and Discord (CryptoPunks 2023). Proven experience is reflected from the strong community and CryptoPunks have created a reliable image and as for securing personal information the chosen aspects presented in Figure 7. NFT Marketplace Business Model (Patel 2022) explained this further.

The successful strategy checkpoints are presented in Figure 7. NFT Marketplace Business Model (Patel 2022) and for CryptoPunks the chosen blockchain network is Ethereum, that works as a decentralized ledger (Parmar 2023). As for the token standard, CryptoPunks are not ERC-721 tokens as they were established before the ERC-721 standard. Hence CryptoPunks are a custom contract, which does not follow any standards. Moreover, as CryptoPunks pre-date also all third party NFT marketplaces they had to write the market for punk transactions on the Ethereum blockchain. In other words, the contract includes the

decentralized marketplace as it is built inside. The images of the punks have also later been included on the chain since they previously were stored as a cryptographic hash of the image on the Cryptopunks contract. Therefore, there are no fees, no risk from centralized authorities and there is not any reliance on other marketplaces. There are also other options, as CryptoPunks can be traded on OpenSea, if they are wrapped as ERC-721. (Larvalabs 2022) The NFT market type for CryptoPunks is open and non-curated as for purchasing CryptoPunks, Larva Labs website is currently the only possible purchase platform for the original tokens. There are no added fees charged by YugaLabs excluding gas fees charged by Ethereum. To get your own CryptoPunk NFT Metamask browser plugin needs to be installed that allows access to the Ethereum account for the websites. Then in the interface the punks can be bid on. There is a project, with long-term goals, for a new decentralized marketplace that is not built on a contract. This marketplace has no fees and there are no claims for shares of secondary sales to the creators. This project is truly decentralized and therefore there is no risks in regulations or censorships and will ensure decentralization. (Larvalabs 2022)

Regarding the collaboration model CryptoPunks have followed the Figure 8. Centralized Collaboration model (Lee 2021a), because as they have adopted the centralized collaboration model as they have not previously granted the buyers any commercial rights, which is a big contrast to the BAYC unlimited model. The limited license they adopted provided rights for specific commercial usages with restrictions. (Lee 2021a; Colicev 2022) CryptoPunks collection license had confusion as when the collection was first published there was not any detailed license to share (Lee 2021b). The rights were to “use, copy, and display the Art for your purchased NFTs for the purpose of commercializing your own merchandise” with an annual cap of $100 000 dollars. In addition, this license does not give any rights for derivative works, usage in third party advertising, hate speeches, commercial movies or media, exceed the annual cap, attempt to trademark/copyright/or acquire some other way additional intellectual property rights, and other commercialization of the purchased art. (Lee 2021b) Benefit from this model is that it has not the risk of misuse of the product. However, it does not have the same power to more innovative ecosystem as for example BAYC has (Lee 2021a; Colicev 2022; CryptoPunks 2023). Recently, Yuga Labs, the inventors of BAYC, acquired the IP of CryptoPunks from Larva Labs and are planning to give the

community the same rights as BAYC have given which includes commercial rights. (Yuga Labs 2022; Matney 2022)

CryptoPunks community gives abundant amount of importance in their NFT ranking the attribute count. Using Rarity Tools CryptoPunks collections rarest token is CryptoPunk #8348 with the rarity score 10342.68. As the importance of attribute count in rarity scoring, the rarest token has an attribute count of 7. Usually, the attribute count is not considered as an important factor in evaluating the rarity of an NFT. (Rarity Tools 2022c)

4.2.2 CryptoPunks marketing mix

CryptoPunks marketing mix is presented below.

Product	Price	Place	Promotion	People	Process	Physical Evidence	Sustainability
10 000 NFTs Art Ethereum blockchain 24 x 24 size pixel art Custom contract Rare features Newness	Initially free High pricing	Larva Labs Own marketplace	Twitter Discord Celebrity marketing?	Team of two	Business model Technology	Own website NonFungible.com Ownership PFP One of the first projects Design	New marketplace project New owner

Figure 12. CryptoPunks marketing mix

The “product” is virtual crypto art, unique NFT collection of 10 000 pieces in the Ethereum blockchain. CryptoPunks are generated algorithmically and are 24x24 size pixel art images and they have a custom contract that does not comply with any standards. The images have different attributes and unique combinations of faces, even including alien, ape and a zombie (Loi & Tang 2022). The London punk movement of the 1970s inspired the CryptoPunks NFT collection (Trautman 2021) and many NFT projects have used CryptoPunks as inspiration (Parmar 2023). CryptoPunks NFT project was one of the first and got the early advantage and as it had an impact for the NFT market development. Therefore, the newness of the NFT market and this new NFT collection created value for the customers as there were no previous similar offerings available (Osterwalder & Pigneur 2010). Also, the art has been widely used as profile images which increases the influence. (Larvalabs 2022; Colicev 2022) The project became popular as people were afraid of missing out as the project got attention

in different social media platforms (Parmar 2023). Besides the art, the creators have stated that the collection allows people to express themselves with the art. The collection is widely desired as in the digital world there is huge value being the original NFT project. Therefore this project has maintained its popularity. (Jennings 2023)

CryptoPunks collection has the full NFT rights of the ownership and therefore, the consumers cannot use the NFT in own projects (Colicev 2022). As for the announcement of Yuga Labs acquiring CryptoPunks has not yet made any changes, however Yuga Labs have stated they want to give wider rights. This announcement increased investors confidence about the project and hence, the prices got higher. (Jennings 2023)

First, the collection could be acquired free whoever had an Ethereum wallet, however in 2021, when the NFT market expanded, the prices rose and the secondary market value increased. In March 2023 the lowest selling price for a NFT was 65.49 ETH (96,183.86 dollars) and the average bid of 2022 was 86,52 ETH (127,069.25 dollars). Statistics in March 2023: highest all-time sale 24 million dollars and in a year the number of sales has gone down around 27 percent (NonFungible 2023b). There are currently 3650 owners and a total supply of 9998 tokens (NFT Stats 2022). Value of sales all time is over 2 billion dollars (Larvalabs 2022). The prices being high is reflected from the fact that CryptoPunks was one of the first NFT projects and therefore, they are mostly on top of different statistics. The prices between CryptoPunks depend on their attributes and the rarity. (Jennings 2023).

The whole collection can be seen on Larva Labs website with their own page (Trautman 2021). The collection can also be seen on OpenSea, however the only place to purchase the collection is Larva Labs' own website by using a meta wallet. Larva Labs has an alternative for this as their project to establish a new platform. However, as explained in the business model, if stored as ERC-721 the collection can be traded in OpenSea. (Larva Labs 2022)

Communication channels used and the number of followers in May 2023 for promotion is listed in table Table 2. CryptoPunks marketing channel. CryptoPunks relies on the two most popular social networks for NFTs in their communication, Twitter and Discord. These channels have straight links on their website. Discord channel is used for interaction by

chatting with the developers and other CryptoPunk owners. The Discord chat has approximately 77 thousand members. This is the main source for information, new announcements and interaction with the project developers. (CryptoPunks 2023; CryptoPunks [Discord] 2023) They have also a Twitter account with over 280 thousand followers and 1690 tweets. The tweets consist of collaborations, announcements, and retweets. (CryptoPunks [Twitter] 2023) Besides Discord and Twitter there are no announced other official sites for the CryptoPunks collection (CryptoPunks 2023)

Table 2. CryptoPunks marketing channel followers (CryptoPunks 2023)

CryptoPunks	Followers
Twitter	288 t
Discord	77 t

The team behind the project includes two persons, Matt Hall and John Watkinson, technologists with experience of many softwares (Larvalabs 2022; Colicev 2022). They had gained knowledge from previous projects, which helped them create CryptoPunks (Jennings 2023). The process includes the chosen business model and technology and how is it seen for the customers. The team has improved processes according to the technology development and made improvements. As CryptoPunks was one of the first NFT projects and got the hype, they have got successful on the PFPs field, and maintained strong physical evidence. Owners have used their NFTs as profile pictures in different social networks, which has increased awareness, brand attachment and helped the collection to get credibility. (Casale-Brunet et al. 2022) Moreover, NonFungible and other databases provide physical evidence what are statistics of the project and how is it compared to other projects (NonFungible 2022a).

4.2.3 Sustainability

CryptoPunks is also on the Ethereum blockchain as BAYC, which has decreased their environmental impact (Ethereum 2023a). Larvalabs have plans for sustainable financing as

they have started a new marketplace project to ensure decentralized environment and a zero-free interaction with the NFTs. This gives sustainable opportunity for consumers and ensures the future. In addition, Yuga Labs have acquired CryptoPunks, there are new future opportunities, which gives investors hope for financial responsibility. There is not anything else mentioned in the aspect of sustainability on the website. (Larvalabs 2022)

4.3 Doodles

Doodles is an NFT art project in the Ethereum blockchain with the collection of 10 000 NFTs with individual traits. The collection was launched in October 2021 and the art is designed by Burnt Toast, and art is hand-drawn. (Doodles 2023) From the launch Doodles has maintained as one of the most influential NFT endeavours (Langston 203).

4.3.1 Doodles Business model

Doodles business model also has followed the four segments of Figure 6. NFT Business Model (Patel 2022). The digital collectible for Doodles, is a digital art collection of 10 000 NFTs with restricted rights (Doodles 2023). Doodles was launched at the year of NFT boom and their community has since been strong. The proven experience is increased as Doodles have stated in their website their vision and general guidelines. The vision includes bringing joy worldwide by their NFTs, and to achieve this goal increasing interest towards the collection needs to be fostered. The three main areas of their vision to focus on are Doodlebank, partnerships and product. Doodlebank is a community treasury to sustain funds for Doodles owners and for future projects. For Doodlebank they have hired some Doodles collectors who are passionate to build the community and help with the marketing. Partnerships with retailers, studios, platforms and IPs are utilised to increase awareness and interest towards the brand. Product includes the whole experience in the blockchain for collectors and the goal is to make it the most positive experience. (Doodles 2023) Doodles business model has taken the community centered vision to a next level, by letting their

collectors participate on decisions. Decisions in Doodlebank work with giving one vote to one Doodle owner, and with this vote an owner can contribute to decisions made for new proposals regarding to the Doodles ecosystem. For example, there has been votes about team scaling, live events etc. (Langston 2023)

Doodles checklist for Figure 7. NFT Marketplace Business Model (Patel 2022) starts by the blockchain network, which is Ethereum, and the token standard is ERC-721. The NFT market type is open and non-curated as the collection can be traded in OpenSea and the collection can be bought by connecting a wallet. (Doodles 2023).

Doodles rely on Figure 8. Centralized Collaboration model (Lee 2021a) as Doodles' terms of service, for Doodles minted on the Ethereum blockchain before May 15th 2022, inclines the Doodles team owns the name and intellectual property involved in the Doodles NFT project and all that is not granted specifically to the collectors. By purchasing a Doodles NFT, the buyer has the right to show it off, sell it and merchandise it up to 100 000 dollars. If desiring to merchandise over $100 000, the buyer can reach out to the team for making a licensing deal. They offer limited commercial rights as buyer can use the image in its fullness only, not using individual layers or other projects utilizing their creation, and the limited sales amount, and Doodles cannot be used in any harmful material. The terms of service also clearly states that there are no guarantees or future promises related to benefits and, that Doodles are not intended as investments as they are collectable NFTs. Therefore, there is no promises of the worth. Moreover, the buyer is responsible of taxes and the buyer must be over 18 as the Doodles are not targeted for children. (Doodles 2023)

From the start Doodles have been community-centered with making their roadmap collaborative by voting rights for collectors (Langston 2023). Value is given to collectors by giving exclusive experiences only for Doodle owners. Exclusive access is given for merchandise, latest products and different real-life events. Beyond these benefits, collectors can vote on community-driven features, products and events due to the goal of having a collaborative roadmap. To fund these experiences, The Doodlebank was created as a community treasury, which possesses over 5 million dollars. Doodlebank is used for Doodles holders to propose for different ways for where to use the funds. (Doodles 2023)

Beyond the NFT world Doodles are ambitious about extending to the real world from the blockchain as becoming a comprehensive web3 entertainment company. Web3 is a decentralized internet with a new idea of World Wide Web. Doodles team have created in-person events by partnerships. For example, in December 2021 they partnered with another NFT project, The Heart Project, to organize an extensive event with live music, gallery, merchandise etc. (Langston 2023) In addition to live events, Doodles announced in January 2023 in Twitter that they acquired an award winning animation studio, Golden Wolf, which is a step to expand their franchise (Doodles [Twitter] 2023a).

Top sales all time in March 2023 on NonFungible for Doodles is 763 thousand dollars for an alien Doodles. Other highest sales include ape, skeleton and a cat Doodles. Value of all time sales is 635 million dollars. (NonFungible 2023c) Currently, there are 5454 Doodles owners. Rarity Tools has ranked Doodle #2912 as the rarest with the rarity score 14546.06. The highest rarity scores about traits got the gold space background and the gold alien feature. (Rarity Tools 2023)

4.3.2 Doodles marketing mix

Doodles marketing mix is presented below.

Product	Price	Place	Promotion	People	Process	Physical Evidence	Sustainability
10 000 NFTs	High pricing	Opensea	Exclusive experiences	Community	Roadmap	Positive experie	Responsible funding
Art		Real-life	Twitter	Team of 3	Doodlebank	Ownership	Sustainable future
ERC-721		Ethereum	YouTube	Celebrity	Business model	Brand	
Ethereum blockchain			Instagram		Technology	NonFungible	
Blockchain experience			Discord		Collaborative	Design	
Branding							

Figure 13. Doodles marketing mix

The product of Doodles is stated to be the whole experience in the blockchain, and the goal is to make it welcoming. The collection is 10 000 NFTs in the Ethereum blockchain and the art is line-drawn characters that are colourful (Langston 2023) and hand-drawn. Besides this virtual collection Doodles website also sells physical merchandise of Doodles such as

clothes and accessories and other utilities. The NFT collection includes rare features that are also presented in Doodles website. These special features include special faces, heads and customs, and the amount of these are presented. Special faces include ducks, sharks, dinos and Puffer-up Doodles. Special heads include coffees, rainbows, devils etc. and customs include aliens, cats, doodle mascots, skellys and apes. (Doodles 2023)

During the launch in 2021 the pricing was 0.123 ETH per mint, which was considered high pricing during the time. The pricing was set higher to ensure an initial treasury for their Doodlebank. (Langston 2023) For the place, since the goal has been to expand to the real world in addition to the virtual, Doodles, has created several pop-up shops, with limited-edition merchandise for Doodles owners. (Alcantara 2022) And for the digital collection purchase they can be traded in OpenSea (Doodles 2023).

Doodles marketing channels used, and their followers in May 2023 are presented in Table 3. Doodles marketing channels followers (Doodles 2023). Doodles joined YouTube on 14 March 2022 and in May 2023 have only two videos in the channel. They have a Doodles 2 NFT trailer and a Doodles introduction video for The Stuudio, and these two videos have approximately 120 thousand views. (Doodles [YouTube] 2023) Doodles have also an Instagram channel thedoodles with approximately 85 thousand followers and 26 Instagram posts (Doodles 2023 [Instagram]). The most followers are in Twitter with approximately 400 thousand. Doodles joined this channel in June 2021 and have over 2500 tweets. This channel is used for informative tweets, showing the art and retweeting collectors tweets. (Doodles [Twitter] 2023b)

Table 3. Doodles marketing channels followers (Doodles 2023)

Doodles	Followers
Twitter	400 t
YouTube	1 t
Instagram	85 t
Discord	86 t

Discord is also used as the main channel for communication and interacting with the collectors. However, in contrast to other NFT projects Doodles experimented a new strategy in Discord. One month after the project went live, and after the membership amount reached 1000, the team of Doodles closed the Discord to create exclusivity and no new member could join. By this, the member got access to the whitelist to get access buying the NFTs after launch. This experiment was risky, however it turned successful as the followers grew and this innovative tactic was valued. As soon as the collection was sold out, Discord was opened for everyone. (Langston 2023; Doodles [Discord] 2023) Celebrity marketing has been a strong strategy for Doodles. An American DJ, Steve Aoki, has published a video from a concert showing his Doodles NFT to the audience on his twitter account (Doodles [Twitter] 2023c)

People behind the Doodles collection are Evan Kreast, Scott Martin and Jordan Castro. Before the Doodles, Kreast and Castro were involved in the launch CryptoKitties, which was also a successful project. In addition, to the creators of Doodles, the team has been added new talent such as singer and songwriter/producer Pharrell Williams as Chief branding officer, and a former president of Billboard Julian Holguin as CEO. (Langston 2023)

Doodles have their vision and roadmap clearly introduced for all collectors and this process includes interaction and involvement from the Doodle collectors. The Doodle collectors can participate in the experience with ideas how to improve or develop the community. (Doodles 2023) The trust towards The Doodles project was increased as some of the creators had already been involved in a previous successful project which build trust towards collectors, and they have increased positive feedback about the project (Langston 2023). In addition, Doodles have clear websites and social media channels, therefore there is several ways to search information about the project (Doodles 2023). In addition to these NonFungible works as a good database for statistics for physical evidence (NonFungible 2022a).

4.3.3 Sustainability

Sustainability is presented in Doodles vision by stating that its necessary to be responsible with funds and to reduce financial risks. It is their goal to ensure sustainable funding with future plans and keeping up with the development. The founders have a great responsibility to ensure the future and improve the collecting experience. Doodles have many plans and projects under development which ensures future value and income for the owners. (Doodles 2023) Moreover, as Doodles is located also on the Ethereum blockchain it shares the same sustainability aspect as previously mentioned in the sustainability discussion of the other two projects.

The future seems bright for Doodles as the fundraise for Doodle in 2022 was a success and they have now the possibility of developing the franchise even further. Moreover, new projects are launched such as Doodles 2 which is going to be on Flow blockchain, which is another proof-of-stake blockchain. Another sector Doodles is going to conquer includes the music industry by their Doodles records with the help of Pharrell Williams. (Langston 2023)

5 Discussion and Conclusions

In this paper, a comprehensive review of NFTs was presented with focusing on the business model and marketing mix areas to find out the value proposition. Since there is limited amount of research on the subject of NFTs, and especially with a more specific studies, the aim of this paper was to reduce this research gab by bringing new input to the fore. NFTs have been in the market a small amount of time so there is still widely unknown topics.

There were three questions that this research was aiming to find answers. Next the findings are discussed in the following way. The first part discusses the findings linking to the research questions. First the discussion starts by answering the two sub questions in order to help identify the success factors of the main research question. The discussion includes findings of the analysis of the three NFT art projects, Bored Ape Yacht Club, CryptoPunks and Doodles. The second part is conclusions followed by the research limitations. The thesis ends on discussion of possible future research.

5.1 How is value proposition defined in related to Non-Fungible tokens?

The first sub question was about the value proposition in NFTs. This sub question helps to answer the main research question as the business models used by NFTs is related to how value is created for the end user. The aim was to find similarities and differences in value proposition between the three NFT art projects. The value proposition was analysed by using the 7P model (marketing mix) to help structure the findings, and to get a standardized method for the three projects. This model includes seven marketing variables, which are affected by the business's choices, and these choices can create value for customers, gain competitive advantage and satisfy customer's needs (Helmold 2020).

The summary of similarities and differences are presented below in Figure 14. Marketing Mix Findings. Basic competitive requirements will be fulfilled with the items presented in

the similarities part and potential differentiation factors which can be used as a competitive advantage are presented in the differences section. The differentiation factors can vary depending on the projects target markets and customer segments.

	Product	Price	Place	Promotion	People	Process	Physical Evidence	Sustainability
Similarities	Limited amount Ethereum blockchain Rarity	Currently high pricing	Ethereum Open and non-curated	Twitter Discord Celebrity marketing Community	Professional teams	Technology	Ownership Brand Design Data statistics Own website First projects	Future projects PoS Social value
Differences	Additional utilities Token standard Commercial rights	BAYC->original 0.08 ETH CryptoPunks-> original free	Marketplace	Youtube Instagram		Decentralized collaboration model Centralized collaboration model Collaborative		Responsible funding Roadmap

Figure 14. Marketing Mix Findings

By analysing the value proposition of NFTs by the marketing mix, the case projects had similarities and differences in the operations. The product of these NFT projects is combined by the NFT digital art, the brand and other utilities and intellectual property rights. In addition to the product itself, the overall image and the brand increases the attractiveness towards the projects (Viitala & Jylhä 2014). NFTs have connected the virtual and real world and created new innovations for companies and consumers. Some of the analysed projects have utilized this opportunity and created added value for the owners through virtual and real-life offerings. All three analysed NFT art projects had a limited collection of 10 000 NFTs, all unique and on Ethereum blockchain. The collection of 10 000 tokens gives the experience of collecting exclusive NFTs as there are not enough tokens for everybody (Casale-Brunet et al. 2022). The limited collection increases the social value as people want to belong to a group. Regarding to token standards, BAYC and Doodles collections are ERC-721 tokens, and CryptoPunks has an own contract with no standards.

The importance of utilities varies depending on the case projects. BAYC and Doodles have extra utilities in real-life such as events and concerts, and also in the form of physical products. CryptoPunks website does not include information about members' utilities. Referencing to the rights included in the ownership, BAYC is the only project chosen in this research that gives full commercial rights to the buyer of an NFT. Doodles and CryptoPunks provide only restricted commercial rights to the buyer. Moreover, the art is usually unique and there is no other similar piece of art available. This unique piece of art has different

value depending on the rarity of certain objects. As the rarity is an important factor on determining the value (Kapferer 2012), there has been built many tools to analyse different tokens rarity. This research analysed the rarest tokens of each collection by using Rarity tools. The rarity and therefore the value is increased by different attributes for example hats, clothes, or alien body. All projects have used rare features in their collection. The case projects have had extra utilities, however there is an increased shift to focusing more on being in the pace of development by having additional projects to gain interest.

BAYC is the only project in this research, which has adopted the decentralized collaboration model with unlimited commercial rights. And according to the statistics provided by NonFungible, BAYC business model has been one of the most successful as BAYC is one of the most popular NFT projects currently (Boom 2022). Therefore, the importance of social media and communities are essential to be successful in this business, and granting full commercial rights may be seen as an advantage. In the value proposition of NFTs it is important to acknowledge that NFT art is not valuable just on its own, but value is created by other commodities which owning of the art brings. These commodities can include real-life events, merchandise, social acceptance and other exclusive benefits. Therefore, owning an NFT can be compared to a membership that gives you exclusive access to other utilities. In the social context everybody wants to be accepted and feel like they belong to a group. It is similar in the NFT market, and the buyers want to belong to the community.

BAYC has been most discussed related to exclusive and luxurious membership utilities such as high-level real-life events with many celebrities. The art of the collectible is used as profile pictures of many and the art has been used in other commercial purpose as there has been granted full rights for the art owners. Doodles has had similar events and exclusive utilities, however not in the same context as BAYC. However, Doodles is moving more to the real-life with their strategy by increasing their influence in the entertainment industry by new business acquisitions. Furthermore, Doodles have adopted the co-creation model, where buyers get to participate more in the project`s future and therefore have the opportunity to make an impact. CryptoPunks has not stated in their website any utilities in addition to the purchase of an NFT. All projects are popular in the PFP field and have gained awareness because of it.

In general, NFT art token has value as it is a prove of ownership with secure digital technology in the blockchain. Therefore, the choice of the used blockchain is critical as buyers evaluate the security and other aspects based on the blockchain and the marketplace used. All three evaluated projects are on the Ethereum blockchain and all are in some way available on the marketplace OpenSea. Therefore, NFT market type for all projects is open and non-curated. All projects have own website pages, which increases the physical evidence for the consumer as there is available information about the projects. When examining value, one should not forget that value is also created by the profitability of the project and purchase, i.e. money. If the project has no future plans, it is difficult to estimate whether the value will remain or increase. All the projects reviewed in this study had some plans for the future and this can be seen as responsible financing.

It is good to remember that all of these three projects were the first ones that hit the success. CryptoPunks was the first and therefore gained from the start a strong community and success even though not having additional exclusive utilities as much as other projects. BAYC and Doodles were created during corona pandemic in 2021 when the NFT market boomed and therefore these projects were also considered as the early starters. BAYC and Doodles have strong social media coverage and are certainly gained a strong community with membership utilities. Communities are essential in NFT value creation as it increases the projects future potentiality and success (Patel 2022). All projects have increased awareness and sales by celebrity ownership and marketing. Therefore, having collaborations and celebrities buying the product gives value to the project, as consumers want to follow celebrities. In addition, all projects have Twitter and Discord as main social platforms for promotion and communication. BAYC and Doodles have also YouTube and Instagram, however only BAYC Instagram popularity has been profitable from these in terms of the follower amount.

To conclude, the value proposition starts with the strategy selection. From empirical research it seems to be a good strategy to provide owners with the experience of collecting unique NFT art and all example projects have set the number of collectibles as limited amount of 10 000. The attractiveness of the NFT project can be seen increased by combining the virtual and the real world, for example by creating a membership-like feeling. Real world utilities can include exclusive opportunities to owners such as concerts, parties and merchandise.

The value of NFT digital art itself can be said to be increased by the rare characteristics of an individual NFT. Differences were found in the granting of ownership and commercial rights in connection with the purchase. BAYC currently gives full commercial rights to the buyer, which enables NFT to be used more freely, while other projects only give limited rights. Furthermore, it can also be seen that the big value creator is the community, because all the reviewed projects have high focus on the community building. Of course, this has been influenced by the fact that the projects under review were one of the firsts in the NFT art market and, hence they may have gained the charm of novelty.

Based on empirical research, it can be assumed that Twitter and Discord seem to be the most important social media channels for NFT projects. These two social media channels are great for advertising the collection, giving announcements, growing the community and maintaining customer relationships. Other channels can be seen as a positive thing; however the maintenance requires more human resources. More value can be gained by utilization of social value. When a brand is well-known, consumers want to show that they own the product of that brand, and in the world of NFT art, a good way to present the ownership is to use NFT as a profile picture. All examined NFT projects are popular in the profile picture field (PFP). Future projects have value because investors evaluate how their investment may turn out in the future. It seems that responsible financing is secured by continuous growth and returns for owners. With this, it is important to be involved in continuous development.

5.2 What is the role of sustainability in Non-Fungible token business models?

The second sub question was about the role of sustainability in NFT business models. This aspect was critical to analyse as the energy consumption and environmental impacts have been discussed recently related to NFTs and cryptocurrencies (Fadeyi et al. 2020; Calma 2021). In addition, sustainability is a current topic and cannot be ignored. Sustainability was analysed based on the three NFT projects and is dependent on the information they produce. The study examined sustainability as a whole, taking into account the social, governmental and environmental perspectives. Sustainability is an important aspect to be considered in

order to have credible, future proof for roadmap. However, sustainability`s weight in the case projects' websites was low.

The case projects use the Ethereum blockchain, which currently uses a lower emission PoS model (Ethereum 2023b). Earlier Ethereum blockchain relied on the PoW consensus mechanism, which had higher energy consumption (Ethereum 2022). Although the blockchain has moved to a new model, this does not eliminate the high energy consumption. New more sustainable blockchains are constantly being developed, however it should be remembered that this technology requires a lot of multi-computer backup to guarantee security.

Sustainability is seen in NFT business models in the chosen blockchain, future plans and social wellbeing. Ensuring value, growth and financial stability is important for financial responsibility as the owners are looking for profitable investments (Viitala & Jylhä 2019). All three projects have future plans and new projects under development, and all three projects have increased their sales through the years. This indicates that the three projects have had business models that increase value. Moreover, the social value is increased by focusing on the communities and other utilities that the brand has to offer. However, sustainability is not yet discussed enough on NFT projects' websites and there is not that much previous literature about the combination of economic, social and environmental aspects with clear applications.

The effects of the environment come to the fore in NFT projects with the choice of blockchain, since the technology determines how much energy is consumed in transactions. This depends on the development of the technology and the energy usage compensation mechanisms. Ethereum takes an emission fee in connection with trading and has also moved to a lower emission PoS model. However, very little information is available from an environmental perspective, and this is certainly something that needs to be researched further.

5.3 What are the success factors in Non-Fungible token business models?

The main research question was about the success factors of the business models in NFTs. Success factors in this study meant the factors that the business must achieve in order to reach its goals. With the help of more detailed sub questions there is better understanding of the success factors in NFT business models. Business models includes value proposition as it is one of the main attributes that a business must consider (Zott et al 2011). By studying the business models, the differences and similarities of creating value can be recognized (Andreassed et al. 2018) Sustainability is one of the most scrutinized topics in our society and new solutions are constantly being invented and considered. Thus, sustainability is analysed if it has a role in the success factors of NFT business models.

The case projects were all successful and one of the most popular on NFT art market. Based on the research, it seems that success factors in NFT business models depend to a large extent on the value proposition. This, in turn, is influenced by several factors, the entire experience from the product to the company and the relationship between the consumer and the team behind the business. By combining the virtual and the real world, added value is created for the self-purchased NFT and makes the owner more commit to the brand. Success factors are influenced by clear plans and their transparent communication. The co-creation model, where the owners get to influence future projects, has also started to gain added value. When purchasing an NFT, one also buys a membership, which grants for other exclusive utilities that increases the interest of others. This phenomenon is related to the social value people experience and has great value in the business models.

In general, NFTs have brought new innovations to business models and created new possibilities to create value for businesses (Andreassen et al. 2018). NFTs have improved the ownership method by providing more flexible rights to consumers and transparency by their technology. From the fast and increased billion-dollar business it is still going on strong even though the volatility of uncertainty is around. NFT art has been utilized by artists, companies and celebrities and it has brought new collaborations and a lot of money. NFT authenticity is valuable, and this is possible due to the blockchain technology behind them (Popescu 2021).

Success factors include the newness effect, where the projects are one of the firsts in the market, there are no other similar collection available, and people want to jump on to it. It seems that the analysed projects had the advantage of being the first ones in the market and gained a strong community, which takes them further. All three case projects evaluated were some of the first ones to be launched, CryptoPunks being launched in 2017, BAYC and Doodles in 2021. As the market boomed in 2021 (Zhang 2022), this benefitted the early adopters by giving them wide attention, and this can be seen as one of the factors leading these projects to succeed. However, the success is not maintained without clear future prospects stated in the project websites in their roadmaps. The secondary market of the projects create value for the buyer as they value a clear strategy on how to ensure worth in the future. Therefore, the goal for the projects is to ensure the continuous operation and giving future expectations for collectors.

The right choice of channels for customers relationships is important in business models (Osterwalder & Pigneur 2010). As the empirical evidence prove, there is a high importance of building a community for NFT projects, especially using Twitter and Discord. These two social media channels have clearly an importance in the NFT market and utilizing these there may be a better possibility to succeed. Focusing on the positive brand image and attracting celebrities attracts consumers. The success factors in NFT business models are the limited digital art collection which ensures the exclusivity and collectible experience, the given authenticity and ownership by the blockchain selected, ensuring better financials, building a strong community by highlighting the social value and having other utilities given. In addition, from the empirical research giving other exclusive benefits only for members including real-life events and giving the proof of authenticity and ownership by secure technology can be seen as success factors. These benefits can be seen as competitive advantage. Other success factors seem to be building a strong community and maintaining the hype by improving and developing the brand and business further with future plans, utilizing collaborations and celebrity marketing as well as giving commercial rights to increase the total value. Overall, the biggest value creation can be argued to be the whole product experience, strong community and the brand. Competitive advantage may be gained by technology development and improving security.

5.4 Conclusions

The aim of the study was to explore the NFT business and to identify the success factors in NFT business models, while focusing on digital art, value creation and sustainability. Research questions were compiled in order to reduce the gap in the existing research, to which answers were sought with the support of previous studies and theories, as well as empirical analysis using the case study method. This paper started by introducing business models, the marketing mix and following by NFT description, NFT business models and NFT marketing mix. With this ground information, the paper analysed three different NFT projects with the same perspectives. The NFT projects analysed were BAYC, CryptoPunks and Doodles, and these were chosen by utilizing different databases. These projects were analysed by content analysis method describing their business models, marketing mix and sustainability using various sources, however mainly from their own website pages and different publications.

The research was conducted as qualitative and using previous literature and focusing on a case study to gain more detailed findings. To strengthen the validity and reliability of the research, the aim was to describe the process and methodology as clearly as possible. Moreover, efforts have been made to justify these choices. Case study method was used, as the study was concerning contemporary set of events, which the researcher had no control over, and the use of this method had an advantage related to the research questions (Yin 2014). Theories were used as an aid to help the analysis, and to decrease the researcher's effect on the results (Tuomi & Sarajärvi 2018). The data was collected by documentation, and the material was carefully reviewed to ensure validity of the research. Qualitative research method, content analysis was used as it enabled a versatile examination of the data. It provided tools to understand the phenomenon and interpretation of the findings. Data was analysed by grouping the material into different themes, which made going through the material more systematic, easier to go through and combine the findings by synthesis. In data analysis figures and tables were utilized when necessary to make the data into a simple form.

The implementation of the research was successful, and the research provided answers to the research questions. This study increased the understanding of NFT business, its value proposition and the role of sustainability, and provided empirical research on NFT art projects. As a result of the research, the basics of NFT value creation were found. Value is created by the NFT itself and its additional features which include the intellectual property rights and other utilities. The value is increased by choosing carefully a business model, which includes choices about the blockchain technology used, token standard, digital collectibles, NFT market type, the rights granted in connection with commercialization, growing the brand and focusing on building a strong community.

The findings of this research confirm the results and the findings of previous studies and bring more perspective to the matter. According to Popescu (2021) NFTs have provided new potential for entrepreneurs by possibilities for innovation, and this research confirms this as case study projects have utilized innovativeness for example by combining virtual and real world. Moreover, this research confirms the previous studies in relation to NFTs creating value by the proof of authenticity and digital scarcity (Li & Chen 2022), and NFT communities are in the centre of business models (Patel 2022). Value is increased by other utilities such as membership feeling (Colicev 2022), rarity (Kapferer 2012), social value (Casale-Brunet et al. 2022; Trautman 2021) and the chosen blockchain (Zarifis & Cheng 2022). This research identified success factors of NFT business models and provided contribution to previous NFT studies. Especially this research identified value propositions for NFT art projects with empirical research. Moreover, this research analysed NFT projects' marketing mixes, which contributes to the previous marketing studies how value is created. In addition, this research provided new perspective on NFT business models by empirical research on NFT art projects. This research increased understanding of the role of sustainability in NFT business models, as it seen mainly in the blockchain used and its energy consumption (Majer 2022). Nevertheless, sustainability aspect needs more research as for now the empirical evidence is low.

Even though there are questions if the NFT boom will continue, there seems to be a bright future for the technology as it brings new innovations for ownership and transaction technology utilization as well as building a brand and improving marketing strategies.

However, there remains sustainability concerns as the sustainability of NFT business is dependent on the development of blockchains.

5.5 Limitations

This study had certain limitations in order to gain more detailed analysis. The limitations contained were the perspective, theories chosen, research methodology and case limitations. This study focused on NFT business models, their success factors, value creation and sustainability. It is good to be aware that, in general, little research has been done on the topic of NFT in the past and many topics have been left unexplored in more detail. Especially limited previous study from the business models and sustainability's involvement in more detailed view.

The main limitations of this study are described as follows. First, the research information and data are limited to the years 2017-2023 when the NFT market has been at its hottest. In general, the market is new and there is limited evidence, and this paper covers the years with most boomed projects. Secondly, the research analyses more deeply only three different successful NFT art projects, in order to have more detailed analysis on success factors. On the other hand, analysing only three projects leaves out other projects which may have different findings. The limitation of the chosen projects mean that the research focuses only on the biggest projects that are on the Ethereum blockchain, and to NFT art category, as there is more evidence available regarding these. Also, it affects that smaller projects have been cut off, other NFT categories are not studied in detail and projects from other blockchains are left out. Nevertheless, in general, information can be replicated in other studies or projects, because the underlying idea is the same.

Thirdly, the topics examined were business models and value creation, using the marketing mix as an aid. Other topics outside of these remained under scrutiny. The data was collected from publicly available sources using documentation, which means that other evidence sources were not used, for example interviews. Using documentation as an only source, one

must remember to critically interpret the results when these are based on prior existing studies. Due to these limitations, future research topics rise.

5.6 Future research

NFTs are still relatively new business and constantly bring new findings and innovations. There are many topics that have not yet been studied in detail. And as this study focused on NFT digital art, future research should study also other forms of NFTs. In addition, this study focused on successful NFT art projects on the Ethereum blockchain, so other blockchains and new NFT projects should be studied further. There could be analysis of different NFT projects from different blockchains and different categories to analyse further the business model differences. Even though this study researched business models, business model canvas was left out from empirical review as this study focused more on the value proposition and success factors of business models. Hence, using business model canvas in NFT case study analysis could give interesting findings.

Future research should investigate more on the sustainable impact NFTs have on the environment as well as social and financial perspectives. There is currently limited amount of research focusing on sustainability, mainly the energy consumption is somehow discussed, however this aspect should be more widely reviewed. In the future, it would be beneficial to research more about the business models for NFTs and the marketing strategies. Moreover, as the NFT market is changing rapidly the research could focus on the volatile markets and as in the future more data is available, the previous published research should be complemented. It would be interesting to see the different ways to utilize NFTs in the future beyond the focus on cryptoart, for example the utilization purposes for businesses, governments etc. As more NFT art projects have goals of combining the virtual and the real world, the phenomenon of this crossover in NFT projects' roadmaps should be researched to see what the contribution is.

References

Aaltio-Marjosola, Iiris. 1999. Casetutkimus metodisena lähestymistapana. www.metodix.com. Menetelmäartikkelit

Alasuutari, P. 2011. Laadullinen tutkimus 2.0. Tampere: Vastapaino.

Alcantara, A. 2022. Web3 Brands try serving customers in the real world. Accessed 26 March 2023. Available at the https://www.wsj.com/articles/web3-brands-try-serving-customers-in-the-real-world-11660859766

Allen, T. F. H. & Hoekstra, T. W. 1993. Toward a definition of sustainability. Sustainable ecological systems: implementing an ecological approach to land management. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, pp. 98-107.

Andreassed, T., Lervik-Olsen, L., Snyder, H., Riel, Allard., Sweeney, J. & Vaerenbergh, Y. 2018. Business model innovation and value creation: the triadic way. Journal of Service Management, Vol. 29, no. 5.

Ante, L. 2021a. Non-fungible token (NFT) markets on the Ethereum blockchain: Temporal development, cointegration and interrelations. Available at SSRN 3904683.

Ante, L. 2021b. The non-fungible token (NFT) market and its relationship with Bitcoin and Ethereum. Available at the SSRN 3861106.

Baden Fuller, C. et al. 2015. Business models and modelling. 1st ed. Bingley, England: Emerald.

Beqiri, G., Sadiku-Dushi, N. & Beqiri, T. 2022. The Application of Non-Fungible Token (NFT) in Marketing. Gestion 2000, Vol. 39, no. 3, pp. 89-106.

Beyer, E. 2022. Cryptocurrency and NFTs: What`s the Difference? Accessed 22 October 2022. Available at the https://nftnow.com/guides/cryptocurrency-and-nfts-whats-the-difference/

Birch, K. 2022. Top 10 NFT marketing initiatives by leading brands in 2021. Accessed 15 March 2022. Available at the https://businesschief.com/digital-strategy/top-10-nft-marketing-initiatives-leading-brands-2021

Bolt, W. & Van Oordt, M. 2020. On the value of virtual currencies. Journal of Money, Credit and Banking, Vol. 52, no. 4, pp. 835-862.

Boom, D. 2022. Bored Ape Yacht Club NFT. Accessed 22 January 2022. Available at the https://www.cnet.com/news/how-a-300k-bored-ape-yacht-club-nft-was-accidentally-sold-for-3k/

Bored Ape Yacht Club [@Boredapeyachtclub]. 2023. Instagram. Accessed 3 May 2023. Available at the https://www.instagram.com/boredapeyachtclub/?hl=fi

Bored Ape Yacht Club [@BoredApeYC]. 2023. Twitter. Accessed 3 May 2023. Available at the https://twitter.com/boredapeyc

Bored Ape Yacht Club. 2023. Discord. Accessed 3 May 2023. Available at the https://discord.com/invite/3P5K3dzgdB

Bsteh, S. & Vermeylen, P. D. F. 2021. From Painting to Pixel: Understanding NFT Artworks. Rotterdam: Universidad Erasmo. Disponible en formato digital aquí.

Calma, J. 2021. The climate controversy swirling around NFTs. The Verge, 15.

Casale-Brunet, S., Zichichi, M., Hutchinson, L., Mattavelli, M. & Ferretti, S. 2022. The impact of NFT profile pictures within social network communities. In Proceedings of the 2022 ACM Conference on Information Technology for Social Good. pp. 283-291.

Li, S. & Chen, Y. 2022 How non-fungible tokens empower business model innovation. Business horizons.

Chesbrough, H. 2007. Business model innovation: it's not just about technology anymore. Strategy & leadership, Vol. 35, no. 6, pp. 12-17.

Colicev, A. 2022. How can non-fungible tokens bring value to brands. International Journal of Research in Marketing, ISSN 0167-8116, https://doi.org/10.1016/j.ijresmar.2022.07.003.

CryptoSlate. 2022. Guide to the Bored Ape Yacht Club (BAYC) NFT ecosystem. Accessed 12 February 2023. Available at the https://cryptoslate.com/guide-to-the-bored-ape-yacht-club-bayc-nft-ecosystem/

CryptoPunks. 2023. CryptoPunks. Accessed 18 March 2023. Available at the https://cryptopunks.app/

CryptoPunks [@Cryptopunksnfts]. 2023. Twitter. Accessed 3 May 2023. Available at the https://twitter.com/cryptopunksnfts

CryptoPunks. 2023. Discord. Accessed 3 May 2023. Available at the https://discord.com/invite/tQp4pSE

D3 Network. 2022. Full Interview: Yuga Labs CEO on Bored Ape Yacht Club and the future of Web3. Youtube. Accessed 17 December 2022. Available at the https://www.YouTube.com/watch?v=Ehw2iM0A5H4

Dan, A. 2021. NFTs Reshape brand marketing in the creator economy. Accessed 15 March 2022. Available at the https://www.forbes.com/sites/avidan/2021/09/13/nfts-reshape-brand-marketing-in-the-creator-economy/?sh=2e033316da2d

Digimarkkinointi. 2022. Markkinoinnin kilpailukeinot. Accessed 27 February 2022. Available at the https://www.digimarkkinointi.fi/blogi/markkinoinnin-kilpailukeinot

Doodles. 2023. Doodles. Accessed 20 March 2023. Available at the https://doodles.app

Doodles [@thedoodles]. 2023. Instagram. Accessed 3 May 2023. Available at the https://www.instagram.com/thedoodles

Doodles [@doodles]. 2023a. Twitter. Accessed 3 May 2023. Available at the https://twitter.com/doodles/status/1617500427024482306?s=20&t=Zk7V9gAPnKrxS-XMWedXiw

Doodles [@doodles]. 2023b. Twitter. Accessed 3 May 2023. Available at the https://twitter.com/doodles

Doodles [@doodles]. 2023c. Twitter. Accessed 3 May 2023. Available at the https://twitter.com/steveaoki/status/1481082018238648323?s=20&t=H58IytWEKkXEosRMzFiGbQ

Doodles. 2023. Discord. Accessed 3 May 2023. Available at the https://discord.com/invite/doodles

Doodles. 2023. Youtube. Accessed 3 May 2023. Available at the https://www.youtube.com/@_thedoodles

Ethereum. 2023a. Intro to Ethereum. Accessed 10 April 2022. Available at the https://ethereum.org/en/developers/docs/intro-to-ethereum/

Ethereum. 2023b. PoS. Accessed 10 April 2022. Available at the https://ethereum.org/en/developers/docs/consensus-mechanisms/pos

Ethereum. 2023c. Ethereum`s energy expenditure. Accessed 6 May 2023. Available at the https://ethereum.org/en/energy-consumption/

Ethereum. 2023d. Environmental impacts NFTs. Accessed 6 May 2023. Available at the https://ethereum.org/en/nft/#environmental-impact-nfts

Ethereum. 2022. Proof-of-Work. Accessed 26 March 2022. Available at the https://ethereum.org/en/developers/docs/consensus-mechanisms/pow/

Fadeyi, O., Krejcar, O., Maresova, P., Kuca, K., Brida, P. & Selamat, A. 2020. Opinions on sustainability of smart cities in the context of energy challenges posed by cryptocurrency mining. Sustainability, Vol. 12, no. 1, pp. 169.

Ferretti, S. & D'Angelo, G. 2020. On the Ethereum blockchain structure: A complex networks theory perspective. Concurrency and Computation: Practice and Experience, Vol. 32, no. 12, e5493.

Finanssivalvonta. 2019. Mitä tarkoittaa virtuaalivaluutta, kryptovaluutta, kryptovara, ICO tai lompakkopalvelu? Accessed 6 February 2022. Available at the https://www.finanssivalvonta.fi/kuluttajansuoja/virtuaalivaluutat/

Freudenreich, B., Ludeke-Freund, F. & Schaltegger, S. 2019. A Stakeholder Theory Perspective on Business Models: Value Creation for Sustainability. Journal of business ethics. Vol. 166, no. 1, pp. 3–18.

Garg, S. & Sharma, V. 2017. Green marketing: An emerging approach to sustainable development. International Journal of Applied Agricultural Research, Vol. 12, no. 2, pp. 177-184.

Helmold, M. 2022. Marketing Mix. In: Performance Excellence in Marketing, Sales and Pricing. Management for Professionals. Springer, Cham. https://doi-org.ezproxy.cc.lut.fi/10.1007/978-3-031-10097-0_9

Hennink, M., Hutter, I. & Bailey, A. 2020. Qualitative research methods. Sage.

Herrera, P. 2022. Dapp Industry report-February 2022. Accessed 15 March 2022. Available at the https://dappradar.com/blog/dapp-industry-report-february-2022#nft-adoption

Hissong, S. 2021. How four NFT novices created a Billion-Dollar ecosystem of cartoon apes. Accessed 18 December 2021. Available at the https://www.rollingstone.com/culture/culture-news/bayc-bored-ape-yacht-club-nft-interview-1250461/

Hofstetter, R., Bellis, E., Brandes, L., Clegg, M., Lamberton, C., Reibstein, D., Rohlfsen, F., Schmitt, B. & Zhang, J. 2022. Crypto-marketing: how non-fungible tokens (NFTs) challenge traditional marketing. Marketing Letters, Springer, Vol. 33, no. 4, pp. 705-711.

IBM. 2022. What are smart contracts on blockchain? Accessed 14 September 2022. Available at the https://www.ibm.com/topics/smart-contracts

Ionos. 2023. NFT Domain: a new generation of domains. Accessed 16 April 2023. Available at the https://www.ionos.com/digitalguide/domains/domain-news/nft-domains/

Jennings, P. 2023. CryptoPunks project details and price analysis. Accessed 16 April 2023. Available at the https://www.business2community.com/nft/cryptopunks

Joyce, A. & Paquin, R. L. 2016. The triple layered business model canvas: A tool to design more sustainable business models. Journal of cleaner production, Vol. 135, pp. 1474-1486.

Kapferer, J. 2012. Abundant rarity: The key to luxury growth. Business Horizons, Elsevier, Vol. 55, no. 5.

Kapoor, A., Guhathakurta, D., Mathur, M., Yadav, R., Gupta, M. & Kumaraguru, P. 2022. TweetBoost: Influence of Social Media on NFT Valuation.

KINGSHIP. 2022. Accessed 18 December 2022. Available at the https://www.kingship.io/

Langston, T. 2023. Nft Now: The ultimate guide to Doodles NFTs: everything you need to know. Accessed 25 March 2023. Available at the https://nftnow.com/guides/doodles-guide/

Larvalabs. 2022. CryptoPunks. Accessed 19 November 2022. Available at the https://www.larvalabs.com/cryptopunks

Lee, E. 2021a. The Bored Ape Business Model: Decentralized Collaboration via Blockchain and NFTs. Available at SSRN 3963881.

Lee, E. 2021b. The Cryptic Case of the CryptoPunks Licences: The mystery over the licenses for CryptoPunks NFTs. Available at SSRN 3978963.

Livni, E. 2021. Can Crypto go green? Accessed 6 February 2022. Available at the https://www.nytimes.com/2021/10/10/business/dealbook/crypto-climate.html

Loi. F. & Tang, K. 2022. Physical appearance and nonfungible token pricing: evidence from Cryptopunks. Accessed 18 March 2023. Available at the https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4202168

Londhe, B. 2014. Marketing mix for next generation marketing. Procedia Economics and Finance, Vol. 11, pp. 335-340.

Majer, A. 2022. The Carbon footprint of NFTs: Not all blockchains are created equal. The Linux Foundation.

Massa, L., & Tucci, C. L. 2013. Business model innovation. The Oxford handbook of innovation management, Vol. 20, no. 18, pp. 420-441.

Matney, L. 2022. Bored Apes maker Yuga Labs acquires CryptoPunks NFT collection. Accessed 11 December 2022. Available at the https://techcrunch.com/2022/03/11/bored-apes-maker-yuga-labs-acquires-cryptopunks-nft-collection/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guc

e_referrer_sig=AQAAACpz7_8u0nZc2bDp0ARfaohHqtwB-fst8Ewn64F9RC1IFJAUZBaPeY5YsH5g-r1eoqSEnD0xqkUU82IumnfqqgMAiiX7viMStKiZ_bddu1l-ahwsoLVw4DetF2aBmGGwyvUEuO2-8dZhfsr841xXSVLUdvEM0iSbjD1MwkM2wPcc

Memo Akten. 2021. The unreasonable ecological cost of cryptoart. Accessed 18 September 2022. Available at the https://memoakten.medium.com/the-unreasonable-ecological-cost-of-cryptoart-2221d3eb2053

Mukhopadhyay, M. & Ghosh, K. 2021. Market Microstructure of Non-Fungible Tokens.

Nakamoto, S. 2008. Bitcoin: A peer-to-peer electronic cash system. Decentralized Business Review, 21260.

NFT Stats. 2022. Bored Ape Yacht Club. Accessed 19 November 2022. Available at the https://www.nft-stats.com/collection/boredapeyachtclub

Nftjedi. 2021a. Nou Nft. Commercial Use. Accessed 18 December 2022. Available at the https://nounft.com/2021/11/14/commercial-use-why-dont-more-businesses-adopt-the-bored-ape-yacht-club-license-and-allow-buyers-to-make-commercial-uses-of-nfts/

Nftjedi. 2021b. Nou Nft. Universal Music signs deal with 4 Bored Ape Nfts to form music group Kingship in metaverse. Accessed 18 December 2022. Available at the https://nounft.com/2021/11/13/universal-music-signs-deal-with-4-bored-ape-nfts-to-form-music-group-kingship-in-metaverse/

NonFungible. 2022a. NonFungible. Accessed 17 February 2022. Available at the https://nonfungible.com

NonFungible. 2022b. NFT. Accessed 17 February 2022. Available at the https://nonfungible.com/academy/nft

NonFungible. 2022c. How to build NFT community. Accessed 17 February 2022. Available at the https://nonfungible.com/academy/nft/how-to-build-nft-community

NonFungible. 2022d. Create NFT art. Accessed 17 February 2022. Available at the https://nonfungible.com/academy/nft/create-nft-art

NonFungible. 2022e. Best practices before launching your NFT project. Accessed 17 February 2022. Available at the https://nonfungible.com/academy/nft/best-practices-launch-nft-project

NonFungible. 2022f. Are NFTs bad for the environment?. Accessed 17 February 2022. Available at the https://nonfungible.com/academy/ecosystem/nfts-impact-environment

NonFungible 2023a. Bored Ape Yacht Club. Accessed 13 March 2023. Available at the https://nonfungible.com/market-tracker/boredapeclub

NonFungible 2023b. CryptoPunks. Accessed 13 March 2023. Available at the https://nonfungible.com/market-tracker/cryptopunks

NonFungible 2023c. Doodles. Accessed 13 March 2023. Available at the https://nonfungible.com/market-tracker/doodles

OpenSea. 2022. OpenSea. Accessed 17 February 2022. Available at the https://opensea.io

OpenSea. 2023. OpenSea About. Accessed 13 March 2023. Available at the https://opensea.io/about

Osterwalder, A. & Pigneur, Y. 2010. Business Model Generation : A Handbook for Visionaries, Game Changers, and Challengers, John Wiley & Sons, Incorporated, Chichester.

Patel, R. 2022. NFT Marketplace Business Model: The ultimate guide. Accessed 13 November 2022. Available at the https://aglowiditsolutions.com/blog/nft-marketplace-business-model/

Parmar, D. 2023. A comprehensive guide into CryptoPunks NFTs. Accessed 16 April 2023. Available at the https://geekflare.com/cryptopunks-nfts-guide/

Peres, R., Schreier, M., Schweidel, D. & Sorescu, A. 2022. Blockchain meets marketing: Opportunities, threats, and avenues for future research. International Journal of Research in Marketing.

Pierce, M. 2022. NFT Trends to watch out for in 2023. Accessed 12 February 2023. Available at the https://www.nasdaq.com/articles/nft-trends-to-watch-out-for-in-2023

Popescu, A. 2021. Non-Fungible Tokens (NFT)-Innovation beyond the craze. In 5th International Conference on Innovation in Business, Economics and Marketing Research.

Puusa, A., Juuti, P. & Aaltio, I. 2020. Laadullisen tutkimuksen näkökulmat ja menetelmät. Gaudeamus.

Rarity Tools. 2022a. Introducing Rarity Tools. Accessed 17 December 2022. Available at the https://raritytools.medium.com/introducing-rarity-tools-9b0138e992b3

Rarity Tools. 2022b. Bored Ape Yacht Club. Accessed 17 December 2022. Available at the https://rarity.tools/boredapeyachtclub

Rarity Tools. 2022c. CryptoPunks. Accessed 17 December 2022. Available at the https://rarity.tools/cryptopunks

Rarity Tools. 2023. Doodles. Accessed 17 December 2022. Available at the https://rarity.tools/doodles-official

Schrader-Rank, A. C. 2021. How NFTs Influence Society: A Look at Scarcity Mindset, Generational Gaps in Education, and the Impact on the Environment.

Sparkes, M. 2021. NFT developers call for cut in carbon emissions. New Scientist, 249(3328), p. 16. Accessed 20 February 2022. Available at the https://search-ebscohost-com.ezproxy.cc.lut.fi/login.aspx?direct=true&db=afh&AN=149592290&site=ehost-live

Suchow, J. & Ashrafimoghari, V. 2022. The Paradox of Learning Categories From Rare Examples: A Case Study of NFTs & the Bored Ape Yacht Club. Available at SSRN 4082221.

Sund, K. 2020. Business models and cognition. Kristian J. Sund et al. (eds.). Bingley, England: Emerald Publishing Limited.

TechCrunch. 2017. Decentralizing everything with Ethereum`s Vitalik Buterin – Disrupt SF 2017. Accessed 26 March 2022. HUOM VIDEO Available at the https://www.YouTube.com/watch?v=WSN5BaCzsbo

Tellis, W. 1997. Application of a case study methodology. The qualitative report, Vol. 3, no. 3, pp. 1-19.

Thiele, L. 2016. Sustainability. John Wiley & Sons.

Thomas, G. 2011. A Typology for the Case Study in Social Science Following a Review of Definition, Discourse, and Structure. Qualitative Inquiry, Vol. 17, no. 6, pp. 511–521.

Tokenminds. 2022. Marketing strategy for NFTs: All you need to know about NFT marketing. Accessed 7 May 2022. Available at the https://tokenminds.co/blog/knowledge-base/marketing-strategy-for-nfts-all-you-need-to-know-about-nft-marketing/

Trautman, L. J. 2021. Virtual art and non-fungible tokens. Hofstra L. Rev., Vol. 50, pp. 361.

Truby, J., Brown, R., Dahdal, A. & Ibrahim, I. 2022. Blockchain, climate damage, and death: Policy interventions to reduce carbon emissions, mortality, and net-zero implications of non-fungible tokens and Bitcoin. Energy Research & Social Science, Vol. 88, 102499.

Tuomi, J. & Sarajärvi, A. 2018. Laadullinen tutkimus ja sisällönanalyysi. Uudistettu laitos. Helsinki: Kustannusosakeyhtiö Tammi.

Yin, R. 2014. Case study research: Design and methods. Vol. 5. sage.

Yuga Labs. 2023. Youtube. Accessed 3 May 2023. Available at the https://www.YouTube.com/channel/UCB6R9NAjkgxQi_QEkc4O25Q

Yuga Labs. 2022. Accessed 11 December 2022. Available at the https://mirror.xyz/0xEc9f53fA69682833FBd760C104B5D61aE29221E0/Km81y6Mc3O5LzS0wnrghVIV0HnZgLOd4wsnfcGw3_2I

Zarifis, A., & Cheng, X. 2022. The business models of NFTs and fan tokens and how they build trust. Journal of Electronic Business & Digital Economics.

Zhang, J. 2022. Cryptopricing: Whence comes the value for cryptocurrencies and NFTs? International Journal of Research in Marketing, ISSN 0167-8116, https://doi.org/10.1016/j.ijresmar.2022.08.002. (https://www.sciencedirect.com/science/article/pii/S0167811622000647)

Zott, C., Amit, R. & Massa, L. 2011. The business model: recent developments and future research. Journal of management, Vol. 37, no. 4, pp. 1019-1042.

Viitala, R. & Jylhä, E. 2014. Liiketoimintaosaaminen. Edita Publishing Oy. 6.-7. painos.

Viitala, R. & Jylhä, E. 2019. Johtaminen. Edita Publishing Oy. 1. painos.

Wang, Q., Li, R., Wang, Q. & Chen, S. 2021. Non-fungible token (NFT): Overview, evaluation, opportunities and challenges.

White, B., Mahanti, A. & Passi, K. 2022. Characterizing the OpenSea NFT marketplace. In Companion Proceedings of the Web Conference 2022, pp. 488-496.

Wilkinson, A., Hill, M. & Gollan, P. 2001. "The sustainability debate", International Journal of Operations & Production Management, Vol. 21, no. 12, pp. 1492-1502.

Wilson, K., Karg, A. & Ghaderi, H. 2022. Prospecting non-fungible tokens in the digital economy: Stakeholders and ecosystem, risk and opportunity. Business Horizons, Vol. 65, no. 5, pp. 657-670.

WCED, S. W. S. 1987. World commission on environment and development. Our common future. Vol. 17, no. 1, pp. 1-91.