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## Key Drivers of Intention to Purchase NFTs

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Master Thesis
presented as partial requirement for obtaining the Master Degree Program in Information Management

**NOVA Information Management School**
**Instituto Superior de Estatística e Gestão de Informação**
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# Key Drivers of Intention to Purchase NFTs

By

Mona Zavichi Tork

Master Thesis presented as partial requirement for obtaining the Master's degree in Information Management, with a specialization in Information System and Technology Management

**Supervisor:** Prof. Manuela Aparicio, Ph.D.

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# STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledge the Rules of Conduct and Code of Honor from the NOVA Information Management School.

*Mona Zavichi Tork*
*[Lisbon, July 2023]*

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Best regards,

Mona Zavichi Tork

# ABSTRACT

The rapid surge in popularity of Non-Fungible Tokens (NFTs) has sparked curiosity about their capacity to create new market prospects and led to further investigation into this emerging technology. With their potential to bring about a paradigm shift and disrupt traditional business models, NFTs have garnered considerable interest and attention in various industries. This study provides valuable insights into the key drivers that influence individuals' intentions to purchase NFTs. Decision-makers, creators, and investors can benefit from understanding these drivers as they navigate the NFT market. The study seeks to investigate the impact of perceived value, including its components of scarcity, uniqueness, verifiability, and royalty, as well as facilitating conditions, social influence, and individual differences and personality traits, on the intention to purchase NFTs. A proposed model was created by integrating the concepts of the Technology Acceptance Model (TAM) and pertinent NFT literature. This study utilized a survey to collect data from participants and employed the Partial Least Squares-Structural Equation Modeling (PLS/SEM) technique to empirically validate the proposed model. The findings of the study indicated that perceived value, facilitating conditions, social influence, and individual differences and personality traits impact individuals' inclination to purchase NFTs. Perceived scarcity, verifiability, and royalty were found to affect perceived value, whereas perceived uniqueness did not demonstrate a statistically significant relationship. Furthermore, the study suggests that individual differences and personality traits do not moderate the relationship between perceived value and NFT purchase intention. However, individual differences and personality traits directly influence NFT purchase intention.



# KEYWORDS

Non-fungible tokens; cryptocurrency; Alternative investments; NFT purchase intention; NFT adoption model; NFT acceptance model


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# LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| **AVE** | Average Variance Extracted |
| **B** | beta coefficient |
| **CR** | Composite Reliability |
| **ERC-20** | Ethereum Request for Comments 20 |
| **FC** | Facilitating Condition |
| **FOMO** | fear of missing out |
| **H** | Hypothesis |
| **HR** | Hedonic Regression |
| **HTMT** | Heterotrait-Monotrait Ratio |
| **ICOs** | Initial Coin Offerings |
| **IDPT** | Individual Differences and Personality Traits |
| **IP** | Intellectual property |
| **IS** | Information system |
| **NFT** | Non-Fungible Token |
| **NFTs** | non-fungible tokens |
| **NLP** | Natural Language Processing |
| **NS** | Non-significant |
| **PEU** | Perceived Ease of Use |
| **PI** | Purchase Intention |
| **PLS** | Partial Least Squares |
| **PLS/SEM** | Partial Least Squares/Structural Equation Modeling |
| **PR** | Perceived Royalty |
| **PS** | Perceived Scarcity |
| **PU** | Perceived Uniqueness |
| **PU** | Perceived Usefulness |
| **PVE** | Perceived Verifiability |
| **PVA** | Perceived Value |
| **R2** | R-square |
| **ROI** | Return On Investment |
| **SEM** | Structural Equation Modeling |
| **SI** | Social influence |
| **TAM** | Technology Acceptance Model |
| **VIF** | Variance Inflation Factor |

# 1. INTRODUCTION

The Non-Fungible Token (NFT) is a blockchain-based record of ownership of physical or digital goods and is seen as a revolutionary approach to promoting and generating income from digital assets (Borri et al., 2022). Fungible tokens, like cryptocurrencies, can be used as a medium for business transactions because they are similar to one another, however NFTs cannot be swapped or exchanged at equivalent value.

In recent years, NFT industry has flourished and has drawn a great deal of attention globally (Wang et al., 2021). Investor interest in non-fungible tokens can be attributed to many factors and variables (Albayati et al., 2023).

**Research gap and objectives:**

Although 2020 will be known as a period of economic hardship brought on by Covid, it was additionally a year when individuals began to approach the combination of technology and economic value in far more innovative ways (Baker et al., 2022). The worldwide pandemic has greatly accelerated the pace of technology adoption, creating new economic prospects (Popescu, 2021). Non-fungible tokens are one such emerging technology that has drawn growing interest all over the world (Albayati et al., 2023; Alexander & Bellandi, 2022). NFTs enable the production of distinctive digital assets that can be purchased and sold similarly to physical assets, giving a fresh perspective on digital ownership (Rehman et al., 2021). Anyone involved in the creation, sale, or investment of NFTs should have a solid understanding of the factors that influence NFT purchases. People and companies can maximize their potential in this quickly expanding market by comprehending consumer behavior and preferences, analyzing the industry, choosing wisely where to invest, and developing NFTs that appeal to potential customers. For instance, if consumers are intrigued to the concept of possessing a unique piece of digital art, marketing methods can stress the rarity and exclusivity of a certain NFT. Furthermore, some buyers of NFTs do so with the expectation that they would appreciate as assets over time. Knowing the variables that influence NFT pricing and buying intentions will help investors decide which NFTs to buy and when to do so. Understanding the motives and preferences of NFT customers allows producers and sellers to create focused marketing tactics that appeal to potential buyers and adjust their offers to fit consumer demand, hence increasing sales and income. Therefore, it is imperative to identify the key drivers of intention to purchase NFTs.

The objective of this study is to identify the main factors that affect individuals' intentions to purchase NFTs and develop a model to test those variables' impact. By examining the primary factors behind the intention to purchase NFTs, this study seeks to offer insights into the desires and motivations of potential buyers. The proposed model will be applied and assessed in a real-world setting to determine its validity and effectiveness.

According to Pinto-Gutiérrez et al.(2022), enthusiasm around blockchain technology (growing cryptocurrency values) is one of the factors that explains why investors are interested in non-fungible tokens. Other factors like indiscriminate, scarcity and environmental impact can also be the determinants of buying NFTs (Schrader-Rank, 2021a). This study benefits from the conclusion of previous studies to examine what are the main variables (dependent and independent and intermediate variables) that push investors to buy NFTs and how these variables interact with each other. Also, this goes through the intentions of purchasing digital assets and how businesses can take advantage of NFT.

**Methodological approach:**

This study utilizes an empirical approach with a survey-based research design to gather data from participants to investigate the factors that impact individuals' intentions to purchase NFTs. The collected data is then subjected to analysis using Partial Least Squares/Structural Equation Modeling (PLS/SEM) to examine the relationships between variables and validate the proposed model.

**Results:**

This study seeks to uncover the factors that impact individuals' intentions to purchase NFTs, providing valuable insights into consumer behavior in the NFT market. By exploring the relationships between variables such as perceived value, facilitating conditions, social influence, and individual differences and personality traits, the study aims to shed light on the main drivers of NFT purchase decisions. The study's findings will contribute to our understanding of NFT adoption, offering both practical implications for decision-makers, creators, and investors in the evolving market and theoretical implications for academia.

Regarding the structure of this study, It started by outlining the goals and objectives of the study in detail to give it a clear direction. To build a strong knowledge and understanding base, a comprehensive evaluation of pertinent literature was carried out. By incorporating concepts from the Technology Acceptance Model (TAM) and relevant theoretical literature on Non-Fungible Tokens (NFTs), the literature study identified gaps in current research, which ultimately resulted in the development of a conceptual model. Following the model development, the data collection was conducted through the implementation of a survey methodology. The survey was designed to collect data from participants with the purpose of exploring the factors that impact individuals' intentions to purchase NFTs. The collected data were subsequently analyzed using the PLS/SEM technique. Through this statistical analysis, it was possible to explore the connections between variables and evaluate the validity of the proposed model.

## 2. LITERATURE REVIEW

The objective of this study is to uncover and determine the driving forces behind NFT purchases and to comprehend how these elements influence NFT adoption. We begin by looking at the brief history of cryptocurrencies before defining NFTs and describing how NFTs came into existence. Then, Building upon the widely cited concepts of the Technology Acceptance Model (TAM) in studies on technology adoption, as well as relevant theoretical literature on Non-Fungible Tokens (NFTs), this research investigates the variables associated with the adoption of NFTs. (Toraman & Gecit, 2023). Based on this knowledge, we draw parallels between the acceptance of cryptocurrencies and NFTs. We come to the conclusion that the primary factors of NFT purchasing are social influence and NFT hype, individual differences, NFT features and characteristics, and facilitating conditions. We describe each of these criteria and how they may impact the intention of the buyer.

In order to find related papers, first, I created a list of keywords that I mentioned in the keywords section, and I used them to search for my sources through google scholar. I attempted to pick the most recent and most cited papers. The central theme of my thesis revolves around the integration of concepts derived from the Technology Acceptance Model (TAM) and pertinent theoretical literature on Non-Fungible Tokens (NFTs). Given the novelty of NFTs as a concept, there is a scarcity of publications that specifically delve into the acceptance of NFTs.

A decentralized currency (Bitcoin) was initially put into use in 2009 by Satoshi Nakamoto, merging well-known primitives for controlling possession through public key to keep track of coin ownership, or "proof-of-work" (Sapra et al., 2023). The concept was to create a decentralized peer-to-peer currency exchange platform on cryptographic proof, substituting a reliable third party to confirm each transaction (Nakamoto, 2008).

Bitcoin undoubtedly is the most significant and valued cryptocurrency, however, due to structural restrictions, only currency transactions can be made on the Bitcoin network (Porat et al., 2017). In 2013, Vitalik Buterin proposed a more sophisticated blockchain network called Ethereum (Dutta et al., 2023). After bitcoin, Ethereum is currently the second-largest cryptocurrency by market cap (De Vries, 2023). Ethereum provides a platform for more advanced and modified applications as opposed to being limited to digital currency and anybody has the ability to develop and program apps on a worldwide public infrastructure. As a result, innovative ideas that aim to greatly ease wide-ranging human connection and interaction over several areas have been implemented. As an example, startups can fundraise through initial coin offerings (ICOs) by competing for a certain quantity of cryptocurrency tokens. Startups claim that using these tokens will be the only method to buy their goods (Catalini & Gans, 2018).

These tokens which have the same properties and value as all the others are known as fungible tokens (Ardavanis, 2022; Hammi et al., 2023). Ethereum has also the same value as every other Ethereum and operates through smart contracts that are stored on a blockchain and executed based on predefined conditions. Smart contracts include logical assertions into transactions and operate as a third-party arbitrator (Cong & He, 2019). To make smart contracts more comprehensible and compatible, several standards have been established. One prominent standard on the Ethereum blockchain is ERC-20 (Ethereum Request for Comments 20). This standard serves as the fundamental technical framework for implementing smart contracts related to fungible tokens (Kong & Lin, 2021).

In 2017, CryptoPunks released a new type of token, called non-fungible tokens (NFTs), on the ERC-721 standard. The fundamental distinction between ERC20 and ERC721 would indicate the non-fungibility of ERC-721 tokens (Kong & Lin, 2021). The ERC-721 standard guarantee that tokens based on it are distinctive and cannot be divided or combined.

Digital content has long been accessible for free on websites which can be difficult for actual owners like artists to validate and monetize their digital content. It is simple to copy and complicated to verify the validity of the digital content (Chohan & Paschen, 2023). Furthermore, customers could just purchase non-digital goods like clothes and books and it is challenging for them to buy a genuine digital item.

NFTs are digital content like artwork that is stored on the blockchain and indicates the owner of that item and ensures that only a single individual can possess ownership at any given time. Since NFTs employ smart contracts, the original artist receives a cut-off for all future sales and the consumers can purchase a unique digital asset.

In 2021, the NFTs market has grown dramatically which grabs investors' attention who were looking for alternative investments (Kampakis, 2022). According to Kong & Lin (2021), NFTs act as a revolutionary investment vehicle and offer larger profits than conventional financial investments in the Fintech era. In order to assess NFTs' financial profitability and investment performance, Kampakis (2022) used the hedonic regression (HR) model over 3 years (2018-2021) to examine the NFT collection known as CryptoPunks which is one of the NFT collections with the largest trade turnover. The findings demonstrate that investment in CryptoPunks has the largest return on investment (ROI) rate during 2018 and 2021 with an average monthly return of 34.19% and a standard deviation of 61.76% which is a favorable tradeoff between risk and return. Also, The study of Zhang et al.(2022) shows NFTs serve as a safe refuge and haven instrument for a variety of asset classes like stocks, US currency and others in the periods prior to the COVID-19 pandemic and during the COVID-19 pandemic.

## 2.1. INVESTORS' OR CUSTOMERS' INTENTION TO USE NFTS

Regner et al. (2019) describe NFTs as a token that is unique, cannot be divided, substituted, or replaced, and has a verification process to represent an asset, either physical or digital, on a blockchain. The ERC-721 standard has a feature that assures each token is unique and non-fungible, allowing NFTs to be utilized in innovative applications (Entriken et al., 2018). So, Non-fungible tokens have surfaced as a resolution to the issue of digital uniqueness, particularly as fungible tokens were incapable to solve this problem. This has opened up new possibilities for businesses and brands (Kiliçaslan & EkiZler, 2022).

In addition to the digital world, the usage of NFTs is growing in the area of physical assets. NFTs have the potential to be utilized for various purposes, including verification of driving licenses, academic diplomas, tickets, IDs, passports, medical and insurance documents, real estate and property ownership and supply chain management (Ardavanis, 2022; Regner et al., 2019). This ongoing development of unique NFT use cases offers a chance to draw a wide variety of new consumers to the crypto ecosystem (Ardavanis, 2022). Therefore, it is crucial to identify consumers' intentions to buy NFTs. Through this approach, developers and businesses can enhance the alignment of their products and services with the needs and preferences of potential customers, thereby promoting market adoption and expansion for NFTs. Additionally, knowing why people buy NFTs can provide us important insights into how people behave and what they desire in the broader cryptocurrency and blockchain industries.

Technology acceptance or adoption can be referred to intention of users to utilize technology for doing their tasks. The technology acceptance model (TAM), proposed in 1986, continues to be widely recognized and extensively employed as a prominent theoretical model in the domain of information systems. Davis et al. (1989) introduced the technology acceptance model (TAM) to analyze user behavior when it came to using and adopting new technology. The purpose of the Technology Acceptance Model (TAM) is to assess how quickly new technologies are being embraced by consumers. TAM has undergone rigorous testing with several samples in a variety of contexts and has proven to be a workable and precise model for figuring out IS adoption and acceptance (Mathieson, 1991; Davis & Venkatesh, 1996). The TAM model is focused on how user impressions of the usefulness and easiness of the technology influenced the intentions of acceptance and adoption ((Luarn & Lin, 2005); Lai and Zainal, 2015).

The TAM model specifically investigated the concepts of Perceived Usefulness (PU) and Perceived Ease of Use (PEU) as key factors in determining the acceptance and adoption of new technologies(Help University, Malaysia & Lai, 2017). Perceived usefulness is the subjective perspective of users in which they feel that employing particular technology can increase the productivity of their action and In terms of Perceived Ease of Use, this refers to how simple someone believes using a certain technology to be (Davis et al., 1989). Venkatesh and Davis (2000) developed the Technology Acceptance Model 2 (TAM2) and offered more

comprehensive justifications for why users considered a certain system valuable at three distinct moments in time: before deployment, one month after deployment, and three months after deployment. According to TAM2, views of the system's efficiency are formed based on users' psychological evaluations of the compatibility among significant workplace objectives and the results of carrying out job duties by using the system. The Technology Acceptance Model 3 (TAM3) was created by Venkatesh and Bala (2008) through the integration of TAM2 with the model of the drivers of Perceived Ease of Use (PEU). In TAM 3, in order to describe the consumers' behavioral interest in adopting technology, several factors are presented. Social influence, individual differences, system characteristics, and facilitating conditions which are drivers of Perceived Usefulness (PU) and Perceived Ease of Use (PEU), make up these factors (Help University, Malaysia & Lai, 2017). TAM 3 has become so popular that it is referenced in most research on technology adoption, therefore this study employed it to evaluate the relationships among variables (Y. Lee et al., 2003).

### 2.1.1. Social influence and NFT hype

"Social influence" refers to how much a reference group's participants exert sway over one another's behavior and feel pressured to behave in a particular manner (Kelman, 1958). Considering that public views influence the trajectory of the market, nowadays social media offers a supportive forum for the exchange of thoughts and opinions (Qian et al., 2022). Social media platforms are widely recognized for their capacity to persuade and influence society rather than only serving as venues for networking and gathering. Shaw & Sergueeva (2019), Alalwan et al. (2017) and Lunney et al. (2016) have thoroughly examined the idea of social influence and validated its effects on people's intentions to utilize and accept a variety of technological innovations, such as mobile commerce, mobile banking and Wearable fitness technologies.

NFT can contribute to a brand by setting up a brand community. With the potential of online brand communities which is the online gathering place for individuals with a common passion and interest in a brand, NFTs behave as an incentive for the third wave of e-commerce. Social media platforms can be employed by brands and therefore, brands can utilize the NFTs' community features to build customer engagement, enhance brand awareness, boost interest in buying products of brands and integrate NFT possession with offline use cases. For example, NFT owners can have access to special products or discounts. This leads to building relationships with customers through developing real and innovative tales centered on the brand (Colicev, 2023).

Qian et al. (2022) had chosen Twitter as a popular social media to assess public opinions and emotions about NFT to determine whether or not buyers are attracted or deterred to buy NFT, or if the vendors are successfully stimulating demand. Twitter by having approximately 237 million monetizable daily active users in 2022, is one of the top-rank social networks in terms of popularity, this has facilitated the swift growth of data on the platform and making

the distribution of information in real-time (Zimbra et al., 2018). An influencer by sharing content can affect and grab the attention of a big portion of users in both direct and indirect ways. There are considerable proofs that the profit of stocks and sentiment on tweets about business are related. This may be generalized to show that Twitter has a significant impact on the economic markets and associated events (Ranco et al., 2015). Qian et al. (2022) used AI's natural language processing (NLP) techniques to comprehend the attitudes, feelings, and present public sentiment regarding NFTs on Twitter. According to Google Trends, there was no specific announcement or launch of new NFTs that shocked the audience so the graph dips on 30 and 31 Oct 2021. On the contrary, significant announcements in the NFT industry directly linked to the graph's visible peak on December 14, 15, and 16. Nike revealed its purchase of RTFKT Studios in December 2021, a company that employs cutting-edge Web3 technology to produce virtual sneakers and digital artifacts. This announcement was related to an increase in NFT sales. In the first quarter of 2022, As global attention shifted towards the Ukraine War, interest in NFTs decreased and revenues declined significantly by about 50%. This paper also found that widely popular Twitter users with large followings, such as investors or NFT producers, may genuinely sway public opinion with their emotive tweets. Customers now appreciate and use NFTs as property more than they did in the past when they were just excited about the potential for financial benefit. The adoption of NFTs by celebrities complements this, for example, filmmaker Kevin Smith intends to sell 5,555 NFTs connected to the upcoming film "Killroy Was Here". this movie will only be accessible to NFT owners.

Some people believe that the market of NFT experiencing a financial bubble brought on by a frenzy (Arhum Khawaja, 2021) and that it will burst like Dotcom (Cheong, 2022). According to hedonic regression models (Kong & Lin, 2021), as opposed to the overall technical and economic global price index that affects stock values, the price of an NFT is determined by the acceptance of blockchain technology and the variety of cryptocurrencies, scarcity, and individual preferences.

Pinto-Gutiérrez et al. (2022) assert that NFT has profited from the publicity and hype surrounding important cryptocurrencies, especially Bitcoin, which has the highest market cap. To demonstrate this claim, this research used Google search queries to display that the terms "non-fungible token" and "NFT" is strongly correlated with significant profits of cryptocurrency using weekly data from 2017 to 2021. In another word, they measured the Google search queries and discovered that the search for the "NFT" query is highly influenced by previous Bitcoin outcomes by using vector autoregressive models. Additionally, they discovered that investors display a greater level of interest in NFTs subsequent to the surge in profits of both Bitcoin and Ether when we employ wavelet coherence analysis.

The study of Qian et al. (2022) analyzed the NFT sale between October 2021 and February 2022. NFT purchases showed a growing and afterward dropping pattern during October 2021 and February 2022. Transactions were approximately 141,480 in October 2021. By the middle of February, they had dropped to 63,737, a startling 121% decrease. Beginning of November

2021, sales increased again, but they quickly dropped by the end of the month. Despite the fact that peaks were seen in mid-December 2021 and at the end of January 2022, sales have not reached the same height ever since. Similar patterns can be seen in the statistical representations for primary and secondary sales as well as dollar sales. (Qian et al., 2022)

### 2.1.2. Individual differences and personality traits

According to Schrader-Rank, non-fungible tokens (NFTs) will have an impact on society as a whole, and specifically on the art market. A scarcity mindset enhances people's feeling of urgency for a certain good and it is what motivates people to act quickly in order to obtain a certain good or service. Some individuals have observed that NFTs are becoming more and more common due to their rising scale and scarcity mentality. This mentality, which should not be mistaken for resource scarcity, encourages people to buy and spend more than they need, and develop a sizable market for NFTs using cryptocurrency as the medium of exchange across the blockchain. The high rate of monetary inflation leads the public to become aware of a shortage mindset and let the NFT market grow enormously (Schrader-Rank, 2021b). Rob Massey who is a Global & US Tax Blockchain & Digital Assets leader says that Value is depending on the seller and purchaser's understanding, rarity, availability, and the distribution network. NFTs have no physical restrictions and have greater accessibility and liquidity due to their rapid access and distribution across the world. Due to this market development, everybody with the money to invest in the NFT market is a prospective investor.

### 2.1.3. System characteristics

Non fungible tokens (NFTs), which are maintained on a blockchain, serve as proof of possession for mainly digital content. Based on the 2021 Gartner Hype Cycle for Key Technologies, it is anticipated that non-fungible tokens (NFTs) have the potential to significantly transform marketing operations (Chohan & Paschen, 2023). Understanding the decentralized architecture and characteristics of NFT technology is crucial for its acceptance and adoption, and NFT can influence users to purchase it due to its distinctive features. Moreover, the study by Kong & Lin (2021) adds that NFTs are distinct from financial assets and because of their special characteristics enable purchasers to receive non-financial benefits (like social position) from possession.

Table 1 – NFT's Charactristic table

| Characteristics | Explanation | Reference |
|---|---|---|
| Scarcity | One factor elevating the value of NFTs is their potential rarity. A merchandise's actual value increases with its perceived scarcity, valuable metals are the ideal example of how the notion of scarcity works in the real life. Although creators are free to produce as many goods as desire, they also have the option of setting a cap on the quantity of NFT to control the asset's scarcity and create a sense of rarity. Blockchain enables both schedulings and limiting the distribution of digital content over a certain period of time. | (Popescu, 2021) |
| Uniqueness | NFTs are distinct in that no two NFTs are the same. | (Albayati et al., 2023; Chohan & Paschen, 2023; Popescu, 2021) |
| Verifiability | The fundamental characteristics of blockchain technology enable public verification of ownership. All transactions are saved and recorded on the blockchain which allows traceability. This characteristic completely removes the requirement for a third-party verification technique by enabling any NFT associated with an artwork to be linked toward the original artist. | (Albayati et al., 2023; Popescu, 2021; Wang et al., 2021; Zhang et al., 2022) |
| Indivisibility | Indivisibility means NFT cannot be broken down into smaller parts so, you must purchase the entire NFT to possess it. As a result, if you purchase the NFT, you either own the entire item or nothing of it. | (Popescu, 2021) |
| Royalties | NFT has garnered considerable attention because the creator of artwork receives royalties automatically after each transaction. A key component of NFTs is a smart contract that is incorporated inside the metadata to guarantee that the original inventor earns profits from the secondary sale. Due to the ability to include rights of possession inside the product itself, this mentality is gaining a lot of popularity. | (Chohan & Paschen, 2023; Popescu, 2021) |
| Indestructible | It is impossible to duplicate, erase, or damage any of the metadata that smart contracts have recorded in the blockchain. As a result, NFTs are irreversible. | (Popescu, 2021) |
| Transferable | On approved marketplaces, NFT owners have the freedom to give possession of their NFTs to other customers. In order to transfer an NFT to a user, an NFT, a cryptocurrency balance to cover trading expenses, and a public wallet address of a user are required. | (Bamakan et al., 2022) |

### 2.1.4. Facilitating conditions

NFT, at the early stages, was supported by collectors and art associations, but it has proven to be a beneficial asset in several businesses and industries. Industries that implement NFT right now might reap big rewards later on and this revolutionary technology can be a crucial part of their growth in the future.

The game industry is one of those that has been a pioneer in embracing NFTs. Currently, there are several NFT games available, such as Crypto-Kitties which is an NFT-based game that let players purchase, gather, raise, and trade digital cats (Wilson et al., 2022). In these kinds of games, players can grow pets themselves and invest a lot of time in producing new progeny or spend money on unique digital pets, which they can later resell for a lot of money (Wang et al., 2021). The NFT provides interesting additional features including tracking who owns what in games and game creators who invent those features (such as guns and outfits) can get royalty after each transaction on the marketplace and gamers can get exclusive customized game goods. This will provide a profitable revenue stream where both gamers and creators earn from the secondary NFT market.

NFT has the capacity to become one of the strongest forms of a virtual economy in the future and become the most significant good in the metaverse (Kong & Lin, 2021). Metaverse is a shared environment including augmented reality and the internet which makes possible all kinds of online activities in the digital world such as shopping, work, game and socializing (Wang et al., 2021). Blockchain offers the perfect decentralized foundation for the virtual world. Players in this immersive world may engage in a multitude of fascinating activities, such as gameplay, showcasing their own artwork, buying avatars and accessories, buying lands, etc. Decentraland is one of the most successful projects in the Ethereum-based virtual world. All you must do to become a resident is purchase land which is a metaverse object programmed to represent a 16 m by 16 m virtual piece of land (Dowling, 2022).

A wide range of items fall under the category of digital collectibles, including digital trading cards, wines, digital art, video clip, intellectual properties, etc. (Wang et al., 2021) Up to now, there were few channels for artists, musicians, brands and sports companies to show and make revenue from their digital art or collectibles. In another word, these contents were widely accessible via public platforms like YouTube and Instagram and the creator had no well-defined route for making money from their digital artwork (Wilson et al., 2022). An NFT refers to a digital asset that represents ownership of a digital item. Sellers have long utilized phrases like "limited edition" to attract customers to buy certain items. According to commodity theory, customers want rare goods more than equivalent accessible goods because the ownership of rare assets promotes sentiments of individual difference or distinctiveness (Chohan & Paschen, 2023).

We use sport as an example. An NFT trading platform called NBA Top Shot allows users to purchase, sell and accumulate basketball highlights videos in the form of NFTs (Wang et al., 2021). In 2020 NBA Top Shot achieved a turnover of more than $944 million, which included more than 553,000 market participants. Besides the NBA profiting from purchases of digital material, it uses a business model that shares its achievement with athletes and player associations (Wilson et al., 2022).

Another excellent instance is Bacardi, the largest private, family-run alcoholic beverage business in the world, which creates an NFT to advertise the release of a limited-edition rum. In this particular example, it is noteworthy that the company has made accessible its own staff to assist people who are not professionals in cryptocurrencies or NFTs to translate bids made in US dollars to cryptocurrencies.

Despite the fact that NFTs have a variety of uses currently, they are rarely used to address real problems. Intellectual property (IP) is a crucial area where NFTs can be used to tackle issues now facing society. It requires a significant amount of time and works to register for a patent, copyright, or trademark, and it is expensive. On the other hand, it is feasible to speed up this procedure while still being very confident and assured that the possession of an IP is being protected with a distinctive attribute of NFT technology. NFT by providing IP protection brings excitement for people who think NFTs would simplify the purchasing and selling of patents and provide new possibilities for businesses, academic institutions, and creators to profit from their inventions. This idea will be advantageous to patent owners by giving them the opportunity to tokenize their inventions. Since each activity is stored in the blockchain, making it is considerably simpler to track changes in patent possession. Furthermore, NFTs could also revolutionize patent monetization by facilitating profit-making opportunities for patents. NFTs help the IP market by including automated mechanisms for collecting creators' royalties for their creations, which enables them to profit each time a license for their invention is granted (Bamakan et al., 2022).

## 3. NFT PURCHASE INTENTION RESEARCH MODEL PROPOSAL

In the past several decades there has been significant research on user adoption of new technologies, and numerous theoretical models have indeed been put forth by researchers. These theoretical models examined the adoption of novel technologies by customers from several aspects (Zhou et al., 2021).

This study aims to gain a deeper understanding of the key factors driving individuals' intention to purchase NFTs. The research model is developed by integrating key concepts from the Technology Acceptance Model (TAM) and relevant theoretical literature on Non-Fungible Tokens (NFTs). By exploring the factors influencing the adoption and acceptance of NFTs, the study aims to contribute to the limited body of research on NFT adoption and shed light on the determinants of NFT purchasing. The proposed research model guides the study's findings and reflects a comprehensive analysis of the existing literature. The constructs, hypotheses, and theoretical model used in this research are described in this section.

The proposed model consists of nine distinct constructs: Perceived Scarcity, Perceived Uniqueness, Perceived Verifiability, Perceived Royalty, Perceived Value, Social Influence, Facilitating Conditions, Individual Differences and Personality Traits, and NFT Purchase Intention. These constructs represent different aspects that influence individuals' decision to engage in NFT purchases.

Figure 1 illustrates our proposed theoretical model, which suggests that perceived scarcity, perceived uniqueness, perceived verifiability, and perceived royalty have a positive impact on the perceived value of NFTs. The perceived value, in turn, positively influences NFT purchase intention. Additionally, social influence and facilitating conditions are positively associated with NFT purchase intention. Furthermore, individual differences and personality traits play a positive role in shaping NFT purchase intention. Finally, individual differences and personality traits moderate the relationships between perceived value and intention to purchase NFTs.

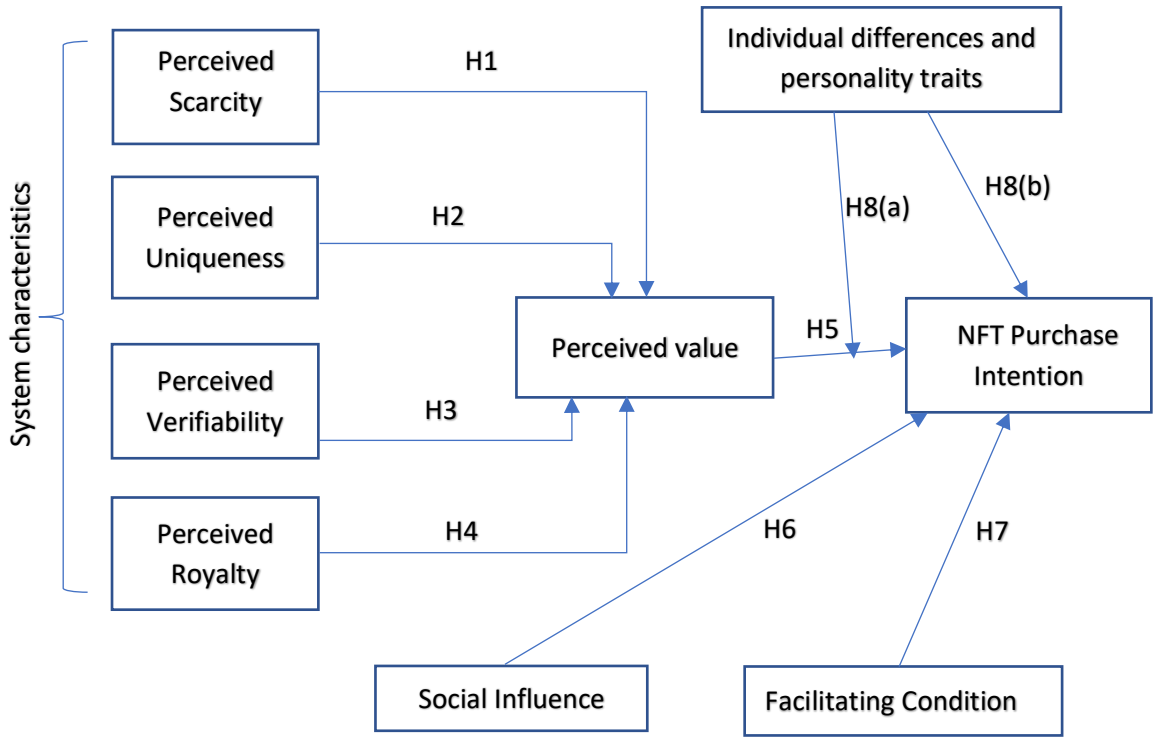


Figure 1 – Proposed Conceptual Model of NFT adoption

To further realize how NFTs might be a marketing drive, we can look at the primary characteristics of NFTs as subcategories. The special characteristics of NFT have hastened its adoption in the financial industry (Ho & Song, 2023). One of the fundamental economic principles, supply and demand, explains the idea of scarcity and rarity. When supply remains constant but demand exceeds supply, prices go up, causing shortage (Kiliçaslan & EkiZler, 2022). Hicks (1986) explains scarcity by stating that reduced supply will lead prices to increase. The user's perception of the goods and acceptance and adoption process is impacted by how scarce the items are (Suri et al., 2007). Products that are rare can improve a user's sense of exclusivity and impact their propensity to buy. If these conditions arise, it contributes to the creation of an optimum purchase experience for clients (Lynn, 1991). Gierl et al. (2008), on the other hand, demonstrate that selling scarcity in restricted quantities instead of limited period of time might offer a superior outcome. Furthermore, Brannon and Brock (2001) claim that rather than common items, the notion of rarity might be more efficient in goods that are perceived as being more innovative from the viewpoint of the buyer. We are shown how rarity can serve as a marketing driver in the digital universe by restricted NFT sales, exclusive accessibility, and sales of physical collections that are only available to those with NFTs. NFTs have a finite supply throughout the value chain since each one is distinctive. Additionally, every individual token will be priced, which establishes a virtual scarcity and fuels people's feeling of urgency for a certain good (Kiliçaslan & EkiZler, 2022). Thus, the following hypothesis is proposed:

**Hypothesis 1 (H1).** Perceived scarcity positively affects perceived value of NFTs.

The incorporation of uniqueness into the marketing framework has been addressed in several theories, including Loomes and Sugden's (1982) regret theory, and Brehm's (1966) reactant theory. This is because scarcity may have a direct impact on uniqueness. According to Netemeyer et al. (2004), a brand's distinctiveness refers to its capacity to stand out from rival products and garner consumer preference. Users like certain items over others because they satisfy their demands, expertise, experience, and distinctiveness (Simonson & Nowlis, 2000). Users' desire for originality is satisfied by uniqueness, which also influences how positively they see the goods (Cheema & Kaikati, 2010). Scarcity and uniqueness work well together to increase the perceived value of a commodity. Customers are more likely to choose an item when it is viewed as unique, increasing perceived value (Dhar & Sherman, 1996). Before NFTs, one of the most popular scholarly debates was the uniqueness of products, particularly digital versions. According to Atasoy & Morewedge (2018), the uniqueness of digital commodities could be lower than that of physical items due to their simplicity of replication. In contrast to this strategy, NFTs are designed to reduce duplication risk due to the basic benefits given by smart contracts. NFTs provide exclusivity in a novel way by enabling customers to demonstrate that they possess exclusive ownership of the commodity at all times (Hofstetter et al., 2022). In this research, we examine how the idea of being different from other goods using non-fungible tokens can promote uniqueness by inspiring consumers' interest, which can subsequently inspire a perception of the goods' value. Thus, the following hypothesis is proposed:

**Hypothesis 2 (H2).** Perceived uniqueness positively affects perceived value of NFTs.

In decentralized applications, every NFT has an owner, which is a public record and simple for anyone to authenticate, as opposed to centralized apps where institutions manage servers that hold ownership records of digital goods (Chohan & Paschen, 2023). NFTs can demonstrate any physical or digital item in the digital world because of the blockchain infrastructure. It’s important to note that the metadata stored in the token's smart contract guarantees its distinctiveness. Additionally, the technology's provision of transparent transaction history, makes it possible for any user to verify the NFT, thereby eliminating the possibility of counterfeiting (Popescu, 2021). In another word, each NFT has a history of transactions since its creation, including each time it was transferred. For owners and potential buyers, this implies that each token can be independently verified to be legitimate and not fake (Dev et al., 2022). Verifiability and traceability are the great indicators that persuade users to effectively adopt this technology and generate an impression of the goods’ value. Because NFT transactions are transparent, there is a higher probability of successful transactions, which increases customer interest in purchasing (Chen et al., 2022). Therefore, the following hypothesis is proposed:

**Hypothesis 3 (H3).** Perceived verifiability positively affects perceived value of NFTs.

Generally speaking, artists and creators are not entitled to royalties on their upcoming sales of their creations. On the contrary, NFTs are specifically designed to provide the creator with a fixed royalty payment every time their digital item is purchased or sold within the marketplace. This approach serves as a practical and helpful method for managing and protecting digital artworks (Wang et al., 2021). NFT producers typically establish an automatic repeating fee or commission on any resale of the NFTs which is easily traceable in blockchain where the NFT is stored. An NFT has the benefit that, unlike conventional royalty system, creators are not reliant on a third party to properly perform their agreements because the smart contract automatically handles the payment of royalties. As a result, NFT producers just should believe in the integrity and honesty of blockchain, as opposed to an artist who must rely on accuracy and correctness of the bookkeeping performed by their record company, even though these companies often keep the majority of the revenue they generate. Smart contracts also don't have any expiration dates. In light of this, the inventor of the NFT will perpetually be paid royalties on all resales of intellectual property until the blockchain and the internet continue to function (Ardavanis, 2022). So, NFTs promote the intellectual property market by integrating royalty collection techniques into creators' innovations, rewarding them whenever their invention is sold (Bamakan et al., 2022). The study of Ardavanis (2022) shows that NFT and blockchain technology characteristics such as the permanent royalty fee function raises a sense of the items' value and the interest in NFT purchases. Thus, the following hypothesis is proposed:

**Hypothesis 4 (H4).** The expectation of receivers' royalties positively influences perceived value of NFTs.

According to Dodds et al. (1991), perceived value positively affects consumers' intention to purchase. This indicates that buyers often choose a product based on its perceived value (Dodds & Monroe, 1985). Research by Kim et al. (2008) revealed that people's intentions to utilize mobile Internet are significantly influenced by perceived value. Similar findings were made by Liu et al. (2015) discovered a strong influence of perceived value on people's intentions to utilize mobile coupon applications. Another study also stated that perceived value plays a significant role in influencing consumers' willingness to embrace and adopt cellphone (Pitchayadejanant, 2011). Therefore, the following hypothesis is proposed:

**Hypothesis 5 (H5).** Perceived value of NFTs positively affects NFT purchase intention.

Social influence refers to the degree to which an individual may be persuaded by other people's propensities to utilize new technology (Chen et al., 2022). Adoption intentions may be impacted by an individual's personal opinions toward an item as well as social influences due to the tendency to conform an individual's behavior to the norms of the specific group (Kulviwat et al., 2009). Social influence plays a significant role in shaping customer behavior when it comes to adopting new technologies. The role of social impact in describing consumer behavioral intention is advocated by several research and methodologies (Chaouali et al.,

2016; Hsu & Lu, 2004; Malhotra & Galletta, 1999). A study of Kulviwat et al. (2009) shows that Social influence exerts a positive influence on individuals' intention to adopt new technologies. Additionally, social influences improved cooperation to establish a supportive belief (Alenazy et al., 2019). Ramjan & Sangkaew (2022) describe that close friends have an impact on the intention to buy NFT, and those who purchase NFT would obey people who are trustworthy, such as relatives or friends. The consumer is encouraged by communication platforms to investigate, assess the amount of risk, and have faith in order to decide whether or not to utilize this solution (Chaouali et al., 2016). The study of Qian et al. (2022) demonstrates how influential people with a sizable, engaged following may shape public opinion by disseminating information about NFT on the social media platforms like Twitter. This marketing tactic was used by the NFT developers to grow the market, boost demand, and ultimately boost sales. Therefore, the following hypothesis is proposed:

**Hypothesis 6 (H6).** Social influence positively affects NFT purchase intention.

A facilitating condition refers to an individual's perception that new technology can be easily used due to the availability of the necessary technological infrastructure. (Venkatesh et al., 2012). Existing research has scientifically proven that facilitating conditions are the primary factor in consumers' desire to embrace a technology (Beh et al., 2021; Venkatesh et al., 2003). Individuals who use information systems must recognize the presence of a number of auxiliary mechanisms that make it possible for them to utilize the IS without experiencing any difficulties (Venkatesh et al., 2012). For instance, customers are more willing to utilize mobile banking when assistance, facilitations, and services are accessible (Alalwan et al., 2017). Progress in information technology, as well as COVID-19 pandemic, raised the need for non-eye-to-eye interactions, hastening the launch and progression of metaverse platforms. As a result of the extended COVID-19 pandemic and subsequent quarantines, individuals started to deliberately develop immersive online platforms to substitute physical activities. The ability for users to generate content, trade it with other people, and link the virtual and physical worlds as a mechanism of value exchange makes NFT a valuable asset in the metaverse (U.-K. Lee & Kim, 2022). Prathivi and Oktavio(2022) demonstrate that as more people join metaverse there are more opportunities for NFTs to be purchased. Another valuable feature of an NFT is intellectual property (Ardavanis, 2022). NFTs are facilitating the verification, protection, buying and selling, and earning revenue of intellectual property. The demand for NFT technology, which enables the validation of digital assets, is steadily increasing, and this trend is expected to persist. NFTs have shown tremendous growth in terms of commercial success and market adoption and acceptance, transitioning from being absent in Gartner's Hype Cycle for Emerging Technologies in 2020 to achieving the "peak of inflated expectations" in the next year (Bonnet & Teuteberg, 2023). Through the provision of these innovative use cases, NFT has shown to be a valuable asset in these enterprises, encouraging people to purchase NFT. Therefore, the following hypothesis is proposed:

**Hypothesis 7 (H7).** Facilitating condition positively affects NFT purchase intention.

Another element influencing people's intentions to purchase and embrace NFT is their individual differences and personality traits. According to Rogers' innovation diffusion hypothesis, personality traits and individual differences have an impact on whether or not individuals accept new, distinctive, and creative technology as well as items or practices (Rogers et al., 2014). According to Sudzina and Pavlicek (2019), personality traits have a favorable impact on cryptocurrency adoption in the Czech Republic, and as NFTs employ cryptocurrencies as a form of trade, they can also have an impact on NFT adoption. Self-efficacy and personal innovativeness are the two aspects of personality traits that this study takes into account (Esmaeilzadeh et al., 2019; Hasan et al., 2022). According to scholars, personal innovativeness refers to an individual's perception of their own inclination to utilize distinctive and innovative technologies (Agarwal & Prasad, 1998; Yi et al., 2006). Personal innovativeness, as defined by Agarwal and Prasad (1998) and Shaw and Sergueeva (2019), is the ability of a person to take risks. This ability is tied to the person's inherently innovative character. Likewise, those with greater risk endurance are more likely to be receptive to experimenting with a new technology due to their optimistic views regarding its utilization (Xu & Gupta, 2009). In general, those with more innovative mindsets more often intend to embrace new technologies (Shaw & Sergueeva, 2019). Some studies discovered that personal innovativeness serves as a strong moderator between the desire to utilize cryptocurrency and the perceived value (Abbasi et al., 2021; Hasan et al., 2022). Since cryptocurrency is used to pay for NFT purchases, we may claim that personal innovativeness moderates the relationships between perceived value and intention to purchase NFT. Several studies also have demonstrated that personal innovativeness influences the intention to adopt blockchain technology (Abbasi et al., 2021; Alaklabi & Kang, 2018). Self-efficacy is the conviction that a person can complete a task (Hasan et al., 2022). According to Rogers et al. (2014), self-efficacy is a trait that varies from person to person and significantly affects how new technologies are accepted. Self-efficacy is also positively associated with the adoption of new technologies. This suggests that those who have great levels of technological self-efficacy find it easier to use new technology overall. Hizam et al. (2022) found that personal innovativeness and self-efficacy have a favorable impact on behavioral intention to adopt Web3 technology, which includes NFTs as a popular use case. Therefore, it can be inferred that personal innovativeness and self-efficacy can also affect the intention to purchase NFTs. According to Ho and Song (2023), the utilization of NFT necessitates self-efficacy to minimize learning endeavor and boost individuals' confidence in making investments in the metaverse. Consequently, those with a strong sense of self-efficacy are more inclined to embrace NFT and self-efficacy can moderate the relationships between perceived value and intention to purchase NFT. These justifications enable us to propose the following hypothesises:

**Hypothesis 8(a) (H8(a)).** Individual differences and personality traits moderate the relationships between perceived value and intention to purchase NFT.

**Hypothesis 8(b) (H8(b)).** Individual differences and personality traits positively affect NFT purchase intention.

## 4. EMPERICAL STUDY TO VALIDATE THE PROPOSED MODEL

To attain the objectives of the study and assess the constructs, we have developed a questionnaire utilizing the measurement model outlined in Appendix A. The development of the measurement model was also guided by an extensive evaluation of the existing scientific literatures pertaining to the topic being studied. To build and manage the survey, the Qualtrics tool was used, which is an online survey platform that enables users to design their own questionnaire and analyze the responses in various ways (Nam et al., 2013). This survey was constructed into three sections. The first section comprised of filter questions that were used to determine whether participants had experience with crypto and NFT purchases, with the aim of creating an accurate sample. The second section was designed to evaluate constructs. Finally, the third section contained questions related to the participants' demographic characteristics. Respondents were given the option to select their responses using a seven-point scale, with options ranging from "1 - Strongly Disagree" to "7 - Strongly Agree". This survey is based on the measurement table provided in Appendix A and has met the ethical standards set by the Ethics Committee of NOVA Information Management School and MagIC Research Center, which oversees the ethical implications and rights of the survey participants. Data collection took place on 22$^{nd}$ March 2023 and in order to distribute the survey, several social media platforms like LinkedIn, Reddit, Discord community channels were used.

In order to examine and interpret the collected data, we utilized the SmartPLS tool and followed a two-step PLS/SEM method (Hair et al., 2013). The usage of PLS/SEM as a method to examine statistical data is preferred by business information systems research for a number of reasons. PLS/SEM can be utilized with small sample sizes and does not require normality assumptions, which is one of these causes (Sohaib et al., 2020). It also can be particularly valuable to assess the reliability of a predictor when examining its potential moderating effect on the relationship between different constructs (Abbasi et al., 2021). After presenting the data obtained from the measurement model, This section provides an explanation of the results obtained from the structural model analysis.

### 4.1. SAMPLE CHARACTERIZATION

The survey was completed by a total of 165 participants, of which 66.10% were male, 31.36% were female, and 2.54% preferred not to disclose their gender. After removing incomplete responses, 125 complete responses were used for further analysis. Over half of the participants in the survey, specifically 52.50%, reported having previous experience with cryptocurrencies. Additionally, a small percentage (7.75%) reported having purchased non-fungible tokens (NFTs) at least once. The characteristics of the participants are presented in table 2. Figure 2 depicts the geographic distribution of our respondents, encompassing 125 participants hailing from 23 countries. These countries consist of Andorra, Australia, Austria, Canada, Cyprus, Denmark, Finland, France, Germany, Ghana, Iran, Kuwait, Luxembourg,

Netherlands, Peru, Portugal, Qatar, Spain, Switzerland, Thailand, United Arab Emirates, United Kingdom, and the United States of America.

Table 2 - Demographic Profile of the participants

| Gender | n | % |
|---|---|---|
| Male | 78 | 66.10 |
| Female | 37 | 31.36 |
| Prefer not to say | 3 | 2.54 |
| | | |
| Age group | n | % |
| 18-30 | 69 | 58.47 |
| 31-40 | 40 | 33.9 |
| 41-50 | 5 | 4.25 |
| 51-60 | 2 | 1.7 |
| >60 | 2 | 1.7 |
| | | |
| Education | n | % |
| Bachelor | 37 | 31 |
| Post graduate studies | 7 | 6 |
| Master | 59 | 50 |
| Ph.D. | 12 | 10 |
| Prefer not to say | 3 | 3 |


Figure 2 – Geographic distribution of the respondents

### 4.2. MEASUREMENT MODEL RESULTS

The PLS/SEM method is used to evaluate the validity of the proposed research model and assess the credibility and reliability of the constructs (Hizam et al., 2022). Various metrics, including outer loading, Cronbach's Alpha, Composite Reliability, Cross Loading, Fornell-larcker, HTMT, Average Variance Extracted (AVE), and Inner VIF, were employed to examine

the performance of the measurement model (XChen et al., 2022). These metrics are commonly utilized to assess the reliability and validity of a measurement model (Abbasi et al., 2021).

To assess the reliability of all indicators, we used outer loadings and found that most of the indicators had values above 0.70, indicating adequate indicator reliability for all constructs (Chin et al., 2003; Hizam et al., 2022; Sarstedt et al., 2017). Outer loading determines the strength of the relationship between an indicator and its associated latent construct. The lower outer loading values of IDPT4 and FC3 (Appendix B) may suggest that these items have a weaker relationship with their corresponding constructs and it is considered standard practice for a researcher to eliminate any items with loading values below 0.7 and retain those with loading values above 0.7 (Chen et al., 2022; Wong, 2013). Overall, based on their outer loading values, the majority of the indicators were deemed to be reliable measures of their corresponding constructs.

The reliability and validity of the constructs were evaluated using Cronbach's alpha and Composite Reliability (CR). Table 3 presents the Cronbach's alpha values for the constructs examined in the study. The results indicate that all of the values exceed 0.7, demonstrating a high level of overall reliability for the data collected (Shahzad et al., 2018). Hair et al. (2019) express that rho_a (Jureskogs composite reliability) is typically situated within the range between Cronbach's alpha (as the lower bound) and rho_c (as the upper bound) and is commonly utilized to signify the internal consistency reliability of a construct. As shown in Table 3, the values obtained were acceptable. Each construct had a Composite Reliability (CR) value surpassing the threshold of 0.7, demonstrating strong internal consistency within each construct (Hair et al., 2011). To evaluate convergent validity, the Average Variance Extracted (AVE) was calculated, and Table 5 illustrates that the AVE value was higher than 0.50, which proved the convergent validity (Hair et al., 2011). Collectively, these studies imply that our constructs are accurate and trustworthy measures of the underlying variables.

Table 3 – CR, Cronbach’s alpha and AVE results

| Constructs | Composite Reliability(rho_ a) | Composite Reliability(rho_ c) | Cronbach’s Alpha | AVE |
|---|---|---|---|---|
| Perceived Scarcity | 0.913 | 0.934 | 0.912 | 0.74 |
| Perceived Uniqueness | 0.843 | 0.885 | 0.836 | 0.608 |
| Perceived Verifiability | 0.854 | 0.892 | 0.841 | 0.675 |
| Perceived Royalty | 0.968 | 0.976 | 0.967 | 0.911 |
| Perceived Value | 0.876 | 0.918 | 0.865 | 0.788 |
| Social influence | 0.804 | 0.87 | 0.802 | 0.626 |
| Facilitating Condition | 0.802 | 0.905 | 0.792 | 0.827 |
| Individual Differences and Personality Traits | 0.868 | 0.938 | 0.868 | 0.883 |
| NFT Purchase Intention | 0.88 | 0.926 | 0.88 | 0.806 |

To evaluate discriminant validity, several statistical techniques used, including cross-loading, Fornell-Larcker criterion, and Heterotrait-Monotrait Ratio (HTMT) (S et al., 2020). Discriminant validity guarantees that distinct constructs are measuring distinct attributes or characteristics, preventing them from measuring the same underlying construct (Jiraphanumes et al., 2022). In simpler terms, discriminant validity is demonstrated when there are low levels of correlation between measurement items and other constructs, except for the one they are meant to measure particularly. This emphasizes the importance of ensuring that each measurement item is accurately measuring the specific construct it is intended to assess, without overlapping with other constructs (Gefen & Straub, 2005, p. 92).

The cross-loadings approach, which was initially suggested by Barclay et al. (1995) and Chin (1998), proposes that each indicator loading should surpass all of its cross-loadings. If this is not the case, it indicates that the measure in question cannot accurately distinguish whether it pertains to the intended construct or to another one, which results in a problem of discriminant validity (Chin, 2009, p. 671). This approach is depicted in the Appendix C.

Table 4 displays the outcomes of the Fornell-Larcker criterion, which was utilized to evaluate the discriminant validity in the present study. As per the Fornell-Larcker criterion, the primary value of the average variance extracted (AVE) for each variable should have a higher value than its correlation with other variables (S et al., 2020). Table 4 provides evidence that all the primary AVE values for each construct are higher compared to the values of the constructs below, indicating that the Fornell-Larcker criterion is met.

Table 4 – Fornell-Larcker criterion results

| | AlphaIndividual Diferencies PersonnalityTrs | Facilitating Conditions | PRoyalties | PUuniqueness | PValue | PVerifiability | Perceived Scarcity | Purchase Intention | Social Influence |
|---|---|---|---|---|---|---|---|---|---|
| AlphaIndividual Diferencies PersonnalityTrs | **0.94** | | | | | | | | |
| Facilitating Conditions | -0.018 | **0.909** | | | | | | | |
| PRoyalties | 0.517 | 0.102 | **0.954** | | | | | | |
| PUniqueness | 0.517 | 0.085 | 0.551 | **0.78** | | | | | |
| PValue | 0.519 | 0.202 | 0.651 | 0.603 | **0.888** | | | | |
| PVerifiability | 0.316 | 0.386 | 0.452 | 0.505 | 0.568 | **0.821** | | | |
| Perceived Scarcity | 0.536 | 0.036 | 0.606 | 0.771 | 0.681 | 0.471 | **0.86** | | |
| Purchase Intention | 0.612 | 0.283 | 0.575 | 0.629 | 0.693 | 0.57 | 0.676 | **0.898** | |
| Social Influence | 0.603 | 0.041 | 0.408 | 0.606 | 0.574 | 0.362 | 0.663 | 0.621 | **0.791** |

Likewise, Table 5 displays the findings of the Heterotrait-Monotrait Ratio of Correlations (HTMT) utilized to assess the study's discriminant validity. None of the HTMT values in the

research exceeded 0.90, proving that the constructs were distinct. Therefore, the study provides evidence that discriminant validity has been achieved.

Table 5 – Heterotrait-Monotrait Ratio (HTMT) results

| | AlphaIndividual Diferencies PersonnalityTrs | Facilitating Conditions | PRoyalties | PUsefulness | PValue | PVerifiability | Perceived Scarcity | Purchase Intention | Social Influence | AlphaIndividual Diferencies PersonnalityTrs x PValue |
|---|---|---|---|---|---|---|---|---|---|---|
| AlphaIndividual Diferencies PersonnalityTrs | | | | | | | | | | |
| Facilitating Conditions | 0.11 | | | | | | | | | |
| PRoyalties | 0.566 | 0.117 | | | | | | | | |
| PUniqueness | 0.61 | 0.194 | 0.609 | | | | | | | |
| PValue | 0.603 | 0.244 | 0.708 | 0.704 | | | | | | |
| PVerifiability | 0.361 | 0.488 | 0.487 | 0.576 | 0.648 | | | | | |
| Perceived Scarcity | 0.603 | 0.082 | 0.645 | 0.886 | 0.758 | 0.523 | | | | |
| Purchase Intention | 0.696 | 0.341 | 0.62 | 0.726 | 0.79 | 0.653 | 0.752 | | | |
| Social Influence | 0.726 | 0.112 | 0.468 | 0.741 | 0.682 | 0.42 | 0.777 | 0.733 | | |
| AlphaIndividual Diferencies PersonnalityTrs x PValue | 0.356 | 0.099 | 0.523 | 0.339 | 0.499 | 0.304 | 0.32 | 0.366 | 0.165 | |

The inner Variance Inflation Factor (VIF) was also investigated to make sure that multicollinearity was not present. The findings in Table 6 demonstrated that there was no multicollinearity problem because all indicators had VIF values less than 5.

Table 6 – Inner Variance Inflation Factor (VIF) results

| | AlphaIndividual Diferencies PersonnalityTrs | Facilitating Conditions | PRoyalties | PUsefulness | PValue | PVerifiability | Perceived Scarcity | Purchase Intention | Social Influence | AlphaIndividual Diferencies PersonnalityTrs x PValue |
|---|---|---|---|---|---|---|---|---|---|---|
| AlphaIndividual Diferencies PersonnalityTrs | | | | | | | | 1.798 | | |
| Facilitating Conditions | | | | | | | | 1.067 | | |
| PRoyalties | | | | | 1.696 | | | | | |
| PUniqueness | | | | | 2.665 | | | | | |
| PValue | | | | | | | | 2.044 | | |
| PVerifiability | | | | | 1.432 | | | | | |
| Perceived Scarcity | | | | | 2.807 | | | | | |
| Purchase Intention | | | | | | | | | | |
| Social Influence | | | | | | | | 1.959 | | |
| AlphaIndividual Diferencies PersonnalityTrs x PValue | | | | | | | | 1.372 | | |

### 4.3. STRUCTURAL MODEL RESULTS

Once the adequacy of the measurement model was confirmed, the next phase involves evaluating the structural model, which was carried out in this study using the path coefficients and bootstrapping approach with 5000 subsamples (Al-Adwan et al., 2023; Martinez-Ruiz & Aluja-Banet, 2009).

The structure model of the study is depicted in Figure 3, and the detailed path model is provided in Tables 7.

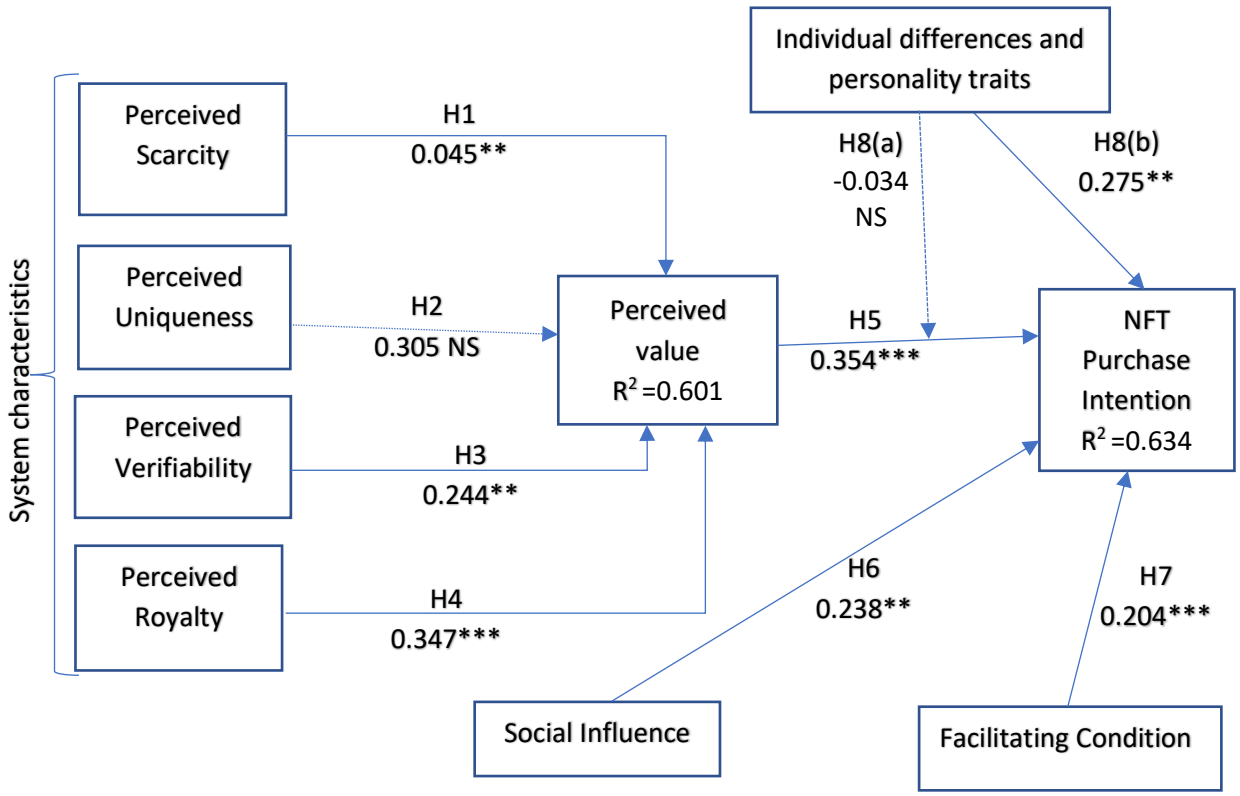


Figure 3 – Structural Model

Table 7 – Path model results

| Hypothesis | Original sample (O) | Sample mean (M) | Standard deviation (STDEV) | T statistics (\|O/STDEV\|) | P values | Conclusion Hypothesis validation |
|---|---|---|---|---|---|---|
| ***H1:*** *PS -> PVA* | 0.347 | 0.338 | 0.11 | 3.149 | 0.002** | significant |
| **H2:** PU -> PVA | 0.045 | 0.054 | 0.104 | 0.429 | 0.668 NS | Non-significant |
| ***H3:*** *PVE -> PVA* | 0.244 | 0.247 | 0.078 | 3.124 | 0.002** | significant |
| ***H4:*** *PR -> PVA* | 0.305 | 0.306 | 0.083 | 3.664 | 0*** | significant |
| ***H5:*** *PVA -> PI* | 0.354 | 0.347 | 0.086 | 4.127 | 0*** | significant |
| ***H6:*** *SI -> PI* | 0.238 | 0.246 | 0.091 | 2.628 | 0.009** | significant |
| ***H7:*** *FC -> PI* | 0.204 | 0.209 | 0.061 | 3.333 | 0.001*** | significant |
| ***H8(a):*** *IDPT x PVA -> PI* | -0.034 | -0.037 | 0.051 | 0.668 | 0.504 NS | Non-significant |
| ***H8(b):*** *IDPT -> PI* | 0.275 | 0.273 | 0.087 | 3.146 | 0.002** | significant |

The findings presented in Table 7 demonstrate that perceived scarcity (H1, β=0.347, p<0.05) and perceived verifiability (H3, β=0.244, p<0.05) had a medium impact on perceived value, while perceived uniqueness (H2, β=0.045, p>0.05) was determined to be statistically insignificant. The explanation for this could be that customers may prioritize the limited

edition nature of NFTs, which triggers a fear of missing out (FOMO) among potential buyers, rather than focusing solely on the uniqueness of the NFTs.

Perceived royalty was also found to have a significant impact on perceived value (H4, $\beta=0.305$, $p<0.001$). Furthermore, the results indicated that perceived value had a significant effect on purchase intention (H5, $\beta=0.354$, $p<0.001$). The proposed research model also identified social influence (H6, $\beta=0.238$, $p<0.05$) and individual differences and personality traits (H9, $\beta=0.275$, $p<0.05$) as having a medium impact on purchase intention, while facilitating conditions (H7, $\beta=0.204$, $p<0.001$) strongly influenced it. However, the study's hypothesis H8, which proposed a moderating effect of individual differences and personality traits on the relationship between perceived value and purchase intention, was not supported by the results, as indicated by the insignificant beta coefficient of -0.034 and p-value greater than 0.05. Therefore, the results suggest that the impact of perceived value on NFT purchase intention is not influenced or moderated by individual differences or personality traits. This finding indicates that in the context of NFTs, individual differences and personality traits may not play a significant role in shaping the relationship between perceived value and purchase intention.

In summary, H1, H3, H4, H5, H6, H7, and H8(b) were supported, while H2 and H8(a) were rejected.

The R-square (R2) values provide information about the contribution of all variables (Chen et al., 2022). In this study, the R-square value of 0.634 for purchase intention indicates that the model can explain 63.4% of the total variance in purchase intention, while the R-square value of 0.601 for perceived value demonstrate that 60.1% of the total variance can be explained. These results suggest that the model exhibits a high level of predictive power, with R2 values of 0.634 and 0.601 for purchase intention and perceived value, respectively. The significant effect of independent constructs on the dependent constructs in the research is supported by the high value of R-square (S et al., 2020).

## 5. DISCUSSION

In recent years, discussions related to NFTs have surged. NFTs garnered significant interest from crypto and blockchain enthusiasts as well as various industries and brands (Kiliçaslan & EkiZler, 2022). The 2021 Gartner Hype Cycle for Key Technologies highlights that NFTs have the potential to substantially alter marketing practices. Consequently, marketing managers need to be ready to meet the rising demand of consumers for NFTs and fulfill their growing interest in these digital assets (Chohan & Paschen, 2023). To effectively incorporate NFTs into their marketing strategies, these managers must understand the determinants of NFT purchasing. With this understanding, they can develop effective marketing campaigns to encourage potential buyers to invest in NFTs.

To investigate the factors influencing the acceptance and adoption of Non-Fungible Tokens (NFTs) by individuals, this research employed a comprehensive approach that integrated concepts from the Technology Acceptance Model (TAM) and relevant theoretical literature on NFTs. As highlighted in the study, the concepts related to NFTs are still relatively new, resulting in a limited amount of academic research on these topics. The results of this study indicate that various factors including perceived scarcity, perceived verifiability, perceived royalty, perceived value, social influence, facilitating conditions, and individual differences and personality traits can all influence the decision to purchase NFTs. Moreover, this study also highlights that perceived royalty, perceived value, and facilitating conditions have a significant impact on NFT purchase intention.

Previous research has shown that due to the scarce nature of NFTs, they can be utilized by brands as an alternate medium to cultivate a more devoted customer base. However, the same study also discovered that perceived uniqueness had no significant impact on perceived value (Kiliçaslan & EkiZler, 2022). Similarly, our study also yielded similar results regarding the effects of perceived scarcity and perceived uniqueness.

The study's findings demonstrated that the user's intention to purchase NFT was positively affected by facilitating conditions. This finding aligns with prior research that suggests facilitating conditions impact the behavioral intention to use cryptocurrency (Gunawijaya & Rahadi, 2023; Joshi et al., 2023). Huang & Kao (2015) study also demonstrated that facilitating conditions have a significant influence on individuals' behavioral intention and usage of technology. This implies that in order to promote the purchase of NFTs, It is crucial to take into account the facilitating conditions that are necessary for users to easily access and use the technology.

The research conducted by Kiliçaslan & EkiZler (2022) found that Perceived value did not emerge as a significant factor in influencing the purchase intention of NFTs. In contract, another study indicates that technical impact, which refers to the technical aspects that affect service quality and delivery, can affect users' attitudes and intentions (Albayati et al., 2023).

Our study similarly demonstrated that perceived value, which encompasses the quality and characteristics of NFTs, can have an impact on purchase intention.

Albayati et al. (2023) demonstrated that social influence and the opinions of those we trust can impact the decision-making in the NFT Metaverse among users. Our study also discovered that social influence has a moderate impact on the decision to purchase NFTs.

The findings of hypothesis 8(a) in this study indicate that individual differences and personality traits do not moderate the relationship between perceived value and intention to purchase NFTs. This result is consistent with a previous study by Hasan et al. (2022). As noted by Al-Adwan et al. (2023), people who possess a notable level of personal innovativeness tend to be more open and willing to adopt novel technologies, and metaverse-based learning systems are more likely to be used by students with high degrees of personal innovativeness. In addition, individuals with high levels of personal innovativeness typically have high degree of self-efficacy, which makes it easier for them to successfully adapt new educational technologies like metaverse-based learning platforms. Our study supports the notion that individual differences and personality traits can have an impact on NFT purchase intention, highlighting the significance of comprehending consumers' personal innovativeness and self-efficacy when marketing NFTs in the metaverse.

One of the significant limitations of this study is the small sample size and the limited number of individuals with NFT experience. This is attributed to the early stages of NFT adoption. It is expected that NFT adoption will increase in the future, potentially leading to more substantial sample sizes for future studies. This study represents one of the earlier investigations on these topics and therefore the sample size was relatively small. In addition, some features and research topics may not have been fully addressed because of the particular model and structure employed in our study, which may have limited the scope of the analysis.

## 6. CONCLUSIONS, IMPLICATIONS AND FUTURE WORK

The primary objective of this research is to determine the key factors that impact an individual's choice to buy NFTs. In order to accomplish this goal, a hypothesized model was constructed by incorporating the concepts of Technology Acceptance Model (TAM) and relevant theoretical literature on NFT. Following the model construction, a survey was conducted to collect pertinent data. The findings of the study indicate that perceived value and facilitating conditions exert a more significant influence on individuals' inclination to buy NFTs compared to social influence and individual differences and personality traits. Moreover, although perceived scarcity, perceived verifiability, and perceived royalty were demonstrated to have an effect on perceived value, the influence of perceived uniqueness on perceived value was not statistically significant. Notably, perceived royalty also exhibited a significant impact on perceived value. Furthermore, the study findings indicate that individual differences and personality traits do not moderate or influence the relationship between perceived value and NFT purchase intention. In other words, the impact of perceived value on the intention to purchase NFTs remains consistent regardless of an individual's unique characteristics or personality traits. However, it was also observed that individual differences and personality traits have a direct influence on NFT purchase intention, rather than acting as a moderator.

The findings of this study have significantly contribute to our current comprehension of NFT adoption and provide valuable insights for businesses and marketers seeking to effectively target NFT buyers. Businesses can tailor their strategies and enhance their marketing efforts in the NFT sector by comprehending the impact of perceived value, facilitating conditions, social influence, and individual differences and personality traits. Understanding the variables that drive NFT adoption and purchase intention enables businesses to better address the requirements and preferences of potential consumers, boosting the likelihood of acquiring and maintaining customers in the NFT market. Moreover, this study has provided academics with insightful information that will serve as a strong foundation for future studies on the adoption of NFTs, consumer behavior, and the factors that influence people's intents to purchase NFTs. Furthermore, this work has expanded our understanding of the intense interest and focus on NFTs. It has therefore opened the door for more research in academia, enabling the investigation of NFT adoption and its affecting elements.

Based on the study's results, businesses can prioritize perceived value components, such as perceived scarcity, verifiability, and royalty in their NFT offerings, marketing messaging, and promotional activities to effectively attract new customers. Ensuring transparency and trust-building measures within the NFT ecosystem is crucial for perceived verifiability. This entails providing accurate information about the origin, ownership, and legitimacy of NFTs, as well as establishing reliable and secure platforms for NFT transactions. Transparent information regarding potential royalties or earnings associated with specific NFTs should also be provided

to address the influence of perceived royalty on perceived value. Finally, to leverage the impact of perceived scarcity on perceived value, businesses, marketers, and policymakers can focus on highlighting the limited availability of NFTs through their marketing and promotional campaigns. The findings of the study also emphasize the impact of social influence, facilitating conditions, and individual differences and personality traits on NFT purchase intention. Businesses can take advantage of social influence by highlighting the positive social impact and benefits linked to owning NFTs. By highlighting how owning and supporting NFTs contribute to artists, promote digital art, and foster community participation, businesses can appeal to socially conscious buyers and tap into this segment of the market. Furthermore, businesses can enhance user experiences, simplify the NFT purchase process, and develop user-friendly interfaces to improve facilitating conditions and attract a wider user base. Additionally, by recognizing the influence of individual differences and personality traits on NFT purchase intention, businesses and marketers can develop personalized marketing strategies. This involves identifying buyer personas with distinct traits and preferences and tailoring their messaging, branding, and outreach efforts accordingly. Customized approaches enable companies to better connect with their target audience and optimize the effectiveness of their marketing efforts in the NFT industry.

Since the study was conducted using a cross-sectional approach, it is limited in its ability to accurately measure alterations in human behavior throughout time. Therefore, to gain a better understanding of the evolving factors that can influence a user's acceptance of NFTs, the researcher recommends carrying out longitudinal studies in the future. By using a longitudinal design, researchers can observe and analyze the progressive changes in behavior and attitudes over an extended period, allowing for more comprehensive insights into the acceptance of NFTs by users. Furthermore, it is imperative for future research to examine the behavior of individuals who have already adopted NFTs, specifically their actions and choices subsequent to adopting the technology, in order to identify the factors that contribute to sustained usage. By studying how NFT users continue to engage with the technology over time, researchers can acquire a more profound comprehension of the ongoing motivations and influences that drive their intentions. Consequently, it is highly recommended that future research should prioritize the examination of the post-adoption behavior of NFT adopters to reveal the factors that foster their continued utilization of this technology.

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## APPENDIX A

Appendix A - Measurement Model

| Construct | Measurement Items | Reference |
|---|---|---|
| Perceived Scarcity | *When I see my favourite NFT with a sales countdown, I want to buy it aggressively.* | (Chen et al., 2020) |
| | *I feel that owning a limited-edition NFT can create a personal aura and value, representing high social status, not general public.* | |
| | *Possessing limited-edition NFT, I have a sense of accomplishment that I am unique.* | |
| | *I feel unique in surrounding others by having a limited-edition NFT.* | |
| | *When I see seasonal limited NFT, I feel it is very worth buying the product.* | |
| Perceived Uniqueness | *Having an eye for NFTs that are interesting and unusual assists me in establishing a distinct image.* | (Liang & He, 2012) (Nan et al., 2022) |
| | *When buying NFTs, an important goal is to find something that communicates my uniqueness.* | |
| | *I actively seek to develop my personal uniqueness by purchasing special NFTs.* | |
| | *I often think of the NFTs I buy and do in terms of how I can use them to shape a more unusual personal image.* | |
| | *The NFTs has distinctive features and appearance.* | |
| Perceived Verifiability | *I find NFT processes trustworthy.* | (Chen et al., 2022) (Fettahoğlu & Sayan, 2021) (Joo & Han, 2021) |
| | *With NFT I don't have to trust an authority.* | |
| | *I believe that it is easy to trace the history of all items along NFT supply chain.* | |
| | *I believe that it is easy to verify all information ranging from the origin of a specified item to its sale along NFT supply chain.* | |
| Perceived Royalty | *I would invest in NFT because I want to generate high returns.* | (Pos, 2022) |
| | *I would invest in NFT because I expect to make a profit.* | |
| | *I would invest in NFTs because I aim for financial gains.* | |
| | *I would invest in NFTs because I believe it's price will increase.* | |
| Perceived Value | *I consider NFT to be a good investment.* | (Hellier et al., 2003) |
| | *My NFTs provides me with a high investment return.* | |
| | *The flexibility of NFTs is sufficient to meet my needs.* | |

| | | |
|---|---|---|
| Social influence | *People who influence my behavior encourage me to use NFTs.* | (Kumar & Madhumohan, 2014)<br><br>(Rahi et al., 2018) |
| | *My family thinks I should use NFTs.* | |
| | *I would get NFTs if my friends recommend it.* | |
| | *Among my peers, possessing NFT is considered as a prestige symbol.* | |
| facilitating condition | *I have access to enough resources to purchase NFT.* | (Shen et al., 2017) |
| | *I have enough knowledge to use NFTs.* | |
| | *There are specialists who can help me solve operational issues with NFT purchase.* | |
| individual differences and personality traits | *I would purchase my favorite NFT if I could find self-help information on YouTube for assistance through the steps.* | (Chan et al., 2010)<br><br>(Sharma et al., 2017) |
| | *I would purchase this NFT if I someone showed me how to do it first.* | |
| | *I am not hesitant to try new technologies.* | |
| | *Among my peers, I am usually the first person to try new technologies.* | |
| NFT Purchase Intention | *"I would consider buying this NFT at expected price."* | (Kiliçaslan & EkiZler, 2022) |
| | *"The likelihood of purchasing this NFT is high."* | |
| | *"The probability that I would consider buying this NFT is high."* | |

## APPENDIX B

Nova IMS Ethics Committee


This is to certify that
Project No.: **INFSYS2023-3-123823**
Project Title: **The main variables that push buying NFT**
Principal Researcher: **Mona ZavichiTork**

according to the regulations of the Ethics Committee of NOVA IMS and MagIC Research Center this project was considered to meet the requirements of the NOVA IMS Internal Review Board, being considered **APPROVED** on 3/15/2023.

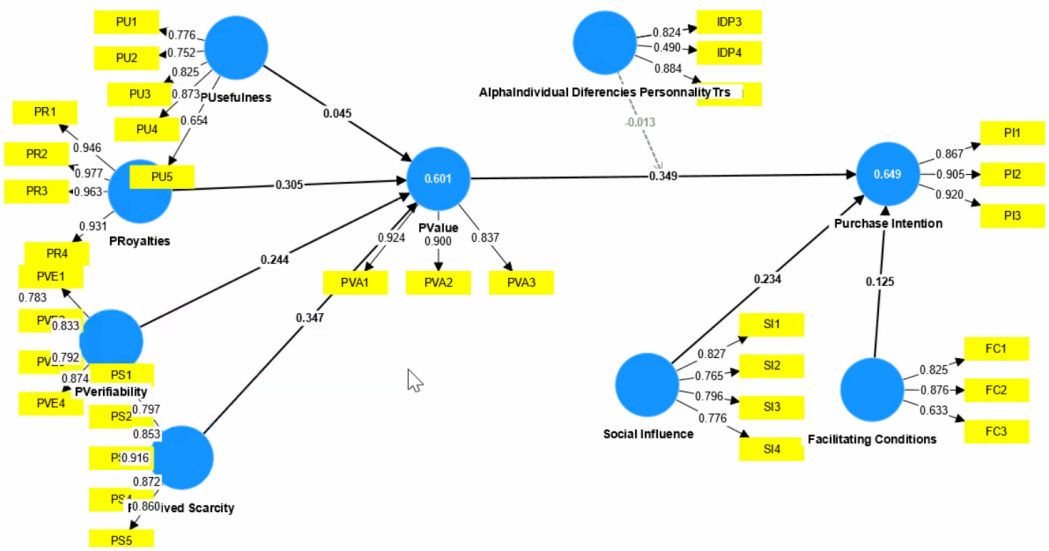
It is the Principal Researcher's responsibility to ensure that all researchers and stakeholders associated with this project are aware of the conditions of approval and which documents have been approved.

The Principal Researcher is required to notify the Ethics Committee, via amendment or progress report, of
- Any significant change to the project and the reason for that change;
- Any unforeseen events or unexpected developments that merit notification;
- The inability of the Principal Researcher to continue in that role or any other change in research personnel involved in the project.

Lisbon, 3/15/2023

NOVA IMS Ethics Committee
ethicscommittee@novaims.unl.pt

## APPENDIX C




Appendix C – Outer Loading results

## APPENDIX D

Appendix D – cross-loadings results

| | AlphaIndividual Diferencies Personnality Trs | Facilitating Conditions | PRoyalties | PUniqueness | PValue | PVerifiability | Perceived Scarcity | Purchase Intention | Social Influence | AlphaIndividual Diferencies Personnality Trs x PValue |
|---|---|---|---|---|---|---|---|---|---|---|
| FC1 | 0.056 | **0.896** | 0.114 | 0.078 | 0.153 | 0.349 | 0.003 | 0.239 | 0.031 | -0.1 |
| FC2 | -0.079 | **0.922** | 0.075 | 0.077 | 0.211 | 0.354 | 0.059 | 0.274 | 0.042 | -0.06 |
| IDPT2 | **0.938** | -0.104 | 0.52 | 0.446 | 0.455 | 0.265 | 0.493 | 0.568 | 0.532 | -0.302 |
| IDPT1 | **0.942** | 0.068 | 0.453 | 0.525 | 0.519 | 0.329 | 0.515 | 0.583 | 0.6 | -0.322 |
| PI1 | 0.646 | 0.162 | 0.61 | 0.536 | 0.655 | 0.472 | 0.635 | **0.867** | 0.558 | -0.48 |
| PI2 | 0.462 | 0.346 | 0.434 | 0.584 | 0.573 | 0.53 | 0.577 | **0.906** | 0.552 | -0.202 |
| PI3 | 0.531 | 0.262 | 0.497 | 0.574 | 0.635 | 0.533 | 0.604 | **0.921** | 0.561 | -0.243 |
| PR1 | 0.439 | 0.17 | **0.946** | 0.518 | 0.635 | 0.454 | 0.581 | 0.574 | 0.402 | -0.476 |
| PR2 | 0.512 | 0.119 | **0.977** | 0.539 | 0.631 | 0.42 | 0.591 | 0.563 | 0.408 | -0.49 |
| PR3 | 0.527 | 0.048 | **0.963** | 0.515 | 0.595 | 0.424 | 0.543 | 0.511 | 0.407 | -0.474 |
| PR4 | 0.499 | 0.048 | **0.931** | 0.529 | 0.62 | 0.425 | 0.597 | 0.546 | 0.338 | -0.521 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PS1 | 0.39 | 0.094 | 0.44 | 0.601 | 0.608 | 0.448 | **0.797** | 0.559 | 0.536 | -0.279 |
| PS2 | 0.525 | -0.057 | 0.59 | 0.668 | 0.581 | 0.358 | **0.853** | 0.569 | 0.535 | -0.279 |
| PS3 | 0.469 | 0.061 | 0.557 | 0.666 | 0.622 | 0.466 | **0.916** | 0.637 | 0.566 | -0.269 |
| PS4 | 0.506 | 0.043 | 0.517 | 0.717 | 0.547 | 0.346 | **0.872** | 0.571 | 0.585 | -0.24 |
| PS5 | 0.418 | 0.01 | 0.503 | 0.667 | 0.564 | 0.398 | **0.86** | 0.564 | 0.628 | -0.244 |
| PU1 | 0.408 | -0.035 | 0.525 | **0.776** | 0.488 | 0.339 | 0.658 | 0.413 | 0.448 | -0.269 |
| PU2 | 0.479 | -0.13 | 0.37 | **0.752** | 0.385 | 0.295 | 0.615 | 0.379 | 0.485 | -0.249 |
| PU3 | 0.353 | 0.158 | 0.356 | **0.825** | 0.45 | 0.324 | 0.597 | 0.486 | 0.529 | -0.231 |
| PU4 | 0.442 | 0.163 | 0.458 | **0.873** | 0.535 | 0.476 | 0.657 | 0.611 | 0.601 | -0.206 |
| PU5 | 0.337 | 0.133 | 0.416 | **0.654** | 0.468 | 0.504 | 0.469 | 0.525 | 0.287 | -0.248 |
| PVA1 | 0.436 | 0.16 | 0.6 | 0.579 | **0.924** | 0.522 | 0.7 | 0.665 | 0.559 | -0.382 |
| PVA2 | 0.46 | 0.186 | 0.625 | 0.515 | **0.9** | 0.484 | 0.612 | 0.627 | 0.498 | -0.428 |
| PVA3 | 0.496 | 0.197 | 0.5 | 0.512 | **0.837** | 0.51 | 0.486 | 0.547 | 0.466 | -0.427 |
| PVE1 | 0.306 | 0.194 | 0.442 | 0.515 | 0.571 | **0.783** | 0.455 | 0.502 | 0.386 | -0.173 |
| PVE2 | 0.177 | 0.356 | 0.316 | 0.396 | 0.433 | **0.833** | 0.334 | 0.484 | 0.291 | -0.204 |
| PVE3 | 0.231 | 0.379 | 0.293 | 0.316 | 0.38 | **0.792** | 0.332 | 0.405 | 0.231 | -0.247 |
| PVE4 | 0.303 | 0.382 | 0.395 | 0.381 | 0.432 | **0.874** | 0.395 | 0.455 | 0.24 | -0.294 |
| SI1 | 0.431 | 0.025 | 0.372 | 0.547 | 0.475 | 0.367 | 0.592 | 0.501 | **0.827** | -0.171 |
| SI2 | 0.441 | 0.137 | 0.219 | 0.419 | 0.491 | 0.284 | 0.463 | 0.546 | **0.766** | -0.051 |
| SI3 | 0.529 | 0.003 | 0.378 | 0.483 | 0.41 | 0.277 | 0.526 | 0.468 | **0.796** | -0.074 |
| SI4 | 0.519 | -0.058 | 0.336 | 0.474 | 0.43 | 0.206 | 0.52 | 0.437 | **0.775** | -0.172 |
| IDPT x PVA | -0.332 | -0.086 | -0.514 | -0.308 | -0.461 | -0.274 | -0.306 | -0.348 | -0.145 | **1** |