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The NFT Purchasing Process and the Challenges to Trust at Each Stage

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Abstract: The unique features of Non-Fungible Tokens (NFT) are becoming increasingly appealing as we spend more of our time online. This increased popularity is nevertheless not free of controversies, and there is a lack of clarity over the final form this digital asset will take. While there are some early adopters, the whole NFT ecosystem will have to be clarified for wider adoption, particularly the purchasing process. This research evaluates a model of the purchasing process of NFTs and the role of trust in this process. The validated model identified that the purchasing process of NFTs has four stages and each stage is affected by trust: (1) Trust in the cryptocurrency wallet, (2) trust in the cryptocurrency purchase, (3) trust in the NFT marketplace, and (4) trust in aftersales services.

Keywords: Non-Fungible Tokens; NFT; digital assets; cryptoassets; blockchain; trust

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1. Introduction

The technology of a Non-Fungible Token (NFT) involves data on a blockchain that cannot be changed after they have been added. Therefore, while they share similar blockchain technology with cryptocurrencies, the functionality is different. NFTs are a form of 'cryptoasset', and they are part of the much broader category of digital assets [1]. Their functionality enables them to be used to prove ownership of an intangible-digital, or tangible-physical, asset [2,3] and the associated rights the owner has [4]. NFTs can also unequivocally prove who the previous owners were, which is another way of supporting an NFT's authenticity, as ownership can be traced back to the creator. The most popular practical application of NFTs for digital assets is proving ownership of digital art, virtual items in computer games, and music. For physical assets, they are often used to prove ownership of real estate, luxury bags, and certificates [5]. In some recent examples, all three uses are combined: In a recent NFT virtual fashion show, virtual clothes to be used in virtual worlds were sold along with fashion of a physical nature, for the offline world, where the ownership is proven with NFTs. Additionally, some fashion items of a physical nature, to be worn in the real world, were tokenized so that someone could own a part of a historically significant item of clothing [6]. Other implementations include tracking pharmaceuticals along the supply chain [7] and verifying the authenticity of diamonds and certificates [8].

The popularity of NFTs, and digital assets in general, is increasing due to the conflation of several trends and emerging technologies. These include online games, virtual worlds—also referred to as the metaverse—and the increased demand for digital art [9]. While there is enthusiasm from its early adopters, this does not guarantee that NFTs will be adopted by the wider public and form sustainable business models. Is it, however, a question of technology adoption? Should we be referring to the adoption of NFTs, or their purchase? In one sense, it is a purchase as money is traded for them. In another sense, it is an adoption of not one, but several technologies. While the casual observer might think the purchase process is monolithic, such as purchasing an item of clothing online, a closer look reveals several steps, involving the adoption of several technologies. While the many

organizations involved attempt to mask the complexity from the user, there is nevertheless complexity and risk at several stages of the process.

The people who purchase an NFT or something that includes NFTs are often different from those who use other digital assets. The differences in the consumer's profile can also lead to a different process to purchase them. While most other digital assets are either a form of payment or investment, NFT purchases are often a one-off purchase of digital art. For example, someone purchasing a Bored Ape Yacht Club or CryptoPunks image may have not used an NFT before and may not use them regularly again. While there are several processes to acquire something using blockchain technology, most digital assets have been covered extensively in the literature, unlike the NFT purchasing process. This lack of clarity around NFT purchases causes three problems: The first problem is that consumers purchase NFTs for different reasons such as their claim to uniqueness, in contrast to other digital assets where ownership is harder to support. This means an NFT purchase cannot be seen as any other digital asset. The second problem is that as NFTs are at the early stage of the adoption curve, a relatively small number of consumers have gone through the purchasing process, so their experience is not sufficiently understood. This may cause challenges when this technology reaches a broader adoption. Challenges to trust, which may seem negligible or may even be completely below the surface at this point, may end up 'sinking' this technology as has happened in the past with other emerging technologies, e.g., early virtual worlds before 2010. Trust, in this context, is the willingness of the consumer purchasing an NFT to be vulnerable to the seller for financial loss [10]. The third problem is that NFTs are triggering new business models to utilize their ability to prove that digital content is authentic [2], without the consumer's trust in the purchasing process being fully explored. Where there is risk, trust is required. When there are several stages with their own distinct risk, it is possible that there is a cumulative effect on trust. Therefore, the research questions are:

What stages does a consumer go through to purchase an NFT?
What are the challenges to the consumer's trust at each of the stages of purchasing an NFT?

In this work, we clarified the stages of the consumer's purchase and then developed a model of how these stages affect trust. The developed and tested model identifies four factors influencing trust in an NFT purchase: (1) Trust in the cryptocurrency wallet, (2) trust in the cryptocurrency purchase, (3) trust in the NFT marketplace, and (4) trust in resolving disputes. The Partial Least Squares–Structural Equation Modelling found that all four factors affecting trust had a significant effect, with the first, third, and fourth having a strong effect.

The following section is the theoretical framework that lays the foundation for the next section, which describes the research model. The methodology section covers the data collection and analysis processes. This is followed by the analysis and findings that cover both theoretical and practical contributions. Lastly, the conclusion summarizes the key points, limitations, and future research.

2. Theoretic Framework of NFT Purchasing Process and Trust

There is research published on NFTs from several areas. The literature review found a particularly strong interest in NFTs in the areas of law, economics, cybersecurity, finance, business, and information systems. However, the review also found that the NFT purchasing process and the role of trust have not been sufficiently covered. This is particularly noticeable when compared to other areas of research on the NFT phenomenon such as the economic and legal implications [11]. The following two sections review (1) the purchasing process for NFTs and (2) trust in the blockchain and trust in payments. Related uses of NFT technology such as smart contracts that are immutable are not the focus of this literature review as they are not the target of a consumer's purchase and involve a different process.

2.1. The Purchasing Process for NFTs

The daily purchases we make of low monetary value are not the same as the purchases of financial assets of significant value. The purchase of financial assets can have a variety of stages including underwriting (raising capital for a client), issuance (issuing the asset), depository (safe storage), distribution (selling), and registration (adding new owners to the list). Typically, the larger the investment, the more of these steps will be taken separately with separate organizations. However, the purchase of NFTs differs from this process. In most cases, there is no need for a registrar as the blockchain keeps a ledger, and the other processes are handled by one organization. The process of trading in the stock market is likely closer to the process of purchasing an NFT. When trading financial assets such as stocks there are typically four stages: (1) Exchange, (2) brokerage, (3) clearing, and (4) settlement. Blockchain technology can handle both the (3) clearing and (4) settlement of the trade [12].

The four successful business models utilizing NFTs are as follows: Firstly, someone that creates an NFT; secondly, an NFT marketplace offering them for sale; thirdly, fan tokens; and lastly, online games with virtual items minted as NFTs [13]. Most NFTs are purchased from dedicated NFT marketplaces such as OpenSea (OpenSea.io) and Binance NFT Marketplace (www.binance.com/en/nft, accessed on 1 October 2022). These marketplaces host the NFTs but the buyer still needs to have a cryptocurrency wallet to use them. For example, OpenSea allows approximately 15 cryptocurrency wallets including MetaMask and Coinbase Wallet. A cryptocurrency wallet is a digital equivalent of a wallet, and it is used to store and use cryptocurrencies and NFTs. An NFT marketplace is a website that enables consumers to purchase NFTs.

More specifically for NFTs, Binance, a leading cryptoasset marketplace, suggests to its consumers that there are four steps to purchasing NFTs, but the first step could be split into two or three separate steps: (1) Create an account and deposit cryptocurrencies in the wallet, (2) access the marketplace, (3) identify the NFT you want to purchase, and (4) make a purchase. This process is also simpler because the cryptocurrency wallet provider and the marketplace provider are the same. This is not typically the case. Therefore, for example, at OpenSea, a consumer using a MetaMask wallet would need one additional step.

The number of cryptocurrencies supported is also different between different marketplaces. For example, OpenSea currently supports three, whereas Binance NFT Marketplace accepts over 50 on their NFT marketplace. This means that some consumers may need an additional step of changing their cryptocurrencies into the ones being used by the NFT marketplace they chose. The marketplaces charge the consumer for their service, but the amount varies between each marketplace and over time. As an indication, OpenSea charges a 2.5% fee, while Binance NFT Marketplace charges 1%.

It has been widely supported in the literature that purchases online are not one monolithic action, but instead can include several parts [14,15]. There is no consensus on what these stages are exactly, and there may never be one answer that covers all the possible situations because the context can shape the process differently. However, there is extensive support in the literature that a four-stage model applies to many contexts, and a simplified two-stage model applies to others [14,15]. As it is not possible to identify a model that covers all the contexts, it is important to use the one closest to the context being researched in this paper as a starting point and test it. A popular four-stage model involves (1) requirements determination, (2) vendor selection, (3) purchase, and (4) aftersales service. These four stages can be grouped together into two broader stages: Gathering information on the product or service and executing the transaction [15]. As NFTs are being integrated into an increasing number of technologies and platforms, including, for example, Instagram, each platform may adapt the purchase process to bring it closer to the process used by other assets on that platform.

2.2. Trust in Blockchain and Trust in Payments

Trust is important in many relationships in business. Trust is particularly important in the relationship between the consumer and the organization providing them with a product or service when technology intermediates this relationship [10]. Blockchain technology may support trust, but there are aspects of the final application for the consumer that may create challenges to trust [16]. The final application the consumer uses utilizes a new technology that they are interacting with, supported by a new infrastructure they do not see. The efforts of various regulators to reduce the risk involved for the online consumer in general, and for NFTs in particular, do not resolve these issues entirely. A list of known risks includes a criminal stealing the identity of a legitimate and reputable artist and selling 'fake' NFTs, securities sold as NFTs by people that are not licensed to sell securities, 'wash trading'—a seller purchasing their own NFTs to manipulate the price—and an 'exit scam' or 'rag pull' where the seller takes payment and disappears without delivering on what was promised [17]. Some early NFT issuers are attempting to mitigate this high risk and lack of transparency by issuing a virtual and physical version of the same thing so that the physical version, such as trainer shoes, gives legitimacy to the virtual version [18]. Despite several early efforts from sellers and regulators, the end-consumer faces some lack of transparency and some risk that together create challenges to trust.

This is not necessarily a shortcoming of the regulators, as many regulators want to draw a line where their responsibility ends and the consumer's own responsibility starts so that innovation is not stifled with unnecessary rules. Reducing risk without putting hurdles to innovation can be a delicate balancing act. The legal and regulatory frameworks around purchasing and owning NFTs have been insufficient and incomplete for many years. They do not currently give the necessary legal certainty, but there are ongoing efforts in several countries to ameliorate that. Most countries are moving towards legal acceptance and a strong legal framework. For most countries, the legal clarity given is that digital assets could be used and are compatible with the legal framework, whereas, in other countries such as China, the clarity given is that purchasing digital assets is illegal. Therefore, the world currently has three categories, entirely legal and encouraged (e.g., El Salvador), mostly legal (e.g., France), and mostly illegal (e.g., China). While every consumer may not be fully informed on the legal implications of purchasing, owning, and selling digital assets such as NFTs, the legal and regulatory framework does affect their beliefs and trust. Consumers want to know that they will have a fair remedy if they lose their digital assets, as in several high-profile cases such as Mt. Gox, QuadrigaCX, Terra-Luna, and FTX. In these cases, there were reportedly difficulties in achieving a fair remedy [19]. In the case of digital assets of large financial value, the owner might have to face legal issues when filing their tax reports. Consumers typically want to avoid opportunists, speculators, and fraudsters and also want to have a robust payment method [20]. These risks and the subsequent need for trust appear to spread across the whole purchasing process.

3. Research Model of the NFT Purchasing Process and Trust

The theoretical foundation covers the typical stages of the purchasing process in similar contexts to NFTs. Additionally, literature from areas adjacent to NFTs suggests that consumer trust is important across these stages. The literature gives enough certainty to develop a research model, but this proposed model nevertheless needs to be tested for the specific context of purchasing NFTs. Some research includes the search process a consumer goes through to gather information as a stage of the purchasing process [14], while other works leave it out as it is considered a different process that should be seen separately [21]. The end consumer's information-searching stage for NFTs is also very diverse with little standardization and is out of the scope of this research. The four stages of the purchasing process are more directly related to each other, and they capture a consumer actively making a purchase and executing a transaction. This clarity in focus and purpose is important for accurately measuring peoples' beliefs and having a model that is representative of what it is attempting to model. While the consumer journey is not entirely standardized across

all purchases, it typically consists of the following four stages: (1) Set up a cryptocurrency wallet to pay for and receive NFTs (e.g., MetaMask); (2) purchase cryptocurrency using the wallet or a platform (e.g., Coinbase); (3) use a cryptocurrency wallet to pay for an NFT on an NFT marketplace (e.g., OpenSea) and use the cryptocurrency wallet to receive NFT; and (4) resolve disputes after the purchase: Aftersales service, amendments to owner's rights, blocking resale of stolen NFTs, return, and resale. These four stages are further illustrated in Figure 1.

The research model of trust in the NFT purchasing steps is presented in Figure 2. The cryptocurrency wallet offers payment functionality and storage. There are security and privacy risks related to these wallets [22]. The consumer must trust that the wallet functions as it should: Completes transactions, protects their privacy, and does not have privacy breaches [10,23]. Therefore, the first hypothesis is:

H1. *Trust in cryptocurrency wallets positively influences trust in an NFT purchase.*

Cryptocurrency must be purchased to fulfil the transaction. Typically, this is performed with cryptocurrency wallets. While a digital payment app (e.g., PayPal and Revolut) or stock-trading app (e.g., Robinhood) can be used to purchase cryptocurrencies, they do not usually offer the functionality to make a purchase of an item with them as they are offered more as an investment. This may change in the future. Using a cryptocurrency such as Bitcoin requires trust in it to fulfil its role as a store of value and transfer of money. Risks include the fluctuating value of the cryptocurrency, fluctuating transaction fees [24], and theft of the NFTs [25]. The consumer must trust it as a technology and as a currency [16,23]. Therefore, the second hypothesis is:

H2. *Trust in cryptocurrency purchases positively influences trust in an NFT purchase.*

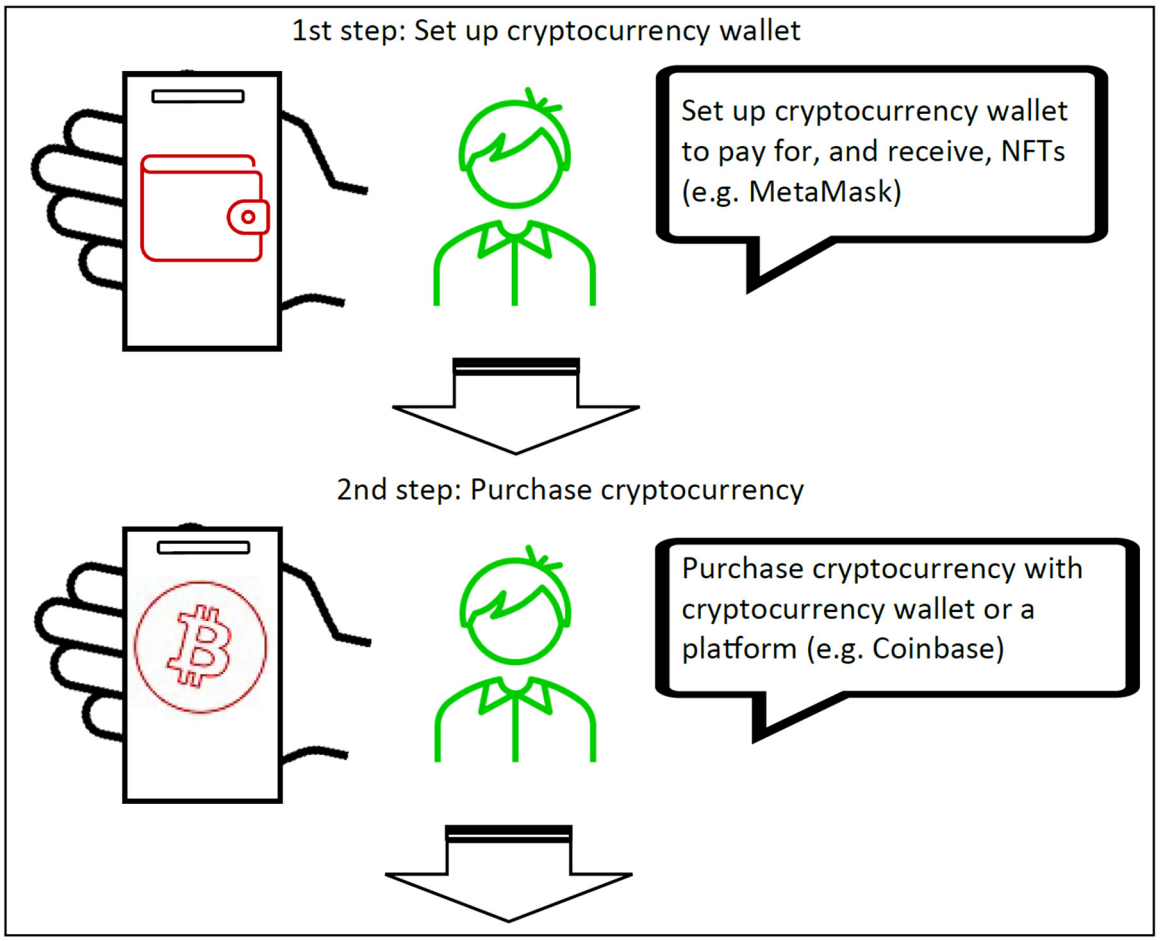

Figure 1. *Cont.*

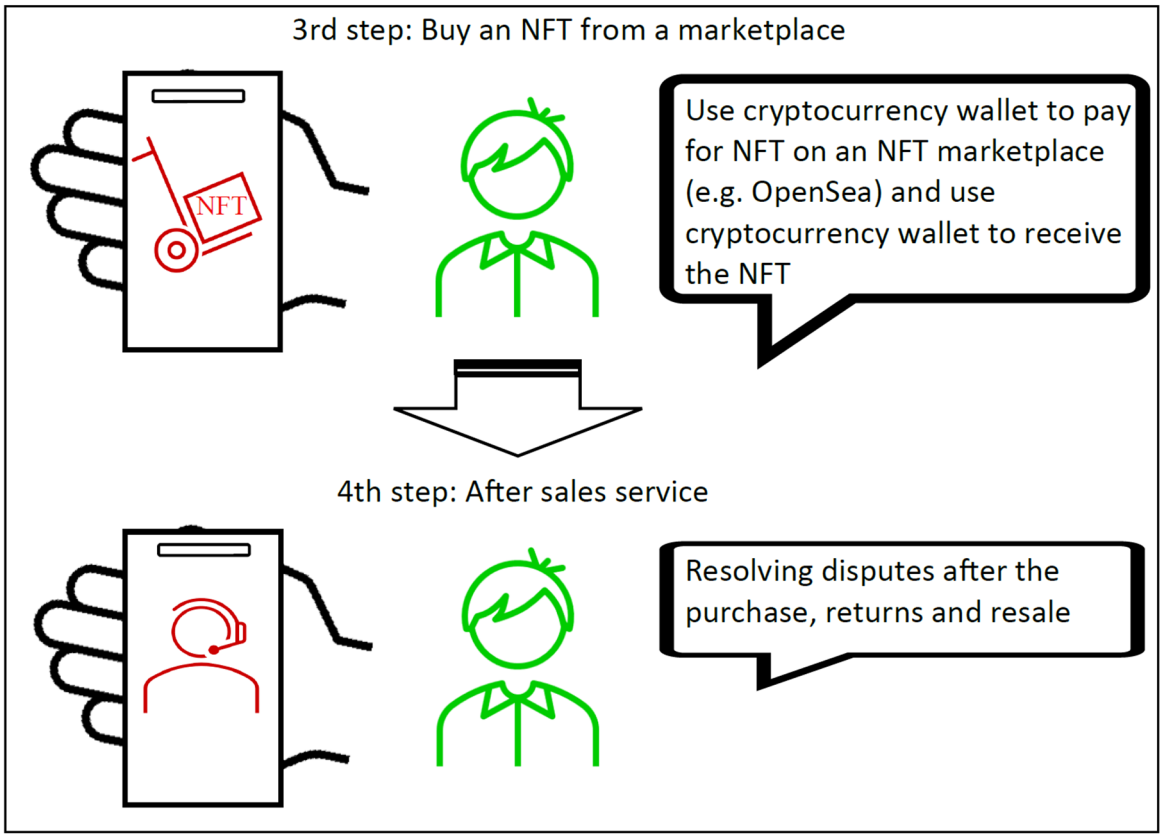

Figure 1. 'Rich Picture' of the four steps a consumer makes to purchase an NFT.

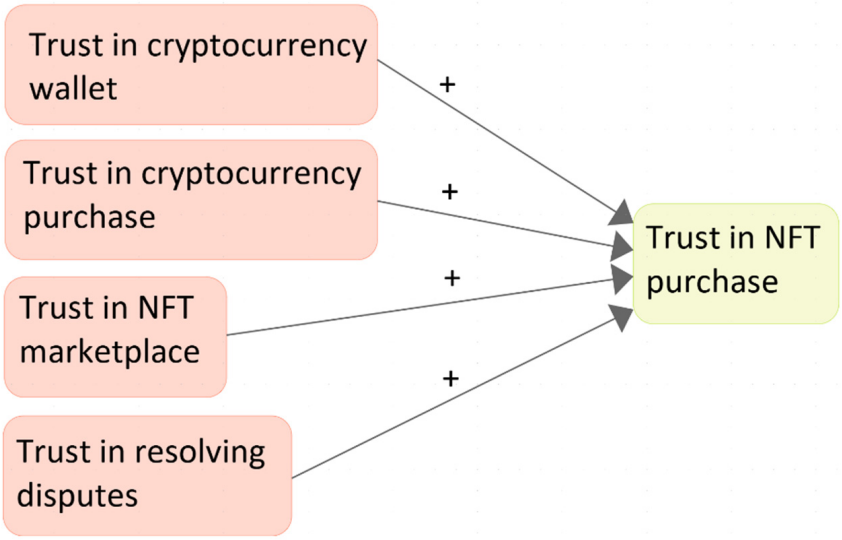

Figure 2. Proposed model of consumer trust in the NFT purchasing steps.

The marketplace of NFTs fulfils several functions. In addition to the obvious, showcasing the NFTs and offering a search and purchase function, they also create contracts. Given the programmability of NFTs, the terms of the agreement may be included, reducing the need for additional intermediaries such as lawyers. For example, the blockchain-based technology behind NFTs can prove that the NFT was sent and received [26]. The consumer must trust the particular marketplace sufficiently to select it out of the alternatives and use it [14,23]. Therefore, the third hypothesis is:

H3. *Trust in NFT marketplaces positively influences trust in an NFT purchase.*

The fundamental difference between NFTs in comparison to cryptocurrencies is that one NFT is not the same as another [4]. Cryptocurrencies are fungible, for example one Bitcoin is the same as another. This difference influences the fourth stage of resolving disputes. Resolving an NFT dispute is not always as simple as reversing one transaction or reimbursing an amount. The consumer must trust the marketplace's aftersales service to select it [14,23]. Therefore, the fourth hypothesis is:

H4. *Trust in resolving disputes with an NFT purchase positively influences trust in an NFT purchase.*

4. Research Method

As the literature review provided a strong theoretical foundation of consumers purchasing other similar technologies, exploratory steps with qualitative analysis were not necessary and the proposed model could be tested quantitatively. The method applied was Partial Least Squares–Structural Equation Modelling (PLS-SEM) with SmartPLS 3.3.5 software. This method is widely used to understand a user's or a consumer's beliefs, particularly their interaction with technology [27,28]. PLS-SEM utilizes measured variables that represent latent variables because some beliefs, such as trust, cannot be easily measured directly [29]. The survey questions given to the participants to answer, so that the variables can be measured, are based on reputable research as Table 1 illustrates.

Table 1. Latent variables and their measured variables.

Latent Variable	Measured Variable	Source of Measured Variables
Trust in cryptocurrency wallet	TW1, TW2, TW3	Lankton et al., 2015; McKnight et al., 2011 [10,23]
Trust in cryptocurrency purchase	TP1, TP2, TP3	Lankton et al., 2015; Zarifis et al., 2014 [16,23]
Trust in NFT marketplace	TM1, TM2, TM3	Choudhury & Karahanna, 2008; Lankton et al., 2015 [14,23]
Trust in resolving disputes	TD1, TD2, TD3	Choudhury & Karahanna, 2008; Lankton et al., 2015 [14,23]
Trust in NFT purchase	TN1, TN2, TN3	Choudhury & Karahanna, 2008; Lankton et al., 2015 [14,23]

4.1. Data Collection Method

While PLS-SEM can be used with small samples, attracting enough participants for the specific model being tested increases confidence in the results. For the model being evaluated here, with five latent variables and three measured variables each, for 80% statistical power and 1% confidence, at least 176 participants are needed [29]. The online survey had 262 submissions. After thorough checks for completeness and validity, 231 could be used. The checks excluded attempts that were incomplete, were completed in an unreasonably short space of time, or had the same value chosen for all questions.

There were six demographic questions and fifteen questions covering the fifteen measured variables. There was also one question asking participants if they had experience using cryptocurrencies. Experience using cryptocurrencies was a requirement to participate in the survey. The participants could respond to each question on a 7-point Likert scale. The survey was hosted online on SoSci Survey (www.soscisurvey.de, accessed on 1 October 2022), which meets GDPR regulations. As this research is carried out within the European Union, it is necessary to follow GDPR regulations in terms of how participants' information is collected and used. The demographic information illustrated in Table 2, shows that the sample is balanced in terms of gender, age, education and income.

Table 2. Demographic information of the survey sample.

Measure	Variable	Participants Percentage
Gender	Female	107 46.42
	Male	124 53.68
Age	Under 18	18 7.79
	18–24	56 24.24
	25–39	97 41.99
	40–59	48 20.78
	60 or older	12 5.19
Educational level	No high school education	18 7.79
	High school graduate	88 38.10
	University bachelor's degree	91 39.39
	University postgraduate degree	34 14.72
Income (in Euro per month)	No income	33 14.29
	400–1200	36 15.58
	1201–3000	111 48.05
	3001–5000	35 15.15
	Over 5000	16 6.93

4.2. Data Analysis Method

The PLS-SEM analysis occurs in two stages, in which the measurement model evaluates how well the measured variables represent the latent variables and the structural model evaluates the model itself. First, the measurement model is tested. This is a form of factor analysis evaluating the relationship between each of the latent variables and their measured variables. Secondly, the structural model evaluates the relationships between the latent variables that form the model and associated hypotheses. In addition to the standard PLS algorithm provided by SmartPLS, the Bootstrapping technique was used to evaluate the statistical significance of the model between the latent variables [29].

5. Analysis

The analysis starts with some basic descriptive analysis, and it is then followed by evaluating the model with PLS-SEM. The PLS-SEM analysis starts with the measurement model and is completed with the structural model.

The preliminary descriptive analysis offered some useful insights. Firstly, the overall low number of participants giving the highest value of '7' to any part of the process indicates that there are indeed some concerns over the purchasing process. The highest response, 7, was selected 361 out of 3234 times, which is less than 9% of the responses. Secondly, the first two variables represent that proven technologies are trusted more on average (5.5, 4.2) than the two newer, less-proven technologies (3.5, 3.9). The first two stages, related to (1) trust in the cryptocurrency wallet and (2) trust in the purchase of cryptocurrency

are closer together. Similarly, the third and fourth stages, which are related to (3) trust in making a purchase on an NFT marketplace and (4) trust in resolving disputes, were closer together. Thirdly, trust in the cryptocurrency wallet was significantly higher than in the NFT marketplace. Fourth, overall, each stage had a different mean, which is an indication that they are, indeed, separate stages. The sections of the analysis that follow provide further support that the differences between the latent variables are statistically significant.

5.1. Measurement Model

The reflective measurement model evaluates the relationship between each of the five latent variables and their measured variables, also often referred to as indicator variables. The measurement model must meet certain criteria before the structural model can be evaluated [29]. Firstly, all the measured variables' factor loadings are above the minimum required level of 0.7 with the lowest being 0.853. The Average Variance Expected (AVE) is above the required level of 0.5 as the lowest value is 0.778. Therefore, both the factor loadings and AVE show a sufficient level of convergent validity. The Composite Reliability (CR) is above 0.7, with the lowest value being 0.913. This indicates that there is sufficient internal consistency and individual construct reliability between the latent variable and the measured variables. The discriminant validity, presented in Table 3, indicates that the measured variables have a stronger relationship with their latent variable than with any of the other variables. Based on the analysis discussed above and present in Table 3, the measurement model is supported, and the analysis can move on to the structural model.

Table 3. Measurement model analysis results.

Variable		Loadings	CR	AVE	Discriminant Validity				
					TD	TM	TN	TP	TW
Trust in resolving disputes	TD1	0.900	0.928	0.812	0.901				
	TD2	0.900							
	TD3	0.903							
Trust in NFT marketplace	TM1	0.917	0.944	0.849	0.805	0.921			
	TM2	0.936							
	TM3	0.911							
Trust in NFT purchase	TN1	0.853	0.921	0.795	0.875	0.887	0.891		
	TN2	0.945							
	TN3	0.874							
Trust in crypto-currency purchase	TP1	0.927	0.939	0.836	0.818	0.848	0.879	0.914	
	TP2	0.920							
	TP3	0.896							
Trust in crypto-currency wallet	TW1	0.890	0.913	0.778	0.799	0.803	0.878	0.814	0.882
	TW2	0.869							
	TW3	0.887							

5.2. Structural Model

The structural model, also referred to as the inner model, evaluates the relationship between the latent variables, also known as constructs [29]. As with the measurement model, several criteria must be met. The coefficient of determination R^2 for the endogenous latent variable TN was 0.898, which is above 0.67 and can be considered 'substantial' [30]. The effect size ($f2$) for the paths TD $\rightarrow$ TN (0.176), TM $\rightarrow$ TN (0.184), and TW $\rightarrow$ TN (0.215) was strong. The effect size of the path TP $\rightarrow$ TN (0.079) was weak but not insignificant. Effect sizes are interpreted as follows: Insignificant = under 0.02, weak = between 0.02 and 0.15, moderate = between 0.15 and 0.35, and strong = above 0.35 [30]. The structural model was further explored with the bootstrapping method, and the results were similar, as illustrated in Table 4.

Table 4. Results of the structural model.

Path	Sample Mean	Standard Deviation	T Statistics	*p*-Value
TD → TN	0.181	0.066	2.652	0.008
TM → TN	0.192	0.065	2.834	0.005
TP → TN	0.087	0.048	1.653	0.099
TW → TN	0.226	0.082	2.624	0.009

6. Findings

Previous research has identified an insufficient understanding of the NFT phenomenon and a need to educate the wider public [8]. This research sheds some light on consumers' beliefs about the challenges of purchasing NFTs. The purchase of an NFT by a consumer should not be seen as one monolithic action but rather four distinct stages of technology adoption, each with its risk and need for trust:

(1) Set up a cryptocurrency wallet to pay for and receive NFTs (e.g., MetaMask).
(2) Purchase cryptocurrency using the wallet or a platform (e.g., Coinbase).
(3) Use the cryptocurrency wallet to pay for an NFT on an NFT marketplace (e.g., OpenSea).
(4) Resolve disputes after the purchase, as well as returns and resale.

The model of trust in an NFT purchase is supported by the data collected. Trust is found to have a significant effect across the four stages of purchasing an NFT, but it is stronger in the first, third, and fourth stages. These stages are (1) trust in the cryptocurrency wallet, (3) trust in the NFT marketplace, and (4) trust in resolving disputes. Trust had a less significant effect in the second stage (2) trust in the cryptocurrency purchase.

6.1. Theoretical Contribution

There are two theoretical contributions: (1) Firstly, the four stages of the purchasing process of NFTs are identified and linked to the existing literature on purchasing stages in e-commerce [14]. (2) Secondly, the significance of trust in the four stages is shown and linked to the existing literature on trust in technology and the purchasing process [14,23]. Therefore, connections are made between the literature on NFTs and digital assets in general, with the purchasing process and trust. Based on the literature review, this area has not been sufficiently covered, unlike other areas such as the economic and legal implications of digital assets [11].

In addition to identifying that the process has four steps, this research distinguishes between two separate stages that influence trust, before the NFT marketplace is involved and the NFT marketplace. It is proven that when a consumer decides to purchase an NFT, there are two steps that influence trust before they go to the NFT marketplace. Therefore, trust in an NFT purchase process does not just involve the NFT marketplace. This is further evidence of how modern e-businesses are often better understood when viewed within their ecosystem rather than when viewed in isolation [4,31].

The four stages to purchase an NFT can differ from the four stages of a different type of purchase in e-commerce, though the third and fourth stages are similar: The third, trust in the marketplace, is similar to trust in the vendor, and the fourth, trust in after-sales service, is also similar [14].

In addition to the insight gained on the research questions, the clarity achieved on the stages of the process contributes to the understanding of NFT business models and how they build trust [13]. A better understanding of NFTs and their relationship with consumers is necessary for this innovation to be truly sustainable across the four pillars of social, economic, and environmental factors [32].

6.2. Practical Contribution

Innovations such as NFTs can initially be rejected by consumers and merchants alike but then gain popularity at a rate that makes it hard for merchants to respond and catch up. By offering clarity on the stages and the importance of trust in each stage, companies in the NFT ecosystem have a roadmap to move forward and keep pace with the rapid growth of NFTs.

The organizations involved in the four stages of purchasing NFTs should be aware of the stages that come before and after them and what trust concerns the consumer has. If there is a thorough understanding of trust across the four stages, some measures can be taken to improve it. If trust is weak in one stage, it can be reinforced in that stage, or if that is not possible, trust in the other stages can be increased to compensate for it. This is important as an organization involved in one stage, may not have control or influence over the other stages, so they may not be able to directly reinforce trust in those stages.

This research sheds light on the NFT ecosystem identifying several of the key players and their business models. This benefits businesses that intend to become involved in this growing innovation and the organizations involved in the ongoing efforts to regulate the NFT ecosystem.

Based on the importance of trust in every one of the four stages, there appear to be two strategies for a business: The first is to lead in one or two of the stages, similar to what is achieved by OpenSea, allowing other parts of the ecosystem to fulfil the other stages in an effective and seamless way. The other parts of the ecosystem are less likely to see such a company as a threat or a 'frienemy' and more likely to collaborate wholeheartedly. The second strategy is to attempt to control all the stages, similar to what the Binance marketplace does. While building a broad open ecosystem is a popular trend, so is the opposite, disintermediation. A company controlling all the stages will hope for 'trust transference' between them. However, as the reported demises of Terra-Luna and FTX in 2022 have shown, a lack of trust also transfers from one part of a business to another [19]. As discussed in the previous section, this research supports the value of understanding ecosystems rather than institutions. Regulators, lawmakers, and economists who are engaged in an ongoing effort to maximize the benefits of NFTs and mitigate the risks will benefit from focusing on the ecosystem rather than individual organizations. This is challenging as they face a cryptoassets ecosystem spread across national borders and jurisdictions.

7. Conclusions

This research identified the stages a consumer goes through to purchase NFTs and validated a model of how trust influences each of those stages. The four stages of the purchase are as follows: (1) Set up a cryptocurrency wallet to pay for and receive NFTs, (2) purchase cryptocurrency using a cryptocurrency wallet or a cryptocurrency platform, (3) use the cryptocurrency wallet to pay for an NFT on an NFT marketplace, and (4) the post-purchase stage including resolving disputes, returns, and resale. Trust has a significant effect across the four stages of purchasing an NFT: (1) Trust in the cryptocurrency wallet, (2) trust in the cryptocurrency purchase, (3) trust in the NFT marketplace, and (4) trust in resolving disputes. Trust is less significant in the second stage.

We next discuss limitations and future research. The limitation of this research is that the sample included participants from only one continent, Europe. It would be useful to replicate this research in other parts of the world. This research answered some questions but it also opened some avenues for further research. Firstly, trust in cryptocurrency was less significant than trust in the cryptocurrency wallet, NFT marketplace, and dispute resolution. It is worth exploring why this is the case. It may be because the first two stages are implemented together or because the cryptocurrency purchase is based on older and more proven technologies. However, it might also have a more fundamental cause that will not change with the passage of time.

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