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User Acceptance of Metaverse: An Analysis for e-Commerce in the Framework of Technology Acceptance Model (TAM)

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Metaverse Kullanıcı Kabulü: Teknoloji Kabul Modeli (TKM) Çerçevesinde e-Ticaret Üzerine Bir Analiz

Abstract

The increase in technology has directed society to penetrate more towards electronic channels. Usage of the internet and e-commerce has been growing dramatically year by year. Thus, households' daily life has become more digitalised, leading innovative entrepreneurs to find new technologies. Firstly, the World has seen the emergence of blockchain technologies in recent years. In the more recent period, terms like Metaverse and NFT became popular. This study aims to analyse Metaverse and NFT terms with Technology Acceptance Model, and accordingly, a structural equation analysis has been conducted via Smart PLS 3. According to the analysis results, Perceived compatibility, enjoyment, and trust have a significant and positive effect on perceived usefulness, the mediation effect has been accepted, and other hypotheses have been rejected. Afterwards, all these results were interpreted accordingly to the analysis.

Keywords : Metaverse, Non-Fungible Token (NFT), Technology Acceptance Model, Consumer Behaviour, e-Commerce, Last Mile Delivery, Blockchain.

JEL Classification Codes : M1, L81, L84, D1.

Öz

Teknolojinin gelişimi insanların elektronik kanallara yoğunlaşmasına neden olmuştur. İnternet kullanımı ve e-ticaret yıllar içinde gelişimini sürdürmektedir. Böylece günlük yaşam daha fazla dijitalleşmiş olup yenilikçi girişimcileri de yeni teknolojiler bulmaya yönlendirmektedir. İlk olarak dünya blokzincir teknolojileri ile tanışmıştır. Yakın bir zamanda ise Metaverse ve NFT gibi terimler popüler hale gelmiştir. Mevcut çalışma Metaverse ve NFT terimlerini TKM ile açıklamaya çalışmaktadır. Bu bağlamda Smart PLS 3 programı kullanılmıştır. Analiz sonuçlarına göre, algılanan uyumluluk, eğlence ve güvenin algılanan fayda üzerinde anlamlı ve pozitif bir etkiye sahip olup aynı zamanda aracılık etkisi kabul edilmiş diğer hipotezler ise reddedilmiştir. Sonrasında tüm sonuçlar analize uygun olarak yorumlanmıştır.

Anahtar Sözcükler : Metaverse, Nitelikli Fikri Tapu (NFT), Teknoloji Kabul Modeli, Tüketici Davranışı, e-Ticaret, Son Adım Teslimat, Blokzincir.

1. Introduction

The World is undergoing rapid change. This change is accelerated by the development of Internet technologies and the exponential growth of data (Pärssinen et al., 2018: 54884). The internet has revolutionised the World (Swan, 2015) and changed how society lives. The usage of smartphones and personal computers has increased dramatically throughout the years. The increasing use of technological devices and digital penetration brought new technology-related platforms to people's lives.

Firstly, at the end of the 20th century, e-commerce emerged. E-commerce is a subject that researches how to use electronic and information technology (Qin & Qin, 2009). E-commerce has grown dramatically throughout the years (Hazarika & Mousavi, 2022). The number of digital e-commerce buyers from all over the World increased from 1,320 billion people in 2014 to 2,140 billion people in 2021 (Coppola, 2021). Especially with the Covid-19 pandemic, e-commerce has grown even more since people were restricted from outside their homes at certain times. This increased their tendency to use electronic channels to fulfil their daily needs and complete their transactions. This tendency has hindered people's negative bias toward e-commerce, and digital channels have been a habit.

Another voguish term has emerged after the massive growth of technology and digital devices. It has been blockchain technologies. Blockchain technologies promoted the traditional business process to change profoundly. Blockchain Technologies have also made a massive impact on society, especially with cryptocurrencies and the investment tendencies of people. Afterwards, terms called Metaverse and NFT have been popular recently, which brings people more advanced versions of the technological and digital World with the Virtual World.

As technology has grown steadily in recent years, technology-related academic research and scales have also gained popularity. Technology Acceptance Model (TAM) is among these models (Alambaigi & Ahangari, 2015: 235). Technology Acceptance Model is the adaptation of users toward a system (Letho & Lee, 2013: 194). The Technology Acceptance Model is widely used in many disciplines to analyse people's tendency to adopt systems and new technologies.

This study initially gives a literature review regarding digitalisation, blockchain, e-commerce, NFT, and Metaverse. Afterwards, the methodology and analysis of the research have been mentioned. Finally, a discussion and conclusion have been given.

2. Digitalisation

Digitalisation has shown its effects worldwide since the start of the 21st century. The usage rate of smartphones, computers, and tablets has increased every year. With these technological devices' increasing and widespread usage, internet usage and dependence have also increased.

Usage of the internet has shown a dramatic increase year by year worldwide. According to Statista (2021), there were approximately one billion internet users worldwide in 2005. The Worldwide internet user population passed two billion in 2011 and three billion in 2015. In 2018 this population passed four billion, and by the end of 2021, the internet user population will be almost five billion. Comparing worldwide internet user numbers from 2005 (one billion and 23 thousand people) to 2021 (four billion and 901 thousand), the internet user population has increased by %479 within 17 years.

These numbers indicate how much the internet and digitalisation have taken over the World. Such a spread of internet usage has changed the way society live their lives. People tend to use digital tools more in their daily lives. With the increasing and widespread usage of these technological devices, the lives of households have been affected dramatically. Digitalisation has been identified as one of the major trends changing society and business (Parviainen et al., 2017: 63).

Digitalisation is a fundamentally disruptive force triggered by the Fourth Industrial Revolution and the Internet of Things, which has changed how we approach and think about business processes and activities. In this increasingly digital age, relationships between organisations (i.e., companies, governmental agencies, and others) and customers are being reshaped, and new business models are being invented (Parida, 2018).

Accordingly, companies, entrepreneurs, and investors started aiming to create new digital tools to attract consumers, create new paths with limitless technology opportunities, and become much more profitable. In the digital age, people have seen born of e-commerce, the growth of e-commerce, and today e-commerce has grown dramatically. Especially with the leverage of the Covid-19 pandemic, e-commerce has already been rising with the high amount of technological penetration of households. The world's total population of e-commerce buyers increased from 1,320 billion in 2014 to 2,140 billion in 2021 (Coppola, 2021). %18 of all retail sales worldwide are from e-commerce and expected to pass %21 by 2024. Before 2017 this ratio was lower than %10. In 2020 global e-retail sales have grown by %27,6 (Madasoğlu, 2021).

According to Interbrand (2021), Amazon is the most valuable e-commerce platform in the World and the second most valuable brand among all the brands in the World (Interbrand, 2021). Amazon has an estimated 2,5 billion monthly visitor traffic (Madasoğlu, 2021). These numbers clearly show how much e-commerce has been growing and will grow; checking the stats of digitalisation and e-commerce, the growth of e-commerce and digitalisation has a tremendous positive correlation.

Today in the marketing literature, Marketing 5.0 is a popular topic that mainly presents ideas regarding the world's digital transformation, including such issues as; agile marketing, artificial intelligence for marketing automation, the internet of things, and blockchain for marketing (Kotler et al., 2021).

As contemporary marketing approaches are mainly concerned with digitalisation and trade is transforming from brick-and-mortar to more e-commerce, consumer demands and business supplies turned more towards a digital breakthrough.

According to Westerman et al. (2012), positive impacts of digitalisation are already seen in various industries, where digital leaders outperform their peers (Kotarba, 2017: 123).

El-Darwicheet et al. (2012) claim that consolidation of digitalisation benefits is also clearly visible on the macroeconomic level, resulting in job creation, innovation, and economic growth and according to Deloitte Access Economics (2015), as well as increasing the efficiency of public service and administration (Kotarba, 2017: 123).

3. Blockchain

The internet has seen massive growth during the 21st century. In the sequel, internet-related platforms have been founded and used widely. These include electronic marketplaces, business processes, and customised services (Acar & Kucukaltan, 2019: 178). One of the advanced technologies of recent years has been blockchain. Blockchain is the technology of the new era, or rather, the software architectural structure. The field of application is expanding day by day. The ultimate effect is that it can bring purchases face-to-face, even if not physically. It will either eliminate the intermediaries or cause their structure to change (Güven & Şahinöz, 2021: 43).

Blockchain is information technology. But blockchain technology is also many other things. The blockchain as a decentralised computing paradigm is a game-changing new computing paradigm. The blockchain is the economic layer that the Web lacks. The blockchain is the trustless participation mechanism, line-item attribution, credit, evidence, and compensation incentives tracking schema for any intelligent agent in any cooperation. (Swan, 2015: 92).

Thanks to blockchain technology, these nonmonetary social currencies may now be more trackable, transmissible, transactive, and monetisable. Social networks can potentially transform into social and economic networks (Swan, 2015, 75).

Through tokenisation, blockchain technology has provided access to assets that could not previously be exchanged rapidly or easily. Tokenisation is a critical component of Decentralized Finance (DeFi) and a built-in feature of several blockchain topologies. Aside from its primary job of serving as network fuel, the attributes and features of a token open up a wide range of economic possibilities (Popescu, 2021: 26).

Blockchain is a database, and data is sequentially recorded in blocks. Each record has a timestamp. When a block is complete, the next block is produced. The blocks are connected to each other in the form of a chain. Just as there are databases everywhere, the same is true for blockchain. Each blockchain is created in the registry (Güven & Şahinöz, 2021: 44).

4. Electronic Commerce

As technology has advanced dramatically throughout recent years, electronic commerce has grown swiftly. With the increased digital penetration worldwide, e-commerce has also increased with the same acceleration. With e-commerce already overgrowing, the Covid-19 pandemic has been another milestone for the escalation of e-commerce. With the Covid-19 pandemic, people were restricted from leaving their houses and had no other option than buying their daily needs from online platforms, which is included in the scope of e-commerce. Afterwards, e-commerce became a habit rather than an obligation for consumers, both for their hedonic needs, like clothes and for their daily needs, like food. Chen and Dubinsky (2003) argued that with the rich and accessible content of online shopping, consumers could easily compare prices, and thus it is convenient and time-saving.

E-commerce gives many opportunities to its users, such as being practical, reaching many products in seconds, more campaigns and discounts, contactless payment opportunities, availability of many product varieties and especially avoiding leaving the house.

According to Oberlo (2021), the e-commerce share/retail share ratio was %10,4 in 2017. This ratio has increased to %12,2 in 2018, %14,1 in 2019, %16,1 in 2020, %18,1 in 2021 and %20 in 2022. This ratio is expected to increase to %22 in 2023. It can be easily interpreted that e-commerce's proportion to total retail shares is increasing % by two every year, and e-commerce is taking over the commercial world.

In recent years terms like Metaverse and NFT have also become voguish, and these terms are showing signs of making a leverage effect on the increase of e-commerce. What made e-commerce that powerful in recent years was people's tendency to use digital channels even more. Metaverse and NFT terms create a new world, which increases people's tendency to get involved in the digital world even more.

5. Metaverse

Since 2020, the word "metaverse" has gained momentum in the tech sector. In 2021, the phrase metaverse, which referred to a three-dimensional virtual environment populated by avatars of actual people and was popularised by Neal Stephenson in his novel Snow Crash (1992), became one of the most popular tech terms (Kim, 2021).

Metaverse term is the combination of the prefix "meta" (implying transcending) with the word "universe", which describes a hypothetical synthetic environment linked to the physical World (Lee et al., 2021: 1). The term "metaverse" originates from the science fiction novel Snow Crash, written by Neal Stephenson (Duan et al., 2021: 1).

According to Smart et al. (2007), the Acceleration Studies Foundation (ASF) divided the Metaverse into four categories: a virtual world in which a flawless virtual story is experienced, a mirror world in which the current real World is reflected, augmented reality

in which increased information is shown in the real world, and lifelogging, which captures and stores everyday information about people and things (Jeon, 2021: 1).

Metaverse is meant to be a completely immersive virtual reality environment. Virtual avatars will navigate this digital environment more interactively. It will enable users to socialise in ways other than exchanging photographs and papers. The Metaverse allows users to pre-screen real estate properties in virtual reality to purchase residences using tokens. Metaverse tokens are becoming more popular due to their applications, and they are transactional entities that may be used to trade in virtual markets (NDTV, 2021).

6. Non-Fungible Token (NFT)

After the emergence of blockchain systems, especially cryptocurrencies, NFT has been another global trending topic.

A Non-Fungible Token (NFT) represents a one-of-a-kind digital asset that cannot be exchanged for another NFT of the same sort. A Non-Fungible Token is simply a non-replicable digital proof of authenticity. NFTs signify ownership of unique goods and are recorded on a blockchain or distributed ledger. The record of ownership is always available and unchangeable and assures that there can only be one owner at any moment, thanks to the security properties of blockchain technology (Popescu, 2021: 26).

NFTs, or Non-Fungible Tokens, are more than simply a way to trade and acquire digital art. As fashion labels and corporations begin to market themselves by distributing their NFTs, they have a wide range of real-world applications. NFTs are a means to exchange everything from social media postings to celebrity assets while keeping the original authorship of the product. NFTs have breathed new life into gaming platforms as users have begun to "play to earn". Today, games can assist players in obtaining NFTs, which can then be exchanged for more outstanding prices on markets. In terms of use cases, NFTs and Metaverse are similar. In the Metaverse, gaming assets are traded as NFTs using Metaverse currencies (NDTV, 2021).

7. Methodology

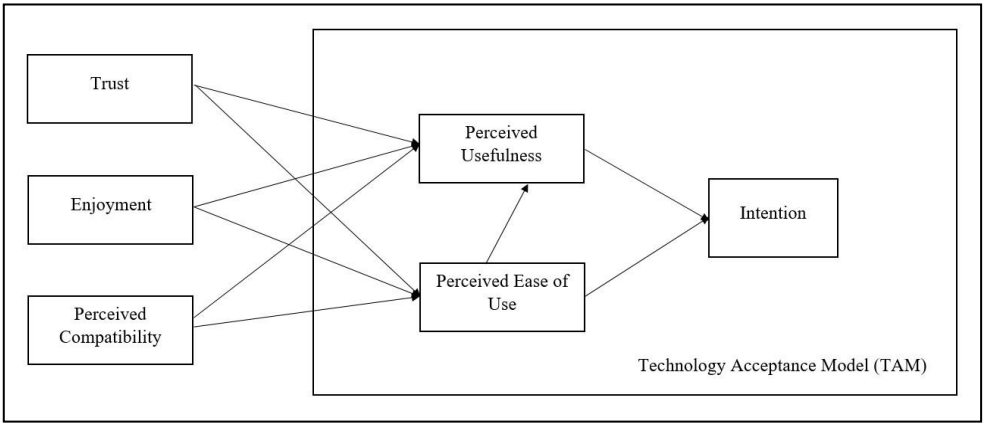
The survey method has been applied for this research. The questionnaire has been adapted from the original Technology Acceptance Model. Sources of other variables have been given in the Technology Acceptance Model section.

Accordingly, the survey has been sent to approximately 500 participants, and 74 surveys have been collected, which has been the most significant limitation of this study. However, many studies related to blockchain technologies have relatively smaller sample sizes due to an inadequate number of proficient blockchain Technology users (Agustina, 2019: 280; Gil-Cordero et al., 2020: 5). These questionnaires have been sent to blockchain users since Metaverse, NFT, and cryptocurrencies use the same system, and users of blockchain technologies: are more adapted to the system. These questionnaires were

collected from November 2021 to January 2022 using online distribution via Google Forms. Since adaptation towards Metaverse, NFT, and e-commerce still needs to be outstanding, the participant number could be much higher. According to the literature regarding TAM, numerous studies have been published using a low number of participants among the studies using PLS-SEM.

The convenience method has been selected as the most appropriate tool to utilise among the random sampling methods.

Figure: 1
Proposed Model



8. Technology Acceptance Model (TAM)

The interpretation of human behaviour by experts has been a frequently studied subject. In this sense, TAM has become an often-used model for understanding user behaviour in adopting new technologies. On the other hand, TAM bases its theoretical infrastructure on the Reasoned Action Theory (GET), which assumes that human behaviour is due to specific causes (Davis et al., 1989: 990; Kong et al., 2021: 366; Rafique et al., 2020: 4).

TAM aims to explain the determinants of acceptance in information technologies while trying to understand people's behaviour in information technologies. The Technology Acceptance Model provides the basis for examining and understanding the impact of technology acceptance, external factors, internal beliefs, attitudes, and the intention (Davis et al., 1989: 989; Venkatesh & Davis, 1996: 455; Manis & Choi, 2019: 505).

TAM includes active use, intention, attitude towards innovation, perceived usefulness, and perceived ease of use of new technological devices or applications (Davis et al., 1989: 990; Venkatesh & Morris, 2000: 118; Venkatesh & Bala, 2008: 276).

Intention consists of positive or negative thoughts of people towards active use. Since social psychologists see intention as the antecedent of behaviour, it is seen as the most critical variable affecting active service. The choice to use the variable used in the research is the most important factor explaining the usage behaviour of people in this context (Venkatesh & Davis, 1996: 460; Davis et al., 1989: 993; Assaker, 2020: 437). According to the literature, the following hypotheses have been formed.

H1: *Perceived usefulness (PU) affects the intention to use Metaverse.*

H2: *Perceived Ease of Use (PEOU) affects the intention to use Metaverse.*

The perceived usefulness of people determines the degree to which they believe their job performance will increase when they use new technology. The usefulness perceived by users of the system is affected by external factors. With the differentiation of processes in TAM, different variables that may affect the perceived usefulness can be added to the model. (Sukendro et al., 2020: 8). According to the literature, the following hypothesis was formed. One of the crucial factors for the widespread use of new technology is the perceived ease of use factor. The ease of use of the system when users use the systems plays a vital role in determining the intention (Davis, 1989: 326; Davis, 1993: 478). Technologies with ease of use have a positive effect on purpose in the adoption process. According to the literature, the following hypothesis was formed.

H3: *Perceived Ease of Use (PEOU) has an impact on Perceived usefulness.*

Trust has been a crucial external factor in the adoption of technological innovation. The phenomenon of trust perceived by people will directly affect the use of the system. The reason is that the interaction will be limited as new technologies bring uncertainty. For this reason, the trust variable has been a frequently used factor when examining the acceptance processes of innovations (Gefen, 2000: 728; Pavlou, 2003: 118; Pavlou & Gefen, 2004: 44; Schierz et al., 2010: 212). Since the technological innovation examined in the research is digital money, measuring users' trust in innovation is imperative. According to the literature, the following hypotheses have been formed (Jarvenpaa et al., 1999).

H4: *Perceived Trust (T) affects Perceived Usefulness.*

H5: *Perceived Trust (T) affects Perceived Ease of Use.*

Perceived enjoyment is directly related to people's intrinsic motivations. If people use the system in a fun way, if the general use of the system is not actively used, it will positively affect their intention to use it. Since the Metaverse system is a 3-dimensional system, the Enjoyment variable was added to the model, considering that the entertainment perceived by the people is important. According to the literature, the following hypotheses have been formed (Linares et al., 2021: 5).

H6: *Perceived Enjoyment (E) affects Perceived Usefulness.*

H7: *Perceived Enjoyment (E) affects Perceived Ease of Use.*

Perceived compatibility is people believing that their habits and adoption of new technology will match. The compatibility of innovations with people's past habits is considered an important external factor in the adoption of technology (Karahanna et al., 1999: 191; Plouffe et al., 2001: 214; Ramadhiana et al., 2021: 4). According to the literature, the following hypotheses have been formed.

H8: *Perceived Compatibility (PC) affects Perceived Usefulness.*

H9: *Perceived Compatibility (PC) affects Perceived Ease of Use.*

As seen in Table 1, it is seen that the research conducted for adopting new technologies within the framework of TAM is specific to applications and devices developed with the development of technological devices. While continuing its technological development, it is observed that most transactions previously performed in the physical environment are transferred to online environments.

In studies by Salloum et al. (2019), Sukendro et al. (2020) and Rafique et al. (2020), it is seen that education and learning are related to the transfer of teaching and learning to the digital environment with the spread of technology devices. In the studies of Min et al. (2019), Ramadhiana et al. (2021) and Kong et al. (2021), there are studies on the acceptance of mobile applications. Learning the factors that affect people's use of mobile applications will provide a healthier service with the improvements to be made. Toraman (2022b) measured people's perceptions, attitudes and intentions towards metaverse technology. It has been concluded that Metaverse can be a self-sufficient ecosystem in the future. Manis et al. (2019); Linares et al. (2001); Sagnier et al. (2021); Fussell and Truong's studies, on the other hand, try the upper levels according to the time of technological developments. The studies examine the acceptance of technologies that enable people to be in different places without leaving their environment. Considering the studies in general, hypotheses that give successful results in some studies do not provide the same results in others. The reason for this can be seen as the sample difference and the fact that people have different behaviours.

Table: 1
Literature Review of Technology Acceptance Model (TAM)

Year	Author (s)	Sector	Hypothesis	Relation	Model
2010	Chandra et al.	New Technology Acceptance: Mobile Payment System	TR→PU	Not Supported	Technology Acceptance Model (TAM) and Diffusion of Innovation Theory (DIT)
			TR→PEOU	Supported	
			PEOU→I	Not Supported	
			PU→I	Supported	
			PEOU→PU	Supported	
2019	Salloum et al.	New Technology Acceptance: E-Learning	PEOU→PU	Supported	
			PU→I	Supported	
			PEOU→I	Supported	
			AT→I	Supported	
			I→AU	Supported	
2019	Min et al.	New Technology Acceptance: Uber Mobile Application	C→PU	Supported	
			C→PEOU	Supported	
			PU→AT	Supported	
			PEOU→AT	Supported	
			AT→I	Supported	
2019	Manis et al.	New Technology Acceptance: The Virtual Reality Hardware (VR)	AT→I	Supported	
			PU→I	Supported	
			PU→AT	Supported	
			PEOU→PU	Supported	
2020	Sagnier et al.	New Technology Acceptance: Virtual Reality	PU→I	Supported	
			PEOU→I	Not Supported	
			PEOU→PU	Not Supported	
2020	Sukendro et al.	New Technology Acceptance: E-Learning	PEOU→PU	Supported	
			PU→AT	Not Supported	
			PEOU→AT	Supported	
			AT→I	Supported	
			PU→I	Supported	
2020	Rafique et al.	New Technology Acceptance: Mobil Library	PEOU→PU	Supported	
			PU→I	Supported	
			PEOU→I	Supported	
2021	Kong et al.	New Technology Acceptance: Mobile Social Media	PEOU→PU	Supported	
			PU→AT	Supported	
			PEOU→AT	Supported	
			AT→I	Supported	
			PU→I	Not Supported	
			PEOU→I	Supported	
2021	Ramadhiana et al.	New Technology Acceptance: Virtual Hotel Operator Applications	PC→PU	Supported	
			PC→PEOU	Supported	
			PU→I	Supported	
			PEOU→I	Supported	
2022	Fussell, S.G. & Truong, D.	New Technology Acceptance: Virtual reality	PEOU→PU	Supported	
			PU→AT	Supported	
			PEOU→AT	Supported	
			PBC→I	Supported	
2021	Linares et al.	New Technology Acceptance: Online Games	PE→FE	Supported	
			PE→CI	Supported	
			PEOU→PE	Supported	
2022	Toraman Y.	Metaverse E-Commerce	PU→I	Supported	
			PEOU→PU	Supported	
			AT→I	Supported	

PU: Perceived Usefulness, PE: Perceived Enjoyment C: Compatibility, PEOU: Perceived Ease of Use, AT: Attitude, I: Intention, AU: Actual Use, PBC: Perceived Behavioural Control, TR: Trust, E: Enjoyment, FE: Flow Experience, CI: Continuance Intention.

9. Analysis

Firstly, reliability analysis has been conducted for the research. The most commonly used methods for the reliability analysis are 'Factor Loading', 'Cronbach's Alpha', 'Composite Reliability', and 'Average Variance Extracted'.

According to Geçit and Taskin (2020), Cronbach's Alpha values are the most widely used reliability tests. Reliability is that a scale does not contain random errors (Yükselen,

2017: 117). Cronbach's Alpha is the most classically accepted measure of reliability. In contrast, build reliability tends to overestimate internal consistency reliability, thus leading to relatively higher reliability estimates. Accordingly, it is reasonable to consider both criteria and interpret their results (Hair et al., 2016: 137). AVE is defined as the sizeable average value of the square loads of the structure-related indicators. In other words, it is the sum of the square loads divided by the number of indicators (Hair et al., 2016: 138). In analysis, Cronbach's Alpha, Structural Reliability, and AVE values should be higher than 0.700 (Hair et al., 2016: 136).

The scale used for this article includes variables of enjoyment, perceived compatibility, trust, perceived ease of use, perceived usefulness and intention. This scale has been adopted by Venkatesh (2000); Holsapple and Wu (2007). Factor analysis of the questions related to these items is given in Table 2:

Table: 2
Factor Analysis

Items	Questions	Factor Loading
E1	It would be fun to use a virtual reality device.	0.890
E2	I will not be bored while using a virtual reality device.	0.939
E3	Virtual reality devices will make my leisure time more fun.	-
PC1	Using metaverse fits well with my lifestyle.	0.927
PC2	Using metaverse fits well with how I purchase products and services.	0.918
PC3	I would appreciate using metaverse instead of alternative models of payment.	0.899
T1	I trust metaverse systems to be reliable.	0.907
T2	I trust metaverse systems to be secure.	-
T3	I believe metaverse systems are trustworthy.	--
T4	I trust metaverse systems.	0.917
T5	Even if the metaverse systems are not monitored, I will trust them to do the job correctly.	0.894
PU1	Using metaverse systems would enable me to accomplish financial tasks and payments quickly.	0.950
PU2	Using metaverse systems would improve my performance in making payments.	0.952
PU3	Using metaverse systems would enhance my effectiveness in making payments.	-
PU4	Using metaverse systems would make it easier for me to manage and make payments.	0.932
PEOU1	Learning to use metaverse systems would be easy for me.	0.922
PEOU2	Getting the metaverse system to do what I want it to do would be easy.	0.950
PEOU3	My interaction with the metaverse system would be clear and understandable.	-
PEOU4	It would be easy for me to become skilful at using the metaverse system.	0.908
I1	I am likely to use metaverse in the near future.	0.963
I2	I am willing to use metaverse in the near future.	-
I3	I intend to use metaverse when the opportunity arises.	0.960

I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

All items have strong factor loading values, as seen from the factor analysis. After conducting a factor analysis for the scale, a reliability analysis was conducted to find out the reliability of the scale. The reliability analysis table is given in Table 3.

Table: 3
Reliability Analysis

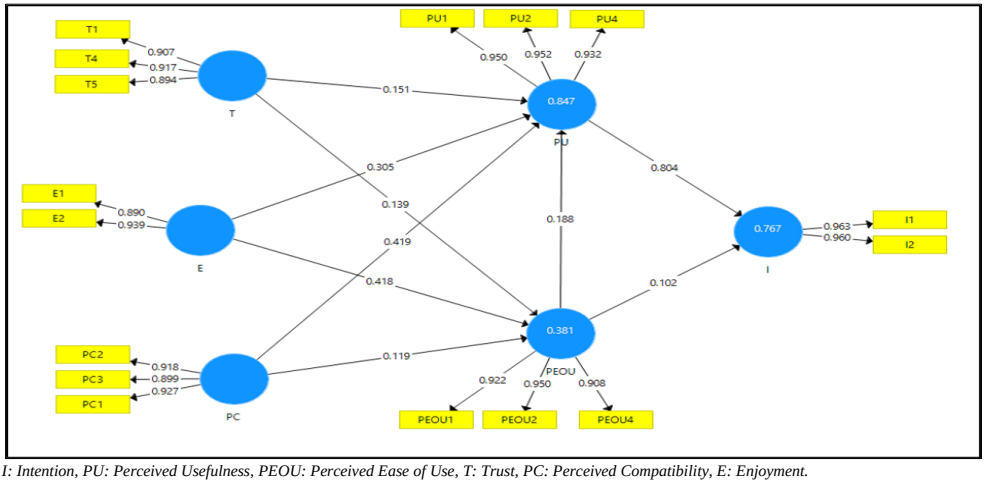
Items	Factor Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
E1	0.890	0.808	0.911	0.836
E2	0.939			
PC1	0.927	0.903	0.906	0837
PC2	0.918			
PC3	0.899			
T1	0.907	0.891	0.900	0.821
T4	0.917			
T5	0.894			
PU1	0.950	0.940	0.943	0.893
PU2	0.952			
PU4	0.932			
PEOU1	0.922	0.918	0.922	0.860
PEOU2	0.950			
PEOU4	0.908			
I1	0.963	0.918	0.919	0.924
I2	0.960			

I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

It is expected for all values to be higher than 0,700, and according to the Table, all values from the items are higher than 0,800. Most of them are even higher than 0,900. This proves that the model has strong reliability.

When the Multicollinearity and Variance Inflation Factors (VIF) values of the research are examined, the VIF value of the perceived usefulness (PU2) variable is 4.860. Since VIF values between 1 and 5 are accepted in the literature, the value of PU2 is acceptable. When the sub-dimensions of the model are examined, the values are between 1.849 and 4.384. T1, T2, E3, PU3, PEOU3, and I3 sub-dimensions were excluded from the model due to the multi-connection problem (Daoud, 2017: 3).

Figure: 2
Path Analysis of Research



I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

Figure 2 shows the model of the research. All the research applications have been conducted accordingly to the above-shown figure. The arrows near the variables indicate factor loadings, and as seen from the figure, all factors related to the variables have a high factor loading ranging from 0,894 to 0,963.

The arrows between variables show path coefficients between variables. As seen in Figure 1, all the variables have a positive path coefficient, which means accepted variables have a positive effect.

Table: 4
Outputs of Structural Model

Hypothesis	Relation	Path Coefficient	t value	p-value	<0,05 Hypothesis supported?
H1	E→PU	0.305	4.257	0.000	Supported
H2	E→PEOU	0.418	3.132	0.002	Supported
H3	PC→PU	0.419	4.272	0.000	Supported
H4	PC→PEOU	0.119	0.570	0.569	Not Supported
H5	T→PU	0.151	2.117	0.034	Supported
H6	T→PEOU	0.139	0.858	0.391	Not Supported
H7	PEOU→PU	0.188	2.550	0.011	Not Supported
H8	PEOU→I	0.102	1.222	0.222	Supported
H9	PU→I	0.804	11.778	0.000	Supported

Significant in the p<0.05 value range. I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

Table 4 shows the results of the hypothesis from H1 to H9. Accordingly, the H1, H2, H3, H5, H7 and H9 hypotheses have been accepted since the p values of these hypotheses are lower than the desired value of 0,05. H4, H6, and H8 hypotheses are rejected since these hypotheses have a p-value higher than 0,05. Even though these three hypotheses have been denied, they will still be analysed on indirect and total effects since this study includes the mediator effect.

Table: 5
Indirect Effects

Relation	t value	p-value
PEOU→PU→I	2.463	0.014

Significant in the p<0.05 value range. I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use.

Table 5 indicates the indirect effect, as the study has a mediation effect. Thus, the PEOU variable has been the independent variable, PU has been the mediator variable, and then I variable has been the dependent variable. The p-value is lower than the value of 0,05, and the PEUO → I effect has been rejected. As PEOU → I has been rejected and PEOU → PU → I effect has been accepted, it can be said that the mediation effect has been accepted.

Table: 6
Total Effects

Relation	t value	p-value
E→I	4.930	0.000
PC→I	4.202	0.000
T→I	2.255	0.024

I: Intention, T: Trust, PC: Perceived Compatibility, E: Enjoyment.

In the research analysis, hypotheses seen on the total effects table were not included. The effect of the independent variables of the research model on the intention is shown in the table above.

Table: 7
R^2 Values of Variables

Items	R^2	$Radj^2$
PU	0.847	0.838
PEOU	0.381	0.354
I	0.767	0.760

I: Intention, PU: Perceived Usefulness, PEOU: Perceived Ease of Use.

In academic studies related to consumer behaviour, R^2 values higher than 0,200 are acceptable (Hair et al., 2011: 147). According to the analysis, all R^2 values are significantly higher than the value of 0,200, ranging from 0,354 to 0,847.

10. Discussion

The development of technology causes both devices and internet connections to be better, to increase the transaction performance of people and indirectly to increase the time spent in the digital environment.

Blockchain-based crypto money systems, NFT, and Metaverse are increasing the number of users daily and are becoming areas where people are more interested. On Metaverse systems, H&M, Samsung, Adidas, GUCCI, J.P. Morgan, etc., it is seen that brands participate in new marketplace creation activities (J.P. Morgan, 2022).

The research analyses the perception, attitude, and usage intention of potential users towards the system while carrying out company operations to transfer electronic commerce activities to Metaverse systems.

Technology Acceptance Model (TAM), frequently used in the literature, was used in research on the acceptance of new technologies. Determining the perceptions of potential users towards the Metaverse system will support the construction of a more stable Metaverse system with the necessary regulations in the future.

When the hypotheses tests of the research were examined, the H4, H6 and H8 hypotheses were rejected, and other hypotheses were accepted. Hypotheses H4 and H6 were obtained from the analysis results, which were not related to the ease of use of the Metaverse system of perceived compatibility and trust. Still, they were related to the benefit that people obtained from the system. The H8 hypothesis, on the other hand, did not have a direct effect, as perceived ease of use had an indirect relationship with intention. The participants' opinions about the ease of use affect the benefit they will get from the system and indirectly affect their choices.

The fact that the users perceive the Metaverse system as a game makes the enjoyment variable important. For people to spend more time in a 3-dimensional world, the system must provide people to have a good time. It is seen that the fun of metaverse systems directly affects people's perceived usefulness and intentions to use them. In this context, the acceptance of the H1 and H2 hypotheses is among the important results of the research. The fact that shopping processes have become a 3-dimensional travel entertainment shows that the past e-commerce habits of the buildings have partially evolved (Alalwan et al., 2018: 105).

The compatibility that users perceive from metaverse systems is also very important. The use of systems people see as compatible with them is positively affected. In particular, results have been parallel to the literature obtained in the research. The positive effect of perceived compatibility on the perceived usefulness of the individual is among the essential results of the study. On the other hand, when the total outcomes are examined, the perceived compatibility also affects the intention emphasising the necessity of showing parallelism to the past habits of the people of the metaverse systems in the future. (Ramadhiana et al., 2021: 2-5). As a result, since people are already carrying out their e-commerce activities in digital environments, it is concluded that they can shop from the retailer of the same brand in the metaverse system.

People prefer to interact in systems they trust. For this reason, with the development of technology, the change of e-commerce marketplaces and the acceptance of use are closely related to the system's reliability. As can be seen in the H5 hypotheses, users' finding the system safe has a direct effect on their perceived usefulness. On the other hand, as seen in the total effects table, it also affects intention. Having a safe environment where people can shop while spending time is crucial (Alalwan et al., 2018: 105; Al-Sharafi et al., 2016).

As emphasised above, it is seen that the independent variables in the research model, Perceived Compatibility, enjoyment, and trust metaverse systems, are important factors for people to buy their products and services from brands and businesses.

The fact that R^2 and $Radj^2$ values are higher than 0.70 in the research shows that it has a substantial explanation percentage (Agustina, 2019: 280-284). Therefore, it is possible to say that the independent variables included in the research model are sufficient. However, expanding the research with different variables will positively contribute to the literature.

11. Conclusion

Technological developments have made it necessary to move traditional market areas to digital environments. While the products were sold through the websites, the product sales, the follow-up of the product delivery processes, and post-delivery customer support services were carried out in digital environments. In this context, e-commerce, which first entered human life with websites, was carried out through new channels such as social media platforms and mobile applications. Today, there is a shift towards metaverse systems using

blockchain technology in their infrastructure. Primarily due to the COVID-19 pandemic, even people's daily shopping is carried out through e-commerce platforms as more and more people are switching from classical commerce towards e-commerce with the increase of digitalisation and the tendency changes that occurred with the Covid-19 pandemic.

Many brands have started e-commerce activities in metaverse systems, indicating that the system is deemed suitable for investment. For example, with an agreement with the clothing giant Gucci Superplastic, the partnership in Super Gucci NFT works has been taken. Three special NFT series will be created and sold under the Super Gucci brand (Supergucci, 2022). NFTs to be issued by Adidas will be another example of this issue (J.P. Morgan, 2022). From this point of view, many companies in the future will increase their activities in the digital environment and want to increase their market share. With new technologies introduced and adapted by the households, different innovation adaptation models similar to the TAM may be used.

Due to the use of blockchain technology in the Metaverse infrastructure, cryptocurrencies have a relationship with cold and hot wallets. Specific to Turkey, the Central Bank of the Republic of Turkey (CBRT) announced that Digital Turkish Lira (DTL) will be tested in 2023, which will contribute positively to the active use of Metaverse technology in the future. In this context, with the introduction of DTL in the future, the Turkish Lira can be used in the Metaverse system. This situation will enable the spread out of Metaverse (Toraman, 2022a, 373).

12. Limitations

The most significant limitation of this study has been the number of respondents. As mentioned in the 'Methodology' section, people need to be more highly adapted to Metaverse and NFT as of early 2022. This adaptation would probably increase in the future, but as one of the earlier studies related to these terms, the sample size has been negligible.

Another sampling method, such as snowball sampling, could have been used. However, knowledge of system users and the total number of system users are relatively low; a sampling method like snowball would not be practical for now. This method can be significantly used with the increasing number of adaptations towards these systems in the future.

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