An Empirical Study on the Factors Influencing the Usage Intention of Metaverse for E-commerce

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Abstract

The "metaverse" is a highly interconnected digital realm with the potential of revolutionizing the way customers, businesses, and brands interact and conduct transactions within a seamlessly interrelated virtual reality. It enables capturing user interest, expanding services significantly, and integrating various revenue models, thus presenting an enticing prospect for stakeholders. As a result, numerous companies are investing substantive resources in developing technologies related to the metaverse. However, due to the rapid pace of its development, there remains an insufficient understanding of the current scope of the metaverse and its subsequent impact on the adoption and implementation of electronic commerce practices. Therefore, this study aims at examining the acceptance of e-commerce in the metaverse through an empirical study based on the Unified Theory of Acceptance and Use of Technology (UTAUT). A total of 237 valid responses were collected and analysed using structural equation modelling (PLS) software to test hypotheses. The results reveal that although social influence, facilitating conditions, and performance expectancy profoundly impact users' satisfaction, and their intention to use the metaverse for e-commerce activities, effort expectancy does not exert such prominent influence. These findings offer practical implications for e-commerce businesses and metaverse platform designers through shedding light on the factors that should be prioritized to enhance user acceptance of e-commerce in the metaverse. In conclusion, the study highlights the transformative capability of the metaverse in reshaping e-commerce practices. Moreover, the findings underscore the importance of social influence, facilitating conditions, and performance expectancy in influencing users' satisfaction and intention to engage in e-commerce within the metaverse. Through recognizing and leveraging these factors, e-commerce businesses and metaverse platform designers can optimize user acceptance, and foster a thriving e-commerce ecosystem in the metaverse.

Keywords

1. Introduction

Since 2021, there has been an increasing interest from both companies and individuals in Metaverse platforms and services. The term "Metaverse" combines "meta," which signifies virtuality or going beyond, with "universe," which refers to the world. The concept of the Metaverse was first introduced in Neal Stephenson's novel "Snow Crash" (Stephenson, 1992). In the book, a 3D virtual reality world is portrayed where users communicate through avatars. Inspired by this novel, Philip Rosedale developed "Second Life", a free 3D virtual world, in 2003. However, it struggled to gain widespread popularity, probably due to the limitations of network and device capabilities supporting 3D graphics at that time (Kim et al., 2021). Furthermore, the closure of certain servers and the termination of 30% of employees in 2010 may have contributed to its lack of success.

Despite the limited attention it received in the past, the concept of the Metaverse has experienced a resurgence of interest as a result of recent advancements in various areas. These include the widespread availability of 5G broadband networks, the progress made in artificial intelligence technology, the development of immersive virtual reality devices, the emergence of non-fungible tokens (NFTs) and cryptocurrency for trading goods and services, in addition to the increased demand for remote activities prompted by the COVID-19 pandemic (Park & Kim, 2021). Such technological advancements have sparked a reassessment of the Metaverse's capability, both in terms of individual usage and its implications for businesses (Kim, 2021).

From the perspective of individual users, the Metaverse platform provides a unique opportunity to perfectly navigate between the real and virtual realms. Within the virtual world, it becomes possible to accomplish things that may be unattainable in reality, generating a sense of novelty and excitement. The Metaverse has garnered remarkable popularity, particularly among Generation Z, individuals born after 2000, as their identities in the real and virtual domains are deeply intertwined. For instance, Roblox, a Metaverse platform, boasts approximately 150 million monthly active user accounts, with two-thirds of its users falling within the 9-12 age group in the United States, and one-third under the age of 16 (Park & Kim, 2021).

Based on the perspective of companies and platform developers, the Metaverse has emerged as a central focus for major technology companies that have devised business models to serve various roles within the Metaverse ecosystem, bridging the gap between Metaverse-generated value and the real world (Seok, 2021). This technology is anticipated to revolutionize how individuals utilize the internet, communicate, and participate in work-related activities (Cook et al., 2020). Meta, for example, has introduced the Oculus Quest 2, an immersive virtual reality headset, and a virtual world platform called Horizon (Seok, 2021). Horizon Workroom Beta, a feature that supports virtual offices, enables people to interact, share data, conduct meetings, and monitor work progress using avatars. In the case of Roblox, users have the ability to create and sell their own content and items, actively contributing to the development of the Metaverse ecosystem, often referred to as "Web 3.0" (Cook et al., 2020).

The establishment of a Metaverse ecosystem is currently in progress (Kim, 2021), as evidenced by the presence of diverse platforms and content providers such as Decentraland, Fortnite, Roblox, Sandbox, and Zepeto, along with user experience designers, including Tafi and Oculus, as well as supporting infrastructures like cloud service providers (Kim, 2021). The virtual world and the real world are interconnected through the use of (NFTs) and cryptocurrency as mediums for exchanging value (Park & Kim, 2021). Notable instances of this include Gucci and Coca-Cola's sale of NFTs on Decentraland (Park & Kim, 2021). Projections indicate that the global Extended Reality (XR) market can reach USD 1.5 trillion by 2030 (PWC, 2019), highlighting the anticipated growth in this field.

The Metaverse has played a crucial role in the realm of e-commerce, resulting in the emergence of numerous innovative business models. Virtual stores, live-stream shopping platforms, and 3D product models are among the distinctive advancements stemming from the Metaverse. In the future, Metaverse e-commerce (Metacommerce) is expected to transform the entire e-commerce process by introducing fresh marketing possibilities, transforming manufacturing and shipping practices, and developing customer service. Despite being in its early stages, the Metaverse has already presented new prospects for the e-commerce market, and an immense influence on the advancement of customer services, logistics, finance, in addition to various other industries. However, the rapid evolution of the metaverse has created difficulty in perceiving its current extent and its impact on the innovation of electronic commerce practices. Therefore, the objective of this study was to investigate the inclusion of e-commerce into the metaverse through conducting an empirical study grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT). Additionally, the study identifies the fundamental factors essential for user acceptance of Metacommerce and how they can be formulated as shopping platforms. Moreover, the utilization of these factors enables e-commerce businesses and metaverse platform designers to promote user acceptance and generate a thriving e-commerce ecosystem in the metaverse.

The structure of this research is as follows: In Section 2, we examine the previous literature on the metaverse, e-commerce within the metaverse, the theory of UTAUT, and the development of hypotheses. Section 3 explains the research methodology and the data collection process. Section 4 applies the UTAUT model and presents the results. Section 5 provides the discussion. Section 6 presents the conclusions. Finally, section 7 demonstrates the limitations.

2. Literature Review

2.1. Metaverse

The metaverse is widely recognized as a groundbreaking platform for Web 3.0, according to various sources (Cook et al., 2020; Grider & Maximo, 2021). The technologies associated with the metaverse are poised to trigger a fundamental transformation in how people communicate, interact, create value, and establish

economies. In the next decade, individuals are anticipated to have the opportunity to participate in immersive internet platforms and explore not only the physical realm but also the virtual world (Smart et al., 2007). While the metaverse is already evolving as part of Web 3.0, there is no definitive explanation of its ultimate form (Cook et al., 2020). Web 1.0 facilitated online connectivity, Web 2.0 enabled the development of online communities, and Web 3.0 will pave the way for a community-owned virtual world (Grider & Maximo, 2021). The metaverse is at the forefront of Web 3.0 development, as emphasized by Cook et al. (2020), and Grider and Maximo (2021), with an estimated market value exceeding US$1 trillion in the upcoming years (Grider & Maximo, 2021).

According to Ning et al. (2021), the metaverse can be characterized by three primary features: multi-technology, sociality, and hyper spatiotemporality. It encompasses the integration of various cutting-edge technologies, including mixed reality (MR), augmented reality (AR), and virtual reality (VR), and operates within a blockchain-based economic system (multi-technology). Moreover, the metaverse comprises economic, cultural, and legal systems (sociality) within a virtual world, transcending the limitations of time and space (hyper spatiotemporality) (Ning et al., 2021).

The metaverse has demonstrated notable effectiveness in various domains, encompassing arts, culture, religion, games, education, and retailing, in addition to other aspects. According to a study conducted by PWC in 2019, the extended reality market is projected to reach an immense size of US$1.5 trillion by 2030. The study also forecasts substantive transformations generated by the metaverse in human life, specifically in business processes, product/service development, training, retail and customer sectors. Seok (2021) outlines the main stakeholders in the metaverse ecosystem and presents four business models: marketing, content creation, media, and subscription fees, categorized into three dimensions: infrastructure, devices, and software. Grider and Maximo (2021) examined the impact of the integration of the real economy and the virtual economy by analysing NFTs, cryptocurrencies, and the metaverse in the context of monetary and financial contracts. The study predicts a transition of the metaverse from a closed corporate model, controlled by major tech companies, to an open crypto metaverse within the framework of Web 3.0. These Web 3.0 metaverses will be decentralized, governed by global users, and interconnected with a larger crypto-based cloud economy. Such transition can enable cloud computing, decentralized finance, payment networks, NFT-based commodities, decentralized governance, and self-sovereign identity.

The COVID-19 pandemic participated in the development of the metaverse, since it compelled individuals to undergo quarantine measures, leading to the need for non-face-to-face activities to sustain their daily lives. Consequently, Park & Kim (2021) noted the emergence of the metaverse platform as a space for conducting such activities. In contrast to mixed-reality technologies, the authors also confirmed that the metaverse is recognized as a social platform that facilitates interactions and coexistence among people (Park & Kim, 2021). Therefore, it is crucial to conduct further research

to elucidate the concept of the metaverse and ascertain the level of user acceptance regarding the existing advanced Metacommerce platforms.

2.2. E-commerce in metaverse (Metacommerce)

Although e-commerce initially gained popularity in the early 1990s with the introduction of the first online bookstores for customers (Tian & Stewart, 2006), it has since become a crucial factor in the global economy, with numerous major corporations being established through e-commerce. In recent years, the retail e-commerce market has experienced considerable expansion, and its estimated value as of 2021 is approximately US$ 4.6 trillion (Grand View Research, 2020). The Metaverse has the capability of redefining the e-commerce experience, providing greater personalization, realism, and immersion (Dincelli & Yayla, 2022). This new platform offers two distinct value propositions: the first is the integration of traditional brick-and-mortar store experiences, such as face-to-face consultations and customer services, with the digital realm. The second value proposition is the increased availability and accessibility enabled by the digital space (Palmié et al., 2022). The metaverse distinguishes itself from existing e-commerce by providing a more seamless integration of experiences (Dwivedi et al., 2022). However, some limitations are expected to be encountered depending on the type of business, particularly those heavily reliant on physical inputs, such as repair shops. Nevertheless, businesses that employ omnichannel strategies to sell their products and services can greatly benefit from the visual and immersive experiences provided by this new channel (Batat, 2022).

The e-commerce experience in the Metaverse is expected to surpass current product recommendations on the internet (Shen et al., 2021), offering ultra-personalization and customization options, including user-designed products. Users are predicted to be able to design their products beyond just selecting colors and prints. Retailers that provide such a personalized experience could charge a premium price (Mandal et al., 2021). Additionally, as suggested by CBRE (2021), user returns, which were estimated to be as high as 30% during the 2021 holiday season in the US by CBRE Supply Chain could be reduced. This decrease may occur as users can experience products virtually or use augmented reality to visualize how furnishings might appear in their homes. CBRE (2021) added that the virtual nature of the metaverse could lead to much higher foot traffic, with users able to visit stores at the click of a button. Furthermore, outlets could attract customers in new and unique ways that are not possible in the physical world, such as offering exclusive live shows at the store (CBRE, 2021).

The assessment suggests that the global retail e-commerce value from the metaverse is projected to reach approximately US$ 2 trillion annually by 2030. This value is equivalent to around 20% of the total retail e-commerce value across all channels, estimated to be around US$ 9 trillion (Grand View Research, 2020). The three primary channels of retail e-commerce in the metaverse comprise metaverse on mobile, metaverse on desktop, and metaverse on VR/AR/haptic ecosystems. These estimates are based on expected trends, two of which are as follows:

- An increase in the amount of time spent in the Metaverse as confirmed in Gartner Research which predicts that by 2026, 25% of individuals will spend at least one hour per day in the Metaverse for purposes such as work, shopping, education, socialization, and/or entertainment (Gartner, 2022).

- An alteration is expected in the utilization of channels for retail e-commerce. Although mobile devices are anticipated to remain crucial for accessing the metaverse, alongside desktop access, a new channel is poised to emerge, providing access to the metaverse, with considerable value attributed to technological advancements. Early observations from retailers indicate that a spatial product experience in the metaverse can greatly increase conversion rates (Shopify, 2020).

In contrast to the current internet-based shopping activity influenced by retail consumerism and social media, the metaverse is predicted to be powered by experiences (Kozinets, 2023). In the future, ownership will retain its significance; however, it may not necessarily result in purchasing goods and services. Moreover, the importance of shared or solitary experiences, such as playing sports or games, and virtually exploring parts of the world with others, are supposed to increase. In the Metaverse, experiences will serve as an amplifier, potentially leading to a more polarized world where Metaverse residents search for platforms and venues to connect with like-minded individuals (Hughes, 2022).

In addition, it is essential for customers to have positive shopping experiences in the metaverse, and relying on outdated 2D approaches like generic chatbots may be insufficient, and could even deter loyal customers from making purchases or sharing their experiences (Dwivedi et al., 2022). Currently, more complex sensory shopping experiences beyond basic haptic replication may not be feasible in the near future (Yang et al., 2022).

2.3. The Unified Theory of Acceptance and Use of Technology (UTAUT)

Before the development of UTAUT, numerous theories existed aiming to explain the reasons why people use information systems. However, these theories were deemed insufficient in providing a thorough understanding of user behaviour towards information systems. They only addressed certain aspects of the phenomenon, resulting in overlaps among the causes identified by the various theories. Therefore, some researchers proposed the need for integrated theories to comprehensively explain the acceptance of technology among information technology users (Agarwal & Karahanna, 2000). The work of Venkatesh et al. (2003) addresses these requirements by incorporating eight different theories and models: Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), (TAM)-(TPB), Motivational Model (MM), Model of PC Utilization (MPCU), Social Cognitive Theory (SCT), and Innovation Diffusion Theory (IDT), to develop the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2012; Venkatesh et al., 2003).

The UTAUT theory identifies four independent variables that affect the behavioural intention of information system users: expected effort, facilitating conditions, performance expectation, and social impact (Venkatesh et al., 2003). Performance expectancy is defined as "the extent to which using a technology will provide benefits to users in performing certain tasks" (Venkatesh et al., 2003; Venkatesh et al., 2012). When users have high-performance expectancy, it means they believe that using the information system can enhance their work performance.

Effort expectancy, which is defined as "the level of ease associated with users' interaction with technology" (Venkatesh et al., 2012; Venkatesh et al., 2003), represents the usability of information systems. The expected effort, on the contrary, was introduced to reflect the perceived ease of use, complexity, and simplicity in previous models (Venkatesh et al., 2003).

Social influence is defined as "the degree to which users perceive those significant others (e.g., family and friends) believe they should adopt a particular technology" (Venkatesh et al., 2003). In other words, it denotes the level of an information system users' perception of the expectations of their peers regarding the system usage.

Facilitating conditions are the "perceived resources and support available to users to perform a behaviour" (Venkatesh et al., 2012). It refers to the information system users' recognition of the various supporting structures that facilitate their utilization of the system (Venkatesh et al., 2012).

Behavioral intention indicates the user's willingness to use the system, ultimately leading to actual usage (Venkatesh et al., 2003). Initially, the UTAUT proposed that four independent variables directly affect behavioural intention. However, based on the theory of planned behaviour (TPB) incorporated in the UTAUT, it is suggested that the cognitive and affective perceptions of users of an information system form their overall perspective of the system, subsequently influencing their behavioural intentions towards it (Ajzen, 2003). Thus, it is reasonable to assume that the four independent variables impact the development of information system users' attitudes, which consequently influence their behavioural intentions.

One of the crucial factors in determining attitudes is the overall satisfaction that users experience while utilizing the information system (Bhattacherjee, 2001). Service satisfaction refers to the overall positive evaluation of service utilization by its users (Oliver, 1997). Users with a positive experience of an information system are probably more satisfied, and sustain such favourable experience through continued usage (Bhattacherjee, 2001). Satisfaction extensively affects customers' behavioural intentions (Oliver, 1997; Oliver, 1980).

Since its introduction in 2003, the UTAUT theory has been widely regarded as a fundamental model in over 800 studies (Venkatesh et al., 2016). Moreover, the UTAUT model has been demonstrated to be applicable in various contexts, such as online shopping, e-government, online discussion forums, e-learning, and mobile banking (Venkatesh et al., 2016). Therefore, this study utilizes the UTAUT model to establish hypotheses and examine the acceptance of Metacommerce by users.

2.4. Development of Hypotheses

Initial research on the metaverse primarily focused on "Second Life" and therefore, did not consider the attributes of contemporary advanced metaverse platforms. However, the metaverse has experienced noteworthy advancements due to several factors, including the convergence of broadband networks, NFT and cryptocurrency transactions, immersive virtual reality technologies and devices, in addition to the impact of the COVID-19 pandemic on remote activities. Further research is necessary for attaining a profound comprehension concerning the way users are expected to embrace this advanced metaverse platform, especially in the context of conducting e-commerce. Since the Metacommerce platform is an information system, the UTAUT model can be utilized to provide an integrated perspective on user acceptance.

According to Venkatesh et al. (2003), performance expectancy measures the extent to which purchasing a product or service within the metaverse benefits users in their purchasing decisions. Performance expectancy consists of four sub-constructs: (1) perceived usefulness, which signifies users' belief in adopting Metacommerce for enhancing their purchasing efficiency; (2) extrinsic motivation, which indicates users' perception of the added value in adopting Metacommerce; (3) relative advantage, which captures users' belief that Metacommerce is superior to previous e-commerce platforms; and (4) outcome expectation, which suggests users' anticipation of experiencing pleasure and a sense of accomplishment after engaging in Metacommerce (Wu et al., 2022).

Effort expectancy encompasses users' expectations regarding the ease of conducting e-commerce (Venkatesh et al., 2003). The sub-constructs that specifically contribute to effort expectancy are threefold: perceived ease of use of Metacommerce, complexity, and actual ease of using Metacommerce.

According to Venkatesh et al. (2003), social influence evaluates the extent to which users perceive the importance of using Metacommerce based on others' expectations. Social influence consists of four sub-constructs: (1) subjective norm, which reflects the influence of significant others on users' decisions regarding Metacommerce usage; (2) celebrity endorsement; (3) social factors, encompassing the impact of cultural and social norms on users' adoption of Metacommerce; and (4) image, indicating users' belief that using Metacommerce can enhance their social image and relationships (Wu et al., 2022). Facilitating conditions, as confirmed by Venkatesh et al. (2003), pertain to users' perceptions of the technical and organizational resources, available to support their usage of Metacommerce. Facilitating conditions comprise three sub-constructs: facilitating conditions, perceived behavioural control, and compatibility with the technology, as mentioned by Wu et al. (2022).

2.4.1 Satisfaction

According to Choi et al. (2004), fulfilling users' demands, goals, and values is a critical motivator for users to continue using a product, service, or brand. As mentioned by Choi et al. (2004), after using a product or service, users tend to develop either favourable or unfavourable assessments of the brand or product, which extensively impacts their level of satisfaction. Early studies on satisfaction often employed the expectation-disconfirmation model, in which users compare their expected cognitive experiences with their perceived ones to determine their level of satisfaction or dissatisfaction (Giese & Cote, 2000; Veenhoven, 1996). Satisfaction occurs when users consider specific attributes of their experience as surpassing their expectations, while dissatisfaction arises when the experience does not conform to their expectations (McKinney et al., 2002; Venkatesh & Goyal, 2010).

Satisfaction profoundly participates in determining users' acceptance of information technologies (Kabra et al., 2017; Koufaris & Hampton-Sosa, 2004). The quality of users' experience in utilizing Metacommerce is influenced by the direct effects of performance expectancy, effort expectancy, social influence, and facilitating conditions. Previous studies have established a relationship between users' experience and their levels of satisfaction (Choi et al., 2018). Performance expectancy signifies the level of users' perception regarding the ability of emerging technologies to improve their work performance (Venkatesh et al., 2003). In the e-commerce domain, the Metaverse provides users with a realistic and immersive experience, thereby improving the quality of their interactions with virtual elements. In consequence, Metacommerce can assist users in effectively managing their purchasing process. Therefore, users of Metacommerce are more likely to hold a favourable evaluation of the platform due to the enhanced efficiency in their purchasing activities. Accordingly, Hypothesis 1 is formulated as follows:

> *H1. Performance expectancy significantly impacts users' satisfaction with the Metacommerce.*

Another factor that determines user satisfaction is the ease of use of new technologies (Han et al., 2022). The Metacommerce platform facilitates viewing and checking products for users, as they are displayed realistically through virtual reality and other interactive technologies. Furthermore, the Metacommerce platform is designed to mimic the real world, allowing users to learn and interact with it in a way that is consistent with their prior experiences. As a result, users are more likely to be satisfied with the ease of use of Metacommerce. Therefore, Hypothesis 2 is formulated as follows:

> *H2. Effort expectancy significantly impacts users' satisfaction with the Metacommerce.*

In certain research studies, social influence has been considered analogous to social norms, since individuals' conduct is impacted by their social circles (Goldstein & Cialdini, 2011). People tend to use products and brands that they believe reflect their identities and are convenient for them according to others' opinions (Choi et al., 2018). Consuming, in accordance with social norms, satisfies individuals' social desires. Thus, Hypothesis 3 is formulated as follows:

> *H3. Social influence significantly impacts users' satisfaction with the Metacommerce.*

Facilitating conditions pertain to the extent to which users perceive that the technical and organizational resources are available to support their use of technology (Venkatesh et al., 2003). The availability of immediate support is one of the fundamental factors that can influence users' evaluation of the Metacommerce platform (Deng et al., 2010). Therefore, as the Metaverse platform continues to develop, users are expected to become more active, and derive greater value from it, resulting in increased satisfaction. Hence, Hypothesis 4 can be formulated as follows:

> *H4. Facilitating conditions significantly impacts users' satisfaction with the Metacommerce.*

2.4.2 Usage Intention

In Fornell et al.'s (1996) empirical study, satisfaction was found to strongly impact users' repeated purchase of goods and services. According to the theory of expectation confirmation, users' satisfaction with previous purchases is a major determinant of their continued intention to purchase a particular product or service, whereas low satisfaction can lead to discontinuation of use (Han et al., 2022). As information systems continue to improve, many studies have explored factors that affect users' intention to continue using a particular system based on their satisfaction (Hidayat-ur-Rehman et al., 2021; Wu et al., 2020). Deng et al., (2010) developed and examined a research model to investigate how users' encounters with information technology impact their satisfaction levels and their intention to continue using the technology. Additionally, through an empirical study on users' continued use of online communities. Yang et al., (2022) determined that satisfaction directly influenced their continued intention to use online forums. Therefore, Hypotheses 5 and 6 can be formulated as follows

> *H5. Facilitating conditions significantly impacts usage intentions.*

> *H6. Users' satisfaction significantly impacts usage intention.*

3. Research Methodology

3.1. Research Model

Figure 1 shows the proposed model, which includes performance expectancy, effort expectancy, social influence, and facilitating conditions which influence users' satisfaction, subsequently affecting their behaviour.
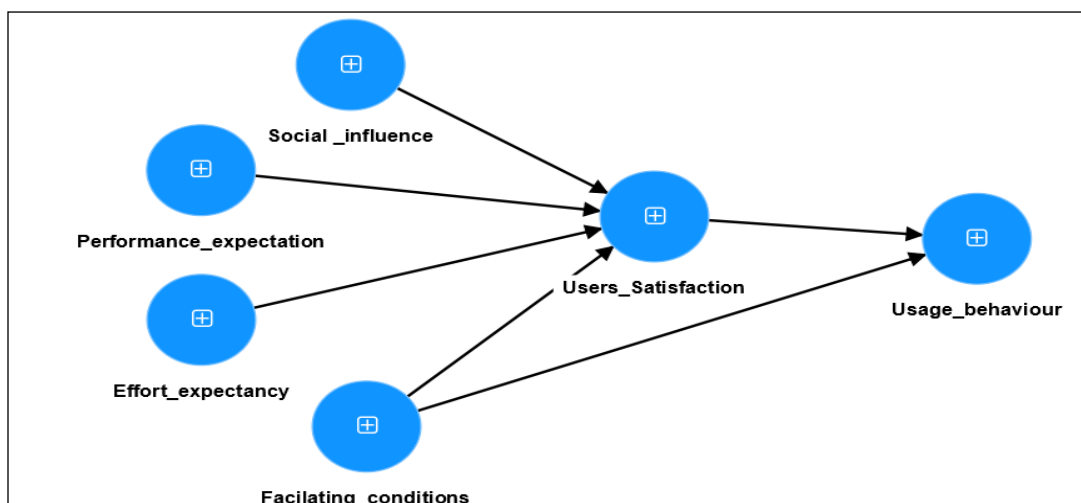
3.2. Measurement Items

The measurement items developed by Venkatesh et al. (2003) have been utilized in numerous studies. To ensure comparability with these studies, the same measurement items were adopted in this research, although some of these items were eliminated during the validation process. The three-step validation guidelines proposed by Churchill (1979) to validate the measurement items and survey questionnaires were followed; moreover, a two-step validation process was implemented to ensure the accuracy of the used survey questionnaires.

First, the validated survey questionnaires from Venkatesh et al. (2003) were utilized. To ensure that all survey questionnaires were convenient for the research context, a pilot test was conducted with the participation of seven experts, with over three years of experience, in the fields of AI and virtual reality. The purpose of this pilot test was to determine whether the questions were easily understood and answered by respondents, and whether they clearly conveyed their meaning.

During the pilot test, some of the experts provided feedback concerning the inconvenience of some questions for the research context, in addition to the similarity of meanings conveyed by other questions. In this study, certain questions from the survey questionnaire were excluded based on the feedback received during the pilot test. Specifically, the following questions were excluded:

The fourth question regarding performance expectancy, phrasing, "Using the system will enhance my likelihood of getting a raise." The first question concerning effort expectancy, stating, "I would have a lucid and comprehensible interaction with the system." The fourth question on the facilitating conditions factor, stating, "An individual is designated to provide support in case of any system-related issues." This decision was supported by the findings of Im et al. (2011) as well, who similarly excluded these questions from their research. According to the pilot test participants, the remaining questions were unambiguous and simple to respond to (see Table 1).

Figure 1. Conceptual Model of Influencing Factors of Usage Intention of Metacommerce

Table 1. Measurement Items

Construct	Items	Adapted from
Performance Expectancy (PEX)	The metaverse application would be beneficial to me in my daily life.	(Im et al., 2011; Venkatesh et al., 2003)
	The utilization of the metaverse application allows me to expedite the completion of tasks.	
	My productivity will be enhanced by utilizing the metaverse application.	
Effort Expectancy (EXP)	Becoming proficient in using the metaverse application would be a straightforward task for me.	(Im et al., 2011)
	The metaverse application would be user-friendly for me.	
	Acquiring the skill to operate the metaverse application comes easily to me.	
Social Influence (SIF)	Individuals who impact my behaviour believe that I ought to utilize the metaverse application.	(Venkatesh et al., 2003)
	The metaverse application is recommended by people who hold significance in my life.	
	The utilization of the metaverse application has been facilitated by the supportive senior management of this institution (my school).	
	Overall, those around me have been supportive of utilizing the metaverse application.	
Facilitating Conditions (FCN)	The resources required for me to use the metaverse application are available to me.	(Venkatesh et al., 2003)
	I possess the requisite knowledge to operate the metaverse application.	
	The metaverse application is incompatible with the other systems that I use.	
Users' Satisfaction (UST)	I am satisfied with my experience using this metaverse application.	(Kim & Son, (2009; Simanjuntak & Purba, 2020)
	I am content with my experience using this metaverse application.	
	The experience using this metaverse application meets my expectations for this type of service.	
Usage Intention (USI)	I plan to utilize the metaverse application within the next 6 months.	(Venkatesh et al., 2003)
	I anticipate using the metaverse application within the next 6 months.	
	Within the next 6 months, I intend to make use of the metaverse application.	

3.3 Data Gathering

The target population of this study consisted of individuals who were potential users of the Metacommerce platforms but had never used them before. To recruit participants for the laboratory experiment, the students enrolled in my classes were approached and obtained their consent to participate. Among the 250 students who agreed to participate, 13 were excluded from the study due to providing unreliable responses. Ultimately, a total of 237 valid data points were collected.

This study utilized laboratory experiments, which involved certain procedures. First, a lecture on metaverse technology in general, and Metacommerce in particular was conducted with access to various metaverse websites. Next, an introduction to the

operational method of the "Zepeto" metaverse mobile platform was provided. Thereafter, students were instructed to download the "Zepeto" mobile application and access it multiple times. Subsequently, they participated in a free discussion with their peers on how metaverse technologies would affect their way of conducting or purchasing a product or service in the future. Afterward, they were required to present their group's findings to others. Finally, all participants were requested to answer the questionnaire.

4. Results

4.1. Sample Characteristics

Table 2 demonstrates a gender ratio of 64.5% males, and 35.5% females. The respondents' age ranged from 18 to above 22 years old. The age group from 18 to 22 represents most of the respondents, reaching 86.5%, compared to the one of the age above 22 which reached 13.5%. Such result indicates that most online users belong to Generation Z. With respect to duration time which users spend every day on the internet, the most duration time spent by the respondents was more than 7 hours per day.

Table 2. Sample Demographics Analysis

Characteristics	Categories	Frequency	Percent (%)
Gender	Male	153	64.5
	Female	84	35.5
Age	18-22	205	86.5
	> 22	32	13.5
Internet users per/da	0-2	51	21.51
	3-5	7	2.99
	>5	179	75.5

4.2. Measurement Model

The facial validity, convergent validity, and reliability of the measurement model can be confirmed by examining a range of statistical values and criteria. To evaluate the reliability of individual variables, the computation of the average variance extracted (AVE), composite reliability, and Cronbach's alpha were performed (Werts et al., 1973). All AVE values exceeded the 0.5 threshold, and all composite reliability and Cronbach's alpha values exceeded the 0.7 threshold (Werts et al., 1973; Fornell & Larcker, 1981). For establishing discriminant validity, two validation options were available for the measurement model. An alternative is to compare the correlation value of the latent variable with other variables to the square root value of the AVE. According to Table 3, the square root values of the AVE for all variables exceeded their correlation values with other variables. The second approach is to ascertain that the factor loading value for each variable is substantially greater than the factor loading values between variables.

As per Table 3, the factor loading values within each variable surpassed those between variables. Based on these two validation methods and the results of the statistical values and criteria, the measurement model in this study demonstrated a sufficient level of validity and reliability. Afterward, a structural equation model analysis using the bootstrapping algorithm with 5,000 subsamples was proceeded.

Table 3. Measurement Model Validity

Construct	Item	Outer Loading	VIF	Cronbach alfa	CR	AVE
Effort Expectancy				0.769	0.775	0.684
	EXP1	0.807	1.581			
	EXP2	0.847	1.627			
	EXP3	0.826	1.519			
Facilitating Conditions				0.846	0.860	0.763
	FCN1	0.888	1.981			
	FCN2	0.885	2.239			
	FCN3	0.848	1.954			
Performance Expectancy				0.775	0.861	0.767
	PEX1	0.854	1.640			
	PEX2	0.885	1.504			
	PEX3	0.889	1.681			
Social Influence				0.851	0.836	0.692
	SIF1	0.819	2.051			
	SIF2	0.744	2.377			
	SIF3	0.861	2.069			
	SIF4	0.819	1.580			
Usage Intention				0.774	0.789	0.688
	USI1	0.849	1.643			
	USI2	0.776	1.493			
	USI3	0.860	1.673			
Users' Satisfaction				0.856	0.858	0.777
	USAT1	0.860	1.933			
	USAT2	0.904	2.421			
	USAT3	0.880	2.210			

Furthermore, the assessment of discriminant validity was performed using the Heterotrait-Monotrait (HTMT) ratio criterion, as described by Yan et al. (2023). Upon analysis, all HTMT ratios were found to be below the cut-off value of 0.90, indicating a successful establishment of discriminant validity, as illustrated in Table 4 and corroborated by Ng et al. (2022) as well as Kock & Hadaya (2018).

### Table 4. Fornell–Larcker Criterion and Heterotrait-Monotrait (HTMT)

	EXP	FCN	PEX	SIF	USI	USAT
EXP						
FCN	0.663					
PEX	0.818	0.799				
SIF	0.898	0.699	0.895			
USI	0.887	0.700	0.889	0.891		
USAT	0.820	0.846	0.892	0.876	0.887	

4.3 Structural Model

The significance of the path coefficients using the bootstrapping technique with 5,000 subsamples was examined. As shown in Table 5 and Figure 2, the performance expectancy ($\beta = 0.108$, $p < 0.05$) exhibits a positive influence on users 'satisfaction; thus, H1 is supported. However, effort expectancy ($\beta = 0.066$, $p > 0.05$) does not demonstrate a negative influence on users' satisfaction; therefore, H2 is not supported. The ($\beta = 0.540$, $p < 0.05$) for social influence shows a positive impact on users' satisfaction, proving the acceptance of H3. Facilitating conditions ($\beta = 0.254$, $p < 0.05$) demonstrates a positive impact on users' satisfaction, thereby supporting H4. The fifth factor facilitating conditions ($\beta = 0.272$, $p < 0.05$) indicates a positive impact on usage intention, thus, H5 is accepted. The ($\beta = 0.657$, $p < 0.05$) for users' satisfaction suggests a positive influence on usage intention, confirming H6. Based on the above results, the factors performance expectancy, social influence, and facilitating conditions were notable predictors of users' satisfaction, which considerably influences usage intention. On the contrary, the results demonstrated a remarkable positive impact by users' satisfaction ($\beta = 0.652$, $p < 0.05$) on usage intention ($p > 0.05$). Overall, the model explained 76.6% of the variance in the acceptance of Metacommerce platforms.

Table 5. Structural Relationships Results

	Hypothesis Relationship	STDEV	P values	Path Cof.	Supported
(H1)	PEX -> USAT	0.056	0.00	0.108	Yes
(H2)	EXP-> USAT	0.054	0.227	0.066	No
(H3)	SIF -> USAT	0.065	0.00	0.540	Yes
(H4)	FCN-> USAT	0.064	0.00	0.254	Yes
(H5)	USAT-> USI	0.069	0.00	0.652	Yes
(H6)	FCN -> USI	0.057	0.00	0.272	Yes
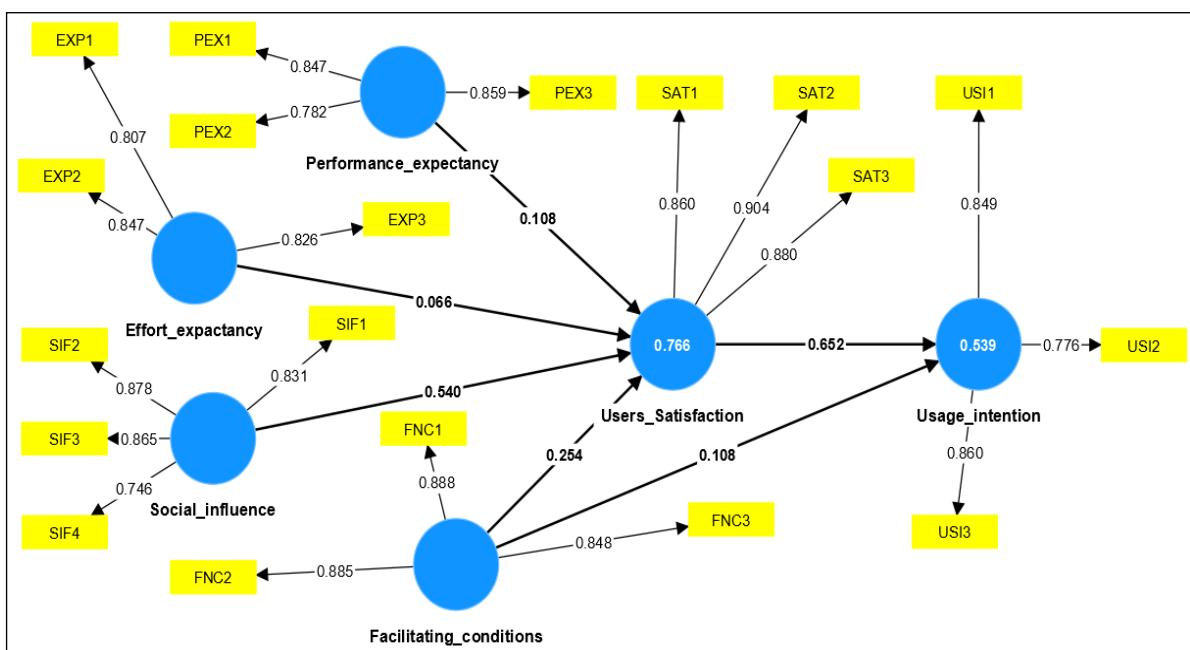
Figure 2. Structural Equation Model Path Analysis

The findings of the analysis suggest that users are more likely to experience satisfaction with the Metaverse when they perceive the platform as a means of accomplishing tasks more efficiently and improving work productivity. Additionally, individuals are probably satisfied with the Metaverse only when the platform is user-friendly and easy to navigate. Given that the Metaverse is a new form of technology, ease of use plays a crucial role in determining user satisfaction. Furthermore, satisfaction with the Metaverse is positively influenced by the expectations of individuals' social network, which may comprise those who have the ability to influence their behaviour or those whom they value. However, it appears that the current application of the Metaverse does not offer unique resources or services that distinguish it from other information systems. Otherwise, as argued in the original model by Venkatesh et al. (2003), the facilitating condition may directly impact behaviour rather than behavioural intention.

In the in-depth interview results, the participants' perceptions and evaluations for each independent variable were elaborated. As users' satisfaction with the Metaverse platform increases, their inclination to engage in positive behaviours also increases, and they are more inclined to continue using the platform to sustain these experiences. Moreover, users are willing to pay subscription or item purchase fees to actively participate in the Metaverse platform. This study has effectively validated the factors contributing to individuals' acceptance of Metacommerce platforms, particularly the four independent variables which impact users' satisfaction and usage intention.

One notable aspect of the analysis involves comparing the size of the path coefficients between variables. Previous studies suggest that performance expectancy is the most influential independent variable on usage intention among the four variables in the UTAUT model. However, the results of this study demonstrate that social influence had the highest impact on users' satisfaction. The path coefficient between performance expectancy and users' satisfaction was relatively small, whereas effort expectancy did not notably affect users' satisfaction. Conversely, users' satisfaction had a noticeable and positive effect on usage intention.

To provide a more concrete interpretation of the results, follow-up interviews were conducted with the participants of the laboratory experiment. The four independent variables proposed by the UTAUT model are broad and abstract concepts requiring contextualization. The interviews highlighted how participants perceived these factors in the context of the Metacommerce platform.

The results of the interviews revealed two main reasons why social influence had the most impact on users' satisfaction. First, the Metaverse differs from existing information systems that aim to enhance task effectiveness, since it constitutes a complete world on its own. Thus, its introduction serves not only to improve work efficiency but also to facilitate social interaction and coexistence in that realm. Additionally, the majority of participants were aged between 18 and 26, and most current Metaverse platform users are below 20 years old. Consequently, their behaviour is easily influenced by their peers and colleagues.

The second reason involves the minimal influence of users' perception of effort expectancy on their satisfaction. Participants reported that the Metaverse provides information in an intuitive way, and using it resembles using the real world. Users do not require any specific knowledge about the Metaverse. Furthermore, most participants already had basic knowledge concerning using web interfaces from their years of web experience, which allowed them to use the Metaverse with ease. Therefore, ease of use is a necessary and natural requirement for Metaverse services.

The interview results demonstrated the reasons of the incapability of facilitating conditions to influence users' satisfaction, which differs from the findings of previous studies. The Metaverse platform used in this study is compatible with smartphones, PCs, and virtual reality with the use of a headset; however, it is particularly user-friendly on smartphones. The participants belonged to Generation Z, and were already familiar with using smartphones which facilitated using the Metaverse platform. However, the natural features of the Metaverse platform did not necessarily increase their satisfaction. During the interviews, the participants mentioned that the constraints of the incumbent Metaverse platform were more influential than its facilitating conditions. They explained that the functions of the Zepeto application were often already provided by other games, and they could not identify unique features of the Metaverse platform that distinguish it from other information systems.

5. Discussion

As people increasingly seek virtual experiences and gratification through Metaverse (Bojic, 2022), and major technology companies continue to invest in developing Metaverse platforms, interest in Metaverse continues to grow (Dwivedi et al., 2022). Despite this trend, there is a lack of studies on determining which factors contribute to user acceptance of Metacommerce platforms. To address this gap, this research applied the UTAUT model; the study identified four independent variables that impact Metacommerce acceptance, and successfully validated them. The satisfaction of using a Metaverse platform is augmented by the expectation of performance, ease of use, and social influences, which notably enhance usage intention. The finding of the study offers many points for further discussion, including advantages of Metaverse for companies, and Metaverse designing.

Advantages of Metaverse for Companies: Companies can attract more subscribers and extend their market influence. Users who are content with the metaverse platform tend to use it more frequently. Satisfaction with the Metaverse platform leads to an increased inclination for purchasing. In addition, companies can leverage the network effect by increasing their subscriber base through positive word-of-mouth promotion. The more active users there are on the Metaverse platform, the more likely they are to pay for subscriptions and in-app purchases. Additionally, investment in infrastructure is essential to ensure the direct delivery of Metaverse services (George et la., 2021).

Metaverse Design: As observed in this research, the presence of facilitating conditions did not significantly influence user satisfaction with the metaverse platform. In addition, interviewees emphasized the importance of incorporating unique features into the Metaverse.

Furthermore, to enhance user experience and usability, the design of the Metaverse is required to closely emulate reality. This implies that the rules and principles applicable in the real world should as well remain valid within the metaverse. Such an approach will promote a sense of familiarity among users, and facilitate their adaptation to the platform. Moreover, to foster user acceptance, the metaverse ought to be designed in an intuitive and easily comprehensible manner, ensuring effortless usage. As indicated by the effort expectancy variable in this study, user-friendliness should be a top priority in the design of the Metaverse. For widespread adoption as a media technology, it must be accessible to all without difficulty. Finally, supporting diverse forms of social interaction through encompassing the utilization of symbols and gestures commonly used for communication in the real world is crucial for the Metaverse.

6. Conclusions

As the purpose of this study has been thoroughly explained in the analysis results and discussion section, the conclusion section aims to summarize the value of this study. The findings provide substantial contribution to both academic and practical areas.

With respect to academic contributions, this research explores the new and emerging field of the Metaverse, specifically focusing on Metacommerce. The study provides a comprehensive understanding of user acceptance of Metacommerce by utilizing the (UTAUT) model as the theoretical framework. Furthermore, the study identifies potential research directions that have emerged as a result of the advent of the Metaverse. Additionally, the study broadens the research scope of human-oriented values by highlighting the role of social influences in this new mixed-reality world. This divergence from the existing research direction, which solely focused on the performance of information systems, provides valuable insights into how the front-end system should be designed.

With regard to practical contributions, the study provides guidelines for designing the Metaverse platform. These guidelines include making the Metaverse user-friendly, addressing problems in both the real and virtual worlds, as well as developing unique services, exclusive to the Metaverse. Furthermore, the dependent variable of this study emphasizes the advantages which companies can attain through utilizing the Metaverse platform, since it enables them to effectively attract subscribers by increasing their usage intention.

7. Limitations

Despite the academic and practical contributions of this study, some limitations have to be acknowledged. The first limitation is related to the Metaverse platform used in this study, "Zepeto," which was ascertained to have limited functionality. Since this platform is primarily designed for smartphones, it provides fewer diverse features compared to other platforms that support immersive virtual reality headsets and provide high-resolution Metaverse experiences. Therefore, further research is required for examining user acceptance and behaviour across different Metaverse platforms. Obtaining more conclusive results can be achieved by analysing a larger sample size in future studies. Additionally, there is a limitation regarding demographic bias, since the respondents for this study consisted only of undergraduate business students aged between 18 and 25 years old. Conducting research on various demographic groups in the future could provide a more comprehensive understanding of acceptance and behaviour towards the Metaverse. Moreover, the utilization of Metaverse technology has the potential to enhance the media usage experience for diverse users. Future studies can examine the impact of the metaverse on these dependent variables, subsequently assisting Metaverse user interface designers in creating more appealing Metaverse environments.

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