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# Adoption and Continuance in the Metaverse

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**Abstract:** The burgeoning metaverse market, encompassing virtual and augmented reality, gaming, and manufacturing processes, presents a unique domain for studying user behavior. This study delineates a research framework to investigate the antecedents of behavioral intention, bifurcating users into inexperienced and experienced cohorts. Utilizing a cross-sectional survey, empirical data were amassed and analyzed using structural equation modeling, encompassing 372 responses from 131 inexperienced and 241 experienced users. For inexperienced users, the analysis underscored the significant impact of perceived usefulness on both satisfaction and adoption intention, while perceived enjoyment was found to bolster only satisfaction. Innovativeness and satisfaction do not drive adoption intention. Conversely, for experienced users, satisfaction was significantly influenced by perceived ease of use, perceived usefulness, and perceived enjoyment. Continuance intention was positively affected by perceived usefulness, perceived enjoyment, trust, innovativeness, and satisfaction. This research extends valuable insights for both theoretical advancements and practical implementations in the burgeoning metaverse landscape.

**Keywords:** metaverse adoption; user experience; behavioral intention; structural equation modeling; cross-sectional survey



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## 1. Introduction

The concept of the metaverse, which originated in speculative fiction, has evolved into a significant technological phenomenon that blends the physical and virtual worlds. The metaverse can be defined as an expansive, interconnected network of virtual 3D spaces where users interact with one another, conduct business, play games, and participate in social, educational, and professional activities through avatars and immersive environments [1]. It encompasses technologies such as virtual reality (VR), augmented reality (AR), and extended reality (XR), allowing users to engage with digital content in real time. The metaverse is expected to have a profound economic and social impact, with its market value projected to reach USD 678.8 billion by 2030 [2]. This rapid growth has attracted investments from major companies, with 17% of businesses in the information technology (IT) sector already investing in metaverse technologies [3]. Given the increasing role of immersive technologies like VR in influencing user behavior, it is crucial to understand the behavioral intentions of metaverse users. Recent studies, such as those by Sousa et al. [4], have demonstrated that immersive experiences can significantly impact behavioral intentions, particularly in tourism, where VR enhances decision-making and user satisfaction. Similarly, Sousa et al. [5] highlight the role of technological innovativeness in shaping users' experiences and intentions after VR interactions. However, these studies primarily focus on tourism, leaving gaps regarding metaverse-specific user behavior. This study fills that gap by examining how prior experience with the metaverse (inexperienced vs. experienced users) affects behavioral intentions, adding valuable insights to the existing literature on immersive technologies and user behavior.

The metaverse offers opportunities for users to engage in various activities, such as social networking, gaming, shopping, and even learning. These activities have been made possible through advancements in digital environments that replicate real-world interactions. For example, virtual stores within the metaverse provide immersive shopping experiences where users can browse and select products in a 3D space [6]. Additionally, the integration of AR and VR technologies has enhanced the gaming industry, allowing for more interactive and immersive experiences [7]. In the educational field, game-based learning within the metaverse can motivate students to engage in continuous learning [8]. This diverse range of applications makes the metaverse a dynamic platform that appeals to various user needs, from entertainment to productivity.

Despite the promising future of the metaverse, several challenges remain, particularly regarding user trust, privacy, and security. Personal information and payment history are critical elements in metaverse transactions, and users' trust in the system's ability to protect their data significantly influences their behavior. Consumers aware of the risks associated with personal information leakage may be less likely to invest in the metaverse [9,10]. Privacy concerns, therefore, have become a decisive factor for users when conducting economic activities within the metaverse. Moreover, users' willingness to adopt and continue using the metaverse is strongly influenced by their perceived ease of use, usefulness, and enjoyment [11,12]. The ease with which users can navigate virtual environments enhances their overall experience, making the technology more appealing.

In this vein, this study aims to explore the factors influencing users' behavioral intentions toward the metaverse by dividing them into two groups: inexperienced and experienced users. This classification enables a deeper understanding of how different levels of exposure to the metaverse impact user engagement with the technology. Specifically, the key objectives of this study are to:

- Investigate the key factors influencing user behavior in the metaverse, focusing on both adoption and continuance intentions.
- Analyze the role of perceived usefulness, ease of use, enjoyment, and satisfaction in shaping user intentions.
- Explore the impact of trust and innovativeness on the adoption intentions of inexperienced metaverse users and the continuance intentions of experienced metaverse users.

To achieve these objectives, this study employs a cross-sectional survey methodology, gathering empirical data from 372 respondents. Structural equation modeling (SEM) is used to analyze the data, providing insights into how these factors interact to influence user behavior. By investigating these elements, this study aims to contribute to both the theoretical framework of metaverse adoption and practical strategies for enhancing user engagement and satisfaction.

This paper provides a comprehensive analysis of metaverse user behavior, focusing on both inexperienced and experienced users. While prior studies have examined factors such as user age and gender in VR contexts [13] and user profiles for 360-degree videos [14], this study distinguishes itself by differentiating metaverse users based on their prior experience with the technology. Although previous research has focused on potential or existing users separately [11,15,16], this paper offers new insights by validating a research model that incorporates users' prior experience. Additionally, the study reinforces established theories by introducing variables such as ease of use, usefulness, and enjoyment, which have been extensively validated in the IT acceptance literature [12,17,18], but require further exploration within the metaverse. Furthermore, the study highlights the role of trust in metaverse adoption, an area rarely addressed in previous metaverse research [11,19,20], and examines how trust impacts user behavior. Finally, this research emphasizes the role of innovativeness, showing that users with higher levels of innovation propensity are more likely to adopt metaverse technologies [21,22], providing practical implications for overcoming adoption barriers among less innovative users.

The remainder of this article is structured as follows: Section 2 summarizes existing studies related to the metaverse and guides the hypotheses for each factor. Section 3 refers

to the measurement and sampling procedures of the analysis. Section 4 describes the empirical analysis results. Section 5 discusses the results of this study. Finally, Section 6 presents contributions, limitations, and research directions.

## 2. Literature Review and Hypothesis Development

The concept of the metaverse has burgeoned from mere speculative fiction into an emergent reality, bearing profound ramifications on various spheres of human interaction and business operations [23–26]. The core idea posits a virtual universe comprising myriad interconnected 3D virtual worlds [27]. Scholars like Schumacher [1] elucidate the metaverse's distinguishing features, such as immersive realism, interoperability, and decentralized architecture, as the linchpins for its boundless potential. Various studies articulate the diverse typologies within the metaverse, grounded in their distinctive thematic underpinning and user engagement mechanics. For instance, social metaverses like VRChat and Rec Room prioritize communal interactions and social connectivity, while gaming-oriented metaverses like Fortnite and Roblox harbor complex gameplay and competitive structures [28]. Noteworthy instances of metaverse implementations bear witness to its boundless prospects. Facebook's pivot to Meta reflects a colossal institutional endorsement of the metaverse vision, propelling significant advancements in hardware and software paradigms [29]. Similarly, Epic Games' MetaHuman Creator exemplifies how the metaverse could redefine digital identity and character creation [30]. Despite the effervescent promise, there is a consensus among scholars concerning the formidable challenges ahead, including privacy, security, and equitable access [31].

As the metaverse continues to evolve and actively intertwines with other industries, researchers have examined it from various perspectives. Several studies have delved into the behavioral intentions of metaverse users, such as acceptance intention, participation intention, interaction intention, and purchase intention. Akour et al. [11] explored the primary factors impacting the adoption intention of the metaverse by employing an artificial neural network. They revealed that adoption intention is influenced by satisfaction, ease of use, and usefulness, with satisfaction being formed by complexity, observability, trialability, and compatibility. Personal innovativeness was validated to affect ease of use and usefulness. Alvarez-Risco et al. [15] developed a conceptual framework to understand the mechanism of intention formation to participate in the metaverse during the COVID-19 pandemic. They provided empirical evidence supporting that self-efficacy in engaging with the metaverse is shaped by institutional support and technological literacy, and that self-efficacy drives the intention to participate. Mull et al. [32] elucidated the relationship among the constructs affecting the intention to interact in virtual space using avatars as online salespeople. The analysis results disclosed that attractiveness positively affects intention to interact in the cases of human avatars, humanoid avatars, fantasy avatars, and animal avatars. Homophily was found to influence the intention to interact when consumers engage with human avatars, humanoid avatars, and fantasy avatars. Hwang and Lee [16] designed an analytical model to explain consumer satisfaction and purchase intention in the metaverse domain. They discovered that both consumer satisfaction and purchase intention are affected by concurrence, interoperability, presence, and seamlessness, with consumer satisfaction enhancing purchase intention. Several studies have explored user behavior and adoption in metaverse contexts, examining a range of factors such as satisfaction, intention, and technology acceptance. Chakraborty et al. [6] analyzed continuance intention toward metaverse-based virtual stores, finding that convenience and entertainment predict usage, moderated by trust and hedonic motivation. Wu et al. [33] focused on young users of digital twin-enhanced metaverse museums, identifying hedonic, utilitarian, and social gratifications as key factors influencing continued use. Liang et al. [19] used flow theory to explore user acceptance of the metaverse, identifying flow experience and personal innovation as significant predictors while revealing varying acceptance levels through complementary analysis techniques. These studies contribute to understanding the diverse factors shaping user engagement with metaverse technologies.

Additionally, several researchers have conducted systematic reviews on the metaverse. Shen et al. [34] performed a systematic literature review to identify the determinants of metaverse users' purchase intentions, highlighting utilitarian value, satisfaction, trust, product attitude, enjoyment, and brand attitude as key factors. They also identified AR, software agents, customization, client design, and function design as essential categories of design artifacts for virtual commerce. Dhingra and Abhishek [35] conducted another systematic review, which revealed the prominence of the Technology Acceptance Model (TAM) in metaverse adoption research, particularly in sectors such as education and tourism.

Other researchers have explored the core concepts, potential issues, game activation, and aesthetic trends within the metaverse. Wang et al. [9] illuminated the fundamentals, privacy, and security of the metaverse, examining a revolutionary distributed metaverse architecture and its main features. They highlighted the potential challenges in delivering the inherent properties of the metaverse, such as immersive realism and heterogeneity, and argued that widespread adoption may be hampered by serious privacy and security breaches. Prayitno [36] posited that the transformation from the real world to virtual space represents a pinnacle of digital civilization. They discussed the potential issues with the metaverse, emphasizing the necessity for users to consider social aspects such as culture and societal conditions, and concluded that adopting the metaverse could help individuals navigate through the COVID-19 pandemic. Park and Kim [37] identified different world types in the metaverse to enhance gaming experiences, and suggested classifications such as survival, racing, jump, multi-choice, maze, and escape room, based on a bottom-up methodology stemming from actual examples. Ba and Shen [38] analyzed the aesthetic trends developed by fans of live-streamed eating shows, revealing that a younger demographic comprises the majority of fan groups, who find physical and emotional satisfaction in following opinion leaders in these shows.

Furthermore, scholars have identified the metaverse for its ideas and possibilities [27, 39–41]; economic impact [29,42]; investment opportunities [10,43]; employment impact [44]; applicability to tourism [45], health [46], and gaming [47]; work utilization [48]; consumer experience [49–53]; software platforms [54,55]; and applicability to autonomous vehicles [56]. Table 1 summarizes the literature review.

**Table 1.** SWOT summary of metaverse from literature review.

| SWOT | Key Points | References |
| --- | --- | --- |
| Strengths | Immersive user experiences that blend physical and virtual worlds, enhancing interactivity and engagement.<br>Extensive business opportunities in industries like gaming, education, health, and retail.<br>Advanced technology integration (VR, AR, XR) allowing real-time interaction. | [1,6,7] |
| Weaknesses | Privacy and data security concerns related to personal information.<br>High cost of infrastructure, hardware, and technological maintenance. | [9,10,31,57] |
| Opportunities | Potential to revolutionize sectors like tourism, education, and healthcare through virtual engagement.<br>Opportunities for global collaboration and social interaction in virtual environments.<br>Expanding market for virtual goods, services, and experiences. | [4,15,45] |
| Threats | Legal and ethical challenges, including regulatory uncertainty and intellectual property issues.<br>Risk of digital addiction and social isolation due to over-immersion in virtual environments.<br>Competition among major tech companies for dominance, which could hinder standardization. | [58–61] |

A plethora of dimensions intersecting with technological advancement, user engagement, and the reimagining of digital spaces have emerged from the burgeoning discourse on the metaverse. However, while several studies have explored the factors influencing

metaverse adoption, such as technology acceptance, trust, and innovativeness, no research has specifically analyzed these factors by dividing users into experienced and inexperienced groups. This gap in understanding the distinct behaviors and perspectives of these user groups in the metaverse, particularly in a rapidly evolving digital era, has yet to be fully addressed in the existing literature.

This study's theoretical foundation is rooted in the TAM, which identifies perceived ease of use and perceived usefulness as key determinants of user acceptance and technology usage behavior [62]. Despite its extensive use, TAM remains relevant for studying emerging technologies like the metaverse, as it effectively explains how perceived ease of use and perceived usefulness influence user acceptance. Given the novel context of the metaverse, applying TAM allows for a structured analysis of these key factors while integrating additional variables such as perceived enjoyment, trust, and innovativeness, which are crucial in understanding the adoption and continuance behaviors of both experienced and inexperienced users. Perceived enjoyment, which measures how much users enjoy the activity itself, plays a vital role in shaping user satisfaction and behavioral intentions, especially in systems where entertainment and engagement are significant drivers [63]. Trust is another essential factor, as it mitigates perceived risks and fosters behavioral intentions by ensuring the security of personal information during interactions within the metaverse [64,65]. Innovativeness, or a user's willingness to experiment with new technologies, impacts both perceived ease of use and perceived usefulness, further influencing both adoption and continuance intentions [66,67]. Satisfaction, an essential outcome variable, plays a critical role in determining user loyalty and continued use, reflecting the importance of user contentment with the metaverse experience [68].

Additionally, this study posits that the relationships between these constructs are moderated by prior experience. For inexperienced users, behavioral intention is treated as adoption intention, while for experienced users, it is considered as continuance intention. This distinction allows for a deeper understanding of how different user groups interact with the metaverse. By integrating these constructs, the extended TAM framework provides a comprehensive approach to analyzing user behavior in the metaverse, as illustrated in Figure 1.

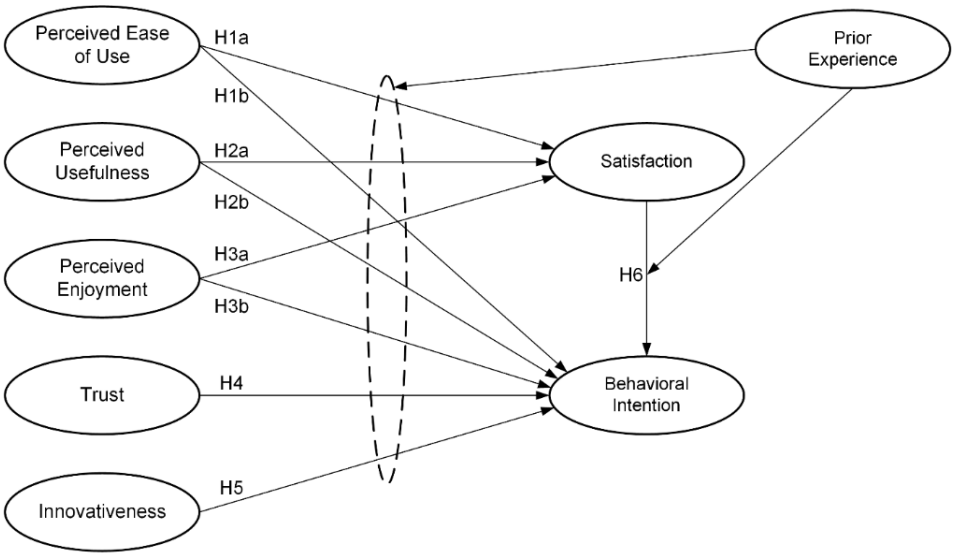


**Figure 1.** Research model.

### *2.1. Perceived Ease of Use*

Perceived ease of use, defined as the extent to which an individual deems a technology straightforward to use [62], prominently influences satisfaction [69,70]. It also acts as a pivotal determinant of behavioral intentions, including adoption intention [71,72] and continuance intention [62,73,74] across various contexts. Notably, it augments the level of

users' intention to engage with the metaverse [11]. Given these explorations, this study posits that perceived ease of use catalyzes both satisfaction and behavioral intention.

**H1a.** *Perceived ease of use positively impacts satisfaction.*

**H1b.** *Perceived ease of use positively impacts behavioral intention.*

### 2.2. Perceived Usefulness

Perceived usefulness is defined as the extent to which utilizing a technology will yield effective results [62]. It has been established as a primary factor influencing the satisfaction of technology users [75,76]. The literature has demonstrated that perceived usefulness significantly affects adoption intention [71,77,78] and continuance intention [79–81] among IT users. Moreover, it enhances the users' intention to engage with the metaverse. In light of the aforementioned findings, the current study posits that perceived usefulness heightens both satisfaction and behavioral intention.

**H2a.** *Perceived usefulness positively impacts satisfaction.*

**H2b.** *Perceived usefulness positively impacts behavioral intention.*

### 2.3. Perceived Enjoyment

Perceived enjoyment measures the extent to which an activity is deemed personally enjoyable, independently of the technology's primary utilitarian function [82]. It has been affirmed to significantly influence the satisfaction of IT users [83,84]. Moreover, perceived enjoyment is positively associated with adoption intention [85–87] and continuance intention [80,84,88] in various studies. Informed by the existing literature, the current study posits that perceived enjoyment fosters both satisfaction and behavioral intention.

**H3a.** *Perceived enjoyment positively impacts satisfaction.*

**H3b.** *Perceived enjoyment positively impacts behavioral intention.*

### 2.4. Trust

Trust is defined as a user's conviction regarding an information system's capacity to secure personal information [89]. The propounded rationalization underscores trust as a crucial catalyst propelling the behavioral intention amidst various contextual frameworks [90–92]. The quintessence of trust burgeons as users interact with information systems, wherein the safeguarding of personal information becomes paramount. The assurance towards the information system's ability to provide a secure environment orchestrates a positive influence, subsequently fostering an inclination towards behavioral intention. Therefore, through a meticulous examination of preceding scholarly endeavors and empirical evidence, this study articulates the subsequent hypothesis.

**H4.** *Trust positively impacts behavioral intention.*

### 2.5. Innovativeness

Innovativeness denotes a consumer's propensity for risk-taking in technology utilization [93]. It is bifurcated into functional and hedonic innovativeness, identified as key antecedents of customer loyalty [94]. Through avenues of perceived ease of use and perceived usefulness, innovativeness markedly shapes the intent to shop online [95]. Further, it influences adoption intention via perceived usefulness [96] and impacts continuance intention both directly [19,22] and indirectly [97]. Given this backdrop, this paper anticipates that innovativeness will foster behavioral intention.

**H5.** *Innovativeness positively impacts behavioral intention.*

### *2.6. Satisfaction*

Satisfaction, defined as a user's response to the output of an information system [68], stands as a pivotal measure for user appraisal of technologies [98,99]. It is identified to underpin loyalty formation [100,101] and demonstrates a positive nexus with adoption intention [102–104] and continuance intention [105–107]. In light of the foregoing, the current paper envisages that satisfaction will galvanize behavioral intention.

**H6.** *Satisfaction positively impacts behavioral intention.*

## 3. Materials and Methods

### *3.1. Measurement Instrument*

This study has adopted measurement tools from validated studies to ensure their reliability and validity. Perceived ease of use and perceived usefulness were adapted from Davis [62] and Lund [108], while perceived enjoyment was sourced from Davis et al. [82]. Trust was measured using items developed by Nguyen et al. [89], and innovativeness was derived from Agarwal and Prasad [66]. Satisfaction was based on Wixom and Todd [109] and Lund [108], adoption intention was sourced from Davis [62], and continuance intention followed Bhattacherjee [110]. These established scales have been widely validated in prior research, providing a solid foundation for the current study. Measurement items were slightly modified to ensure their appropriateness in a metaverse context. All constructs except for demographic information and frequency were assessed using a 7-point Likert scale.

Table A1 presents a detailed list of constructs and items, categorized under inexperienced and experienced users, to gauge perceptions and intentions towards metaverse use. For the group of inexperienced users, adoption intention was measured as the final variable, while for the group of experienced users, continuance intention was measured as the final variable. The constructs of explanatory variables include perceived ease of use, perceived usefulness, perceived enjoyment, trust, innovativeness, and satisfaction. Each construct consists of three items illustrating different aspects of user perceptions. For instance, the perceived ease of use construct, sourced from Davis [62], explores how easy or effortless users find interacting with the metaverse through items such as "Using a Metaverse would be easy for me" for inexperienced users and "Using a Metaverse is easy for me" for experienced users. Similarly, other constructs dive into different dimensions like the perceived usefulness of the metaverse, the enjoyment derived from its use, the level of trust on personal information security, the inclination towards new technology adoption, and satisfaction derived from metaverse use.

The questionnaire was initially written in English by the author. Afterward, a Korean researcher fluent in English translated it into Korean. The items in the questionnaire, particularly those used for measuring constructs like "Using a Metaverse would be easy for me" and similar statements, were translated into Korean for the respondents. Since the primary questions required responses in Likert-scale format, those numerical answers did not require translation. However, the detailed descriptions of each item, such as "Perceived Ease of Use" and other main constructs, were fully translated into Korean to ensure clear understanding for participants. The responses were translated back into English. Academic and industry professionals in the information systems thoroughly refined it, assuring content validity, logical order, and ambiguous expression. Twelve respondents participated in the survey pilot test. They responded as if they were participating in a real survey. After completing all responses, they provided feedback on overlapping questions, constructs, and definitions of terms.

### *3.2. Sample*

This study engaged a professional third-party survey agency to distribute the online questionnaire. It was conducted in Korea because Korean users actively engage with the metaverse across various sectors such as tourism and the arts, making it an ideal context for understanding diverse applications of the technology [111–113]. The sampling frame was determined based on criteria to include a diverse cross-section of the population,

encompassing various age groups, genders, and levels of internet experience. The agency used its database to target respondents who were reflective of the broader Korean internet user demographic, thus ensuring a broad yet relevant respondent base. The agency's expertise ensured that the survey administration procedure was rigorous and that the collected data would be robust and reliable for analysis.

In the first segment of the questionnaire, the survey first asked whether they were familiar with the concept of the metaverse, followed by whether they had previously used it. The online questionnaire employed a branching function, directing respondents who had no metaverse experience to questions measuring adoption intention, while those with prior experience were guided to questions related to continuance intention. This segmentation has enabled a refined understanding of different user experiences and attitudes towards the metaverse. The second segment delved into measuring the key variables of the study to comprehend the intricate dynamics between user behavior, technological aspects, and personal innovativeness within the metaverse environment. The final segment of the questionnaire sought general demographic information such as gender and age, which could potentially influence the perceptions and attitudes towards the metaverse. The questionnaire was made accessible online for a span of two weeks, from the first to the second week of May 2022, ensuring ample time for a substantial response rate. Prior to the commencement of the main survey, the first page of the questionnaire elucidated the aim and significance of the study to the respondents. They were assured of the anonymity of their responses to encourage honest and uninhibited participation. Additionally, respondents were given the choice to agree to the academic publication of the results derived from the survey, with only those consenting proceeding to partake in the main survey. Of the 390 collected samples, 18 were excluded due to inconsistent responses (e.g., giving the same answer to all questions or exhibiting extreme variability within items of a single construct), leaving 372 valid responses for final analysis.

Table 2 delineates the demographic profile of the respondents, segregated into inexperienced and experienced users of the metaverse. It provides a breakdown of the respondents by gender and age. From a gender perspective, there is a relatively even distribution between male and female respondents within both user groups, albeit with a slight male predominance among experienced users (51.5%) and a slight female predominance among inexperienced users (51.9%). Regarding age distribution, the table reveals a broad age range among the respondents, spanning from teens to individuals in their 60s, with a noticeable concentration in the age brackets of people in their 40s and 50s. The age bracket of people in their 40s constituted the largest segment among experienced users at 34.4%, while the age bracket of people in their 50s was the largest among inexperienced users at 34.4%.

**Table 2.** Profile of the respondents.

| Demographics | Item | Inexperienced Users ($N$ = 131) | | Experienced Users ($N$ = 241) | |
|---|---|---|---|---|---|
| | | Frequency | Percentage | Frequency | Percentage |
| Gender | Male | 63 | 48.1% | 124 | 51.5% |
| | Female | 68 | 51.9% | 117 | 48.5% |
| Age (years) | 10–19 | 1 | 0.8% | 1 | 0.4% |
| | 20–29 | 11 | 8.4% | 35 | 14.5% |
| | 30–39 | 32 | 24.4% | 46 | 19.1% |
| | 40–49 | 39 | 29.8% | 83 | 34.4% |
| | 50–59 | 45 | 34.4% | 76 | 31.5% |
| | 60+ | 3 | 2.3% | 0 | 0.0% |

## 4. Results

The current investigation employed the partial least squares (PLS) approach to scrutinize the theoretical framework, utilizing SmartPLS 4 [114]. This technique has garnered recognition in the domain of information systems [115]. PLS was chosen for this analysis

due to its resilience and the absence of limitations concerning data distribution and sample dimensions [116]. Both the measurement model and the structural model underwent evaluation, following the guidelines set [117].

### *4.1. Common Method Bias*

The potential for common method bias was examined to validate the integrity of the research outcomes. Initially, a single factor examination was performed, revealing a variance of 42.415% for the experienced group and 37.222% for the inexperienced group, showing a balanced variance distribution. Moreover, an inspection of the Variance Inflation Factor (VIF) was carried out to scrutinize the multicollinearity among the constructs. The VIF figures for the experienced group fluctuated between 1.215 and 2.974, and for the inexperienced group, the values were between 1.036 and 2.851, as depicted in the following tables. These VIF figures, remaining significantly below the critical value of 10 [118], demonstrated that multicollinearity did not pose a significant threat in the data, and thus, the outcomes are less likely to be affected by CMB.

### *4.2. Measurement Model*

The measurement model was evaluated confirming reliability, convergent validity, and discriminant validity. Scale reliability was confirmed estimating Cronbach's alpha and composite reliability (CR). When Cronbach's alpha is at least 0.7 [119] and CR is at least 0.7 [118], the scales for these constructs are satisfied. In both the inexperienced group and experienced group, the composite reliability (CR) and Cronbach's alpha are over 0.7, indicating that the measurement model has good reliability. Convergent validity is considered acceptable when measurement constructs have an average variance extracted (AVE) of at least 0.50 [119] and item loading of above 0.70 [120]. In both groups, convergent validity was satisfied. Table 3 details the test results of reliability and validity. Last, the AVE values of each variable were compared to the correlation coefficients between them to assess discriminant validity. As described in Table 4, all of the diagonal entries (the square root of AVE) were found to be over any other corresponding rows or column entries in both groups. Thus, discriminant validity is adequate.

**Table 3.** Reliability and validity of measurements.

| Construct | Items | Mean | St. Dev. | Factor Loading | Cronbach's Alpha | CR | AVE |
|---|---|---|---|---|---|---|---|
| Inexperienced Users | | | | | | | |
| Perceived Ease of Use | PEU1 | 2.740 | 0.727 | 0.775 | 0.773 | 0.869 | 0.689 |
| | PEU2 | 2.847 | 0.895 | 0.866 | | | |
| | PEU3 | 2.740 | 0.797 | 0.847 | | | |
| Perceived Usefulness | PUS1 | 3.107 | 0.849 | 0.803 | 0.758 | 0.861 | 0.673 |
| | PUS2 | 3.260 | 0.843 | 0.823 | | | |
| | PUS3 | 3.527 | 0.841 | 0.836 | | | |
| Perceived Enjoyment | PEN1 | 3.359 | 0.801 | 0.830 | 0.840 | 0.903 | 0.757 |
| | PEN2 | 3.427 | 0.811 | 0.892 | | | |
| | PEN3 | 3.389 | 0.861 | 0.887 | | | |
| Trust | TRU1 | 2.702 | 0.880 | 0.893 | 0.868 | 0.919 | 0.790 |
| | TRU2 | 2.649 | 0.907 | 0.909 | | | |
| | TRU3 | 2.565 | 0.925 | 0.864 | | | |
| Innovativeness | INO1 | 3.160 | 0.863 | 0.881 | 0.849 | 0.907 | 0.766 |
| | INO2 | 2.687 | 0.942 | 0.840 | | | |
| | INO3 | 3.015 | 0.874 | 0.903 | | | |
| Satisfaction | SAT1 | 3.099 | 0.846 | 0.846 | 0.832 | 0.899 | 0.749 |
| | SAT2 | 3.137 | 0.799 | 0.898 | | | |
| | SAT3 | 3.076 | 0.737 | 0.851 | | | |
| AdoptionIntention | ADI1 | 3.053 | 0.832 | 0.801 | 0.740 | 0.852 | 0.657 |
| | ADI2 | 3.412 | 0.790 | 0.822 | | | |
| | ADI3 | 3.107 | 0.943 | 0.809 | | | |

**Table 3.** *Cont.*

| Construct | Items | Mean | St. Dev. | Factor Loading | Cronbach's Alpha | CR | AVE |
|---|---|---|---|---|---|---|---|
| Experienced Users | | | | | | | |
| Perceived Ease of Use | PEU1 | 3.224 | 0.815 | 0.869 | 0.819 | 0.891 | 0.732 |
| | PEU2 | 3.307 | 0.936 | 0.813 | | | |
| | PEU3 | 3.303 | 0.927 | 0.883 | | | |
| Perceived Usefulness | PUS1 | 3.419 | 0.842 | 0.830 | 0.744 | 0.854 | 0.661 |
| | PUS2 | 3.622 | 0.856 | 0.825 | | | |
| | PUS3 | 3.809 | 0.905 | 0.783 | | | |
| Perceived Enjoyment | PEN1 | 3.817 | 0.799 | 0.848 | 0.827 | 0.896 | 0.743 |
| | PEN2 | 3.834 | 0.863 | 0.877 | | | |
| | PEN3 | 3.780 | 0.833 | 0.859 | | | |
| Trust | TRU1 | 2.983 | 1.035 | 0.894 | 0.901 | 0.938 | 0.835 |
| | TRU2 | 2.892 | 0.979 | 0.936 | | | |
| | TRU3 | 2.834 | 1.092 | 0.910 | | | |
| Innovativeness | INO1 | 3.556 | 0.901 | 0.860 | 0.859 | 0.914 | 0.780 |
| | INO2 | 3.228 | 0.982 | 0.890 | | | |
| | INO3 | 3.523 | 0.943 | 0.899 | | | |
| Satisfaction | SAT1 | 3.515 | 0.757 | 0.869 | 0.836 | 0.901 | 0.752 |
| | SAT2 | 3.535 | 0.888 | 0.895 | | | |
| | SAT3 | 3.639 | 0.854 | 0.837 | | | |
| Continuance Intention | COI1 | 3.402 | 0.883 | 0.817 | 0.718 | 0.842 | 0.639 |
| | COI2 | 3.718 | 0.742 | 0.774 | | | |
| | COI3 | 3.427 | 0.958 | 0.807 | | | |

**Table 4.** Fornell–Larcker scale results.

| Constructs | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Inexperienced Users | | | | | | | |
| 1. Perceived Ease of Use | 0.830 | | | | | | |
| 2. Perceived Usefulness | 0.177 | 0.821 | | | | | |
| 3. Perceived Enjoyment | 0.170 | 0.758 | 0.870 | | | | |
| 4. Trust | 0.311 | 0.324 | 0.322 | 0.889 | | | |
| 5. Innovativeness | 0.091 | 0.391 | 0.369 | 0.493 | 0.875 | | |
| 6. Satisfaction | 0.229 | 0.637 | 0.691 | 0.494 | 0.507 | 0.865 | |
| 7. Adoption Intention | 0.180 | 0.667 | 0.572 | 0.403 | 0.458 | 0.612 | 0.811 |
| Experienced Users | | | | | | | |
| 1. Perceived Ease of Use | 0.855 | | | | | | |
| 2. Perceived Usefulness | 0.393 | 0.813 | | | | | |
| 3. Perceived Enjoyment | 0.399 | 0.774 | 0.862 | | | | |
| 4. Trust | 0.431 | 0.351 | 0.258 | 0.914 | | | |
| 5. Innovativeness | 0.408 | 0.527 | 0.474 | 0.345 | 0.883 | | |
| 6. Satisfaction | 0.516 | 0.685 | 0.664 | 0.516 | 0.579 | 0.867 | |
| 7. Continuance Intention | 0.383 | 0.665 | 0.629 | 0.419 | 0.546 | 0.666 | 0.800 |

### *4.3. Structural Model*

SEM was utilized to test and confirm the hypotheses among the constructs within the model. The bootstrap resampling method (5000 resamples) was performed.

#### 4.3.1. Inexperienced Group

Contrary to prediction, perceived ease of use does not impact either satisfaction or adoption intention, failing to support H1a and H1b. As predicted, perceived usefulness positively affects both satisfaction and adoption intention, supporting H2a and H2b. Perceived enjoyment influences satisfaction, but not adoption intention. Thus, H3a is supported while H3b is not supported. In contrast to expectations, trust does not impact adoption intention, failing to support H4. As suggested, innovativeness impacts adoption intention, supporting H5. Consistent with prediction, satisfaction influences adoption intention,

supporting H6. Overall, the structural model explained approximately 53.0 percent of the variation in the adoption intention of inexperienced users. Figure 2 illustrates the SEM results of the inexperienced group.

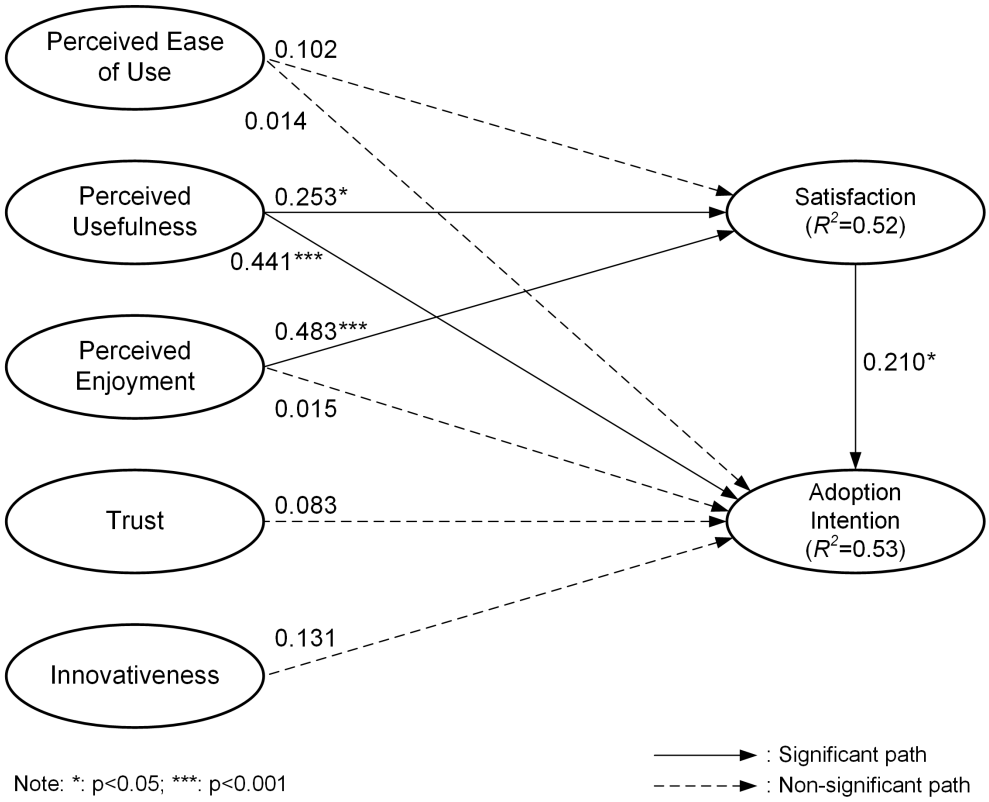


**Figure 2.** Analysis results (inexperienced users).

#### 4.3.2. Experienced Group

Figure 3 shows the SEM results for the experienced group. Perceived ease of use impacts satisfaction, while it does not affect adoption intention. Hence, H1a is supported and H1b is not supported. As predicted, perceived usefulness positively affects both satisfaction and continuance intention, supporting H2a and H2b. In congruence with expectations, perceived enjoyment influences both satisfaction and continuance intention, supporting H3a and H3b. As hypothesized, trust impacts continuance intention, supporting H4. As suggested, innovativeness impacts continuance intention, supporting H5. Consistent with prediction, satisfaction influences continuance intention, supporting H6. Overall, the structural model explained approximately 56.0 percent of the variance in the continuance intention of experienced users. Table 5 presents the SEM results for both groups.

**Table 5.** Summary of the results.

| H | Cause | Effect | Inexperienced Users | | | Experienced Users | | |
|---|---|---|---|---|---|---|---|---|
| | | | Coefficient | *t* | Sig. | Coefficient | *t* | Sig. |
| H1a | PEU | SAT | 0.102 | 1.526 | NS | 0.261 | 5.010 | <0.001 |
| H1b | PEU | BIT | 0.014 | 0.187 | NS | −0.026 | 0.444 | NS |
| H2a | PUS | SAT | 0.253 | 2.241 | <0.05 | 0.371 | 4.717 | <0.001 |
| H2b | PUS | BIT | 0.441 | 3.634 | <0.001 | 0.240 | 2.891 | <0.01 |
| H3a | PEN | SAT | 0.483 | 4.411 | <0.001 | 0.272 | 3.456 | <0.001 |
| H3b | PEN | BIT | 0.015 | 0.112 | NS | 0.191 | 2.498 | <0.05 |
| H4 | Trust | BIT | 0.083 | 1.106 | NS | 0.121 | 2.254 | <0.05 |
| H5 | INO | BIT | 0.131 | 1.650 | NS | 0.164 | 2.671 | <0.01 |
| H6 | SAT | BIT | 0.210 | 1.985 | <0.05 | 0.231 | 3.208 | <0.01 |

Note: NS represents not significant.

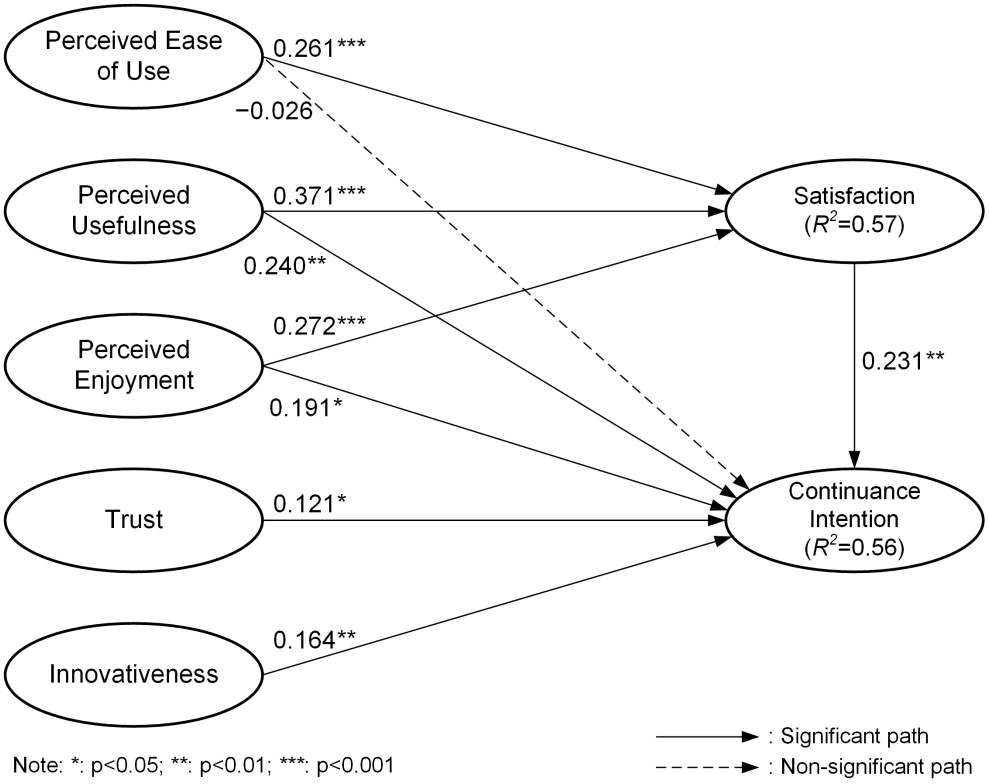


**Figure 3.** Analysis results (experienced users).

## 5. Discussion

This discussion delves into the analysis outcomes, shedding light on behavioral divergences between experienced and inexperienced metaverse users. By juxtaposing these findings with the existing literature, this section elucidates this study's unique theoretical contributions. Through a detailed examination of user satisfaction, adoption, and continuance intentions, it refines the understanding of user behavior within the evolving metaverse ecosystem. First, the highlights are presented, followed by an in-depth discussion of each hypothesis:

- Perceived ease of use has a differing impact on satisfaction between user groups, affecting experienced users positively but showing no effect on inexperienced users.
- Perceived usefulness significantly influences both satisfaction and behavioral intentions (adoption for inexperienced users and continuance for experienced users), reinforcing the core principles of TAM in the metaverse context.
- Perceived enjoyment plays a crucial role in influencing satisfaction across both user groups but impacts continuance intention only for experienced users, suggesting that enjoyment becomes more relevant after initial adoption.
- Trust is more influential on continuance intention for experienced users, highlighting its growing importance as users become more familiar with the metaverse environment.
- Innovativeness affects continuance intention in experienced users but does not significantly impact adoption intention in inexperienced users, emphasizing the need for onboarding strategies to help new users recognize the platform's innovative features.
- User satisfaction is a pivotal factor driving adoption for inexperienced users and continuance for experienced users, reflecting a transition from utilitarian to hedonic motivation as users gain experience.
- The role of experience is crucial in shaping user behavior, with significant differences in how various factors like ease of use, usefulness, and trust affect behavioral intentions based on users' prior familiarity with the metaverse.

The analysis reveals a nimble understanding of how perception of ease of use affects the desire for satisfaction, adoption, and continuation among different user groups. It is intriguing that perceived ease of use does not impact satisfaction in inexperienced users, contrasting with the experienced users for whom a positive effect is noted. This disparity may highlight the varying degrees of exposure and understanding between these groups. Unlike experienced users, newcomers might lack the necessary context or familiarity to appreciate the ease of use the metaverse offers, thereby not affecting their satisfaction. Furthermore, the data indicate that perceived ease of use affects neither adoption intention in inexperienced users nor continuance intention in experienced users. This contradicts former studies that established a positive link between perceived ease of use and behavioral intention [71–74,92,121]. This incongruity might be attributed to the unique environment of the metaverse, a relatively novel domain where conventional determinants could manifest differently.

The analysis underscores a significant relationship between perceived usefulness and satisfaction across both user groups, as well as its effect on adoption intention in inexperienced users and continuance intention in experienced users. These findings are in line with the established theoretical underpinning from the TAM [62] and previous works, which unravel that perceived usefulness significantly influences satisfaction [75,76] and users' behavioral intentions [71,78,80,81]. The clear influence of perceived usefulness on satisfaction across both groups suggests a universal appreciation for utility, irrespective of user familiarity with the metaverse. This aligns with previous works which have also found a significant relationship between perceived usefulness and satisfaction in various digital platforms [122,123]. Moreover, the differentiation in how perceived usefulness affects adoption and continuance intention among inexperienced and experienced users, respectively, hints at a maturation pathway within the user journey. Inexperienced users, upon recognizing the usefulness of the metaverse, are motivated to adopt it, while experienced users are driven to continue its use. This finding aligns with the established principles of TAM, reinforcing the model's applicability in new technological contexts like the metaverse. This study contributes by validating TAM's relevance within the metaverse, a domain still in its developmental stage. Additionally, the comparison between inexperienced and experienced users adds depth to our understanding of user behavior, emphasizing the role of experience in shaping behavioral intentions in this emerging digital space.

The analysis reveals a notable correlation between perceived enjoyment and satisfaction among both inexperienced and experienced users, which aligns with the hedonic motivation theory, suggesting that pleasure derived from technology usage positively affects user satisfaction [63,83,84]. However, the differential impact of perceived enjoyment on adoption intention and continuance intention between inexperienced and experienced users unveils a sophisticated understanding of user behavior in the metaverse environment. For inexperienced users, the lack of impact of perceived enjoyment on adoption intention could be attributed to their limited direct interaction with the metaverse, as they have not fully experienced its immersive or entertaining aspects. Unlike previous studies where participants engaged in virtual experiences [5,19], allowing enjoyment to directly influence their adoption intention, the absence of a direct metaverse experience in this study may explain why enjoyment did not play a significant role in the adoption process. The findings suggest that virtual experiences might be necessary for users to link enjoyment with their decision to adopt. On the flip side, the positive impact of perceived enjoyment on continuance intention among experienced users is consistent with previous research in other digital contexts [80,88]. This suggests that once users surpass the adoption phase, their continuance intention is likely fueled by the enjoyable experiences they encounter, reflecting a transition from utilitarian to hedonic motivation as posited by Thong et al. [124].

The observed differential impact of trust on adoption and continuance intention across inexperienced and experienced users provides an in-depth understanding of user engagement within the metaverse. For inexperienced users, the lack of impact on adoption intention might be due to their limited exposure, which restricts their ability to form

trust-based judgments. Conversely, experienced users, having interacted with the metaverse extensively, could better appreciate the importance of trust, particularly concerning data security and community interactions, thus influencing their continuance intention positively. This pattern aligns with prior research suggesting that trust becomes pivotal as users become more familiar with a digital environment [125]. The findings underline the necessity for metaverse developers to foster trust, especially among experienced users, to encourage continuous engagement, while also portraying the evolutionary nature of trust in influencing user behaviors from the adoption phase to the phase of continued usage, echoing the observations in existing digital interaction paradigms.

The distinct impact of innovativeness on adoption and continuance intention between inexperienced and experienced users offers valuable insights into the user behavior dynamics within the metaverse. For inexperienced users, their lack of exposure to the metaverse may render them unable to appreciate or leverage the innovative aspects of the platform, thereby not influencing their adoption intention. On the other hand, experienced users, having navigated through the metaverse, are more likely to recognize and value the innovative features, which in turn positively influences their continuance intention. This reflects a learning curve where users' ability to appreciate innovativeness grows with their experience within the metaverse. The observed trend aligns with the existing literature that suggests a positive correlation between users' innovativeness and continued engagement in technology-rich environments [97,126]. These findings underline the importance of designing innovative features in a way that caters to both novice and seasoned users to promote adoption and sustained usage, respectively. Moreover, it accentuates the need for a structured onboarding process to help inexperienced users better appreciate the innovative aspects of the metaverse, potentially enhancing their adoption intention.

The analysis unveils a substantial link between user satisfaction and behavioral intentions across different user segments. In the case of inexperienced users, the satisfaction they derive from utilizing the system significantly influences their adoption intention. Their willingness to adopt is driven by the level of satisfaction they experience, likely stemming from ease of use, perceived usefulness, or enjoyment during initial interactions with the system. This is in alignment with earlier studies that highlight satisfaction as a pivotal factor encouraging adoption behaviors among new or inexperienced users [127,128]. On the other hand, for experienced users, the satisfaction they have accumulated over time significantly impacts their continuance intention. Their sustained use is nurtured by the satisfaction garnered from previous interactions, which resonates with the postulates of the expectation–confirmation theory [110]. The satisfaction garnered from the system's ability to meet or exceed initial expectations fosters a conducive environment for continued use. This finding is corroborated by prior research that underscores the imperative role of satisfaction in nurturing continuance intentions among seasoned users [106,107].

## 6. Conclusions

### *6.1. Theoretical Contributions*

This manuscript delineates several pivotal theoretical advancements. The highlights of the theoretical contribution are as follows:

- User experience differentiation: this study categorizes metaverse users into two distinct groups—experienced and inexperienced—providing a thorough understanding of user behavior and enriching the existing literature on metaverse adoption.
- Validation of TAM in the metaverse: this research reinforces the applicability of the TAM within the metaverse, though it questions the impact of perceived ease of use, suggesting that familiarity with IT reduces its relevance.
- Role of trust: this study highlights trust as a key factor influencing behavioral intentions, particularly for experienced users, suggesting a deeper academic exploration into trust in virtual environments.

- Innovativeness as a driver: innovativeness significantly influences continuance intention in experienced users but has a lesser effect on inexperienced users, emphasizing the role of individual traits in metaverse engagement.
- Relevance of perceived usefulness: perceived usefulness remains a critical determinant of both satisfaction and behavioral intentions, reinforcing TAM principles but offering a unique perspective within the metaverse context.
- Evolving impact of ease of use: the results challenge the traditional role of ease of use in influencing behavioral intentions, with its impact diminishing as users become more familiar with the metaverse.

More specifically, this study undertakes a meticulous empirical analysis by categorizing metaverse users into two distinct groups: experienced and inexperienced users. In spite of the metaverse heralding a new era in numerous industries, the examination of user behavior within this domain remains somewhat underexplored [11,15,21,22,111]. By scrutinizing the interrelationships among various variables contingent upon the user's level of experience, this study furnishes a novel scholarly contribution to academics within related disciplines. The partitioning of users based on their experience with the metaverse provides a comprehensive lens through which to comprehend the dynamics at play, thereby enriching the existing body of knowledge. This segmentation allows for a more granular understanding of how different facets interlink and impact user interaction within the metaverse. Through the lens of this study, researchers are positioned to discern the causal interconnections between the requisite factors at different stages of technological maturity. This, in turn, offers a robust foundation for future academic inquiries, enabling scholars to delve deeper into understanding user behavior within evolving digital cases such as the metaverse. While this division provides a useful framework to analyze differences in behavioral intentions, we acknowledge that the samples are not fully representative or equivalent. Therefore, this study raises important theoretical questions rather than claiming definitive breakthroughs.

Second, this work fortifies the existing theory by conforming the TAM, which has been robustly substantiated in the IT field, within the metaverse domain as well. Existing studies have furnished empirical evidence asserting that perceived ease of use dictates behavioral intentions [72–74,121]. The results of this study elucidated that perceived ease did not influence behavioral intentions. It could be attributed to the inherent ease of the metaverse environment and the high IT proficiency of its users, which may reduce the importance of ease of use as a determining factor. Over time, IT solutions have evolved to be intuitive and user-friendly. Additionally, users now possess a level of efficacy substantial enough to operate multiple information devices with ease. In this milieu, the aspect of ease does not lead to behavioral intention. Moving forward, scholars ought to examine how the explanatory prowess of the research model fluctuates based on the incorporation of perceived ease of use, thereby revising the TAM accordingly.

This research significantly broadens the academic understanding by delineating the pivotal role trust plays in shaping behavioral intentions towards metaverse usage. The analysis unveiled that existing or experienced users exhibit a higher propensity to engage with the metaverse when it demonstrates greater reliability. This revelation accentuates the necessity for researchers to delve deeper into discerning which facets of the metaverse are regarded by current users as hallmarks of trust. For instance, users may exhibit acute sensitivity towards the integrity of credit information transacted during payment processes within the metaverse. This suggests a fertile ground for academic inquiry into the dimensions of trust, including aspects of information security which, as evidenced, holds paramount significance for users. The persistent exploration of information security within the metaverse is not only warranted but imperative to cultivate a safer and more trustworthy virtual environment. The insights drawn from this research set a robust foundation for forthcoming scholarly endeavors aimed at meticulously unpacking the dynamics of trust, and how it interlinks with user satisfaction and behavioral intentions in the metaverse landscape.

Finally, this study unveils a pivotal theoretical insight concerning the differential impact of innovativeness on behavioral intentions among experienced and inexperienced users within the metaverse domain. The findings align with the TAM yet bring understanding to how user experience modulates the effects of innovativeness on technology adoption and continuance [62]. For inexperienced users, innovativeness does not significantly drive adoption intention, potentially due to a lack of familiarity or confidence with the metaverse technology. However, among experienced users, innovativeness significantly propels continuance intention, resonating with prior work that associates innovativeness with continued engagement in technologically advanced platforms [66]. This demarcation underscores the roles individual traits play in technology acceptance across different user maturity stages. Future investigations could delve deeper into understanding the underlying mechanisms that mediate the relationship between innovativeness, experience, and behavioral intentions in the metaverse, contributing further to the rich tapestry of the technology acceptance literature.

### *6.2. Managerial Implications*

This study offers significant practical implications for businesses, developers, and users within the metaverse ecosystem. By focusing on user experience differentiation and analyzing both inexperienced and experienced users, this research provides a clear understanding of how different factors influence user behavior in the metaverse. These insights are valuable for professionals who aim to enhance user engagement and satisfaction, improve adoption rates, and ensure the continuous use of metaverse platforms. The highlights of the managerial implications are as follows:

- User onboarding: emphasize functionality and benefits with user-friendly tutorials, gamified onboarding processes, and clear instructions to improve ease of use and adoption rates.
- Trust and data security: web developers should implement strong encryption, transparent data policies, and visible security reminders during key user actions like transactions or avatar customizations.
- Perceived enjoyment: enhance entertainment and social interaction by introducing immersive experiences like virtual concerts or multiplayer games to maintain user engagement.
- Innovative features: continuously update platforms with cutting-edge technology, such as improved AR/VR capabilities, to keep experienced users engaged.
- Cross-industry collaboration: partner with industries like fashion or real estate for virtual reality experiences to expand market opportunities.

One of the key findings is the importance of perceived ease of use and usefulness in influencing user satisfaction and behavior. For marketers and product developers, this suggests that the onboarding experience for new users should be designed to emphasize the functionality and benefits of the platform. Practical steps could include user-friendly tutorials, gamified onboarding processes, and clear instructions that highlight how the metaverse can add value to users' daily lives. Therefore, marketers can focus on campaigns that educate potential users about the real-world applications of the metaverse, from virtual commerce to social interactions.

Trust emerged as a critical factor for experienced users, indicating the need for metaverse providers to invest in data security measures. Web developers and platform designers should prioritize user privacy by implementing robust encryption, transparent data use policies, and regular security updates. Building trust through these methods not only encourages continuous engagement but also protects user retention, especially among experienced users who are already invested in the platform. A suggestion for web developers is to incorporate visible security badges and reminders of data protection during key moments, such as transactions or avatar customizations.

Furthermore, this study highlights the role of perceived enjoyment in driving continuous engagement, particularly for experienced users. This presents an opportunity for

metaverse providers to focus on enhancing the entertainment and social aspects of their platforms. For example, gaming companies and social platforms can incorporate more immersive experiences, such as virtual concerts or multiplayer games that encourage social interaction. Marketers could also create campaigns that promote the metaverse as not just a functional tool but a space for fun and relaxation, appealing to users' emotional needs.

Lastly, the influence of innovativeness on user behavior points to the necessity for continuous platform updates that introduce new and exciting features. Metaverse providers and developers should prioritize innovation by regularly releasing updates that introduce cutting-edge technology, such as improved virtual reality capabilities or more seamless augmented reality experiences. This keeps experienced users engaged, as they are more likely to continue using the platform if they feel it is constantly evolving. This approach can also provide opportunities for cross-industry collaboration, such as partnering with fashion brands for virtual reality clothing or real estate companies for virtual property tours.

### *6.3. Limitations and Future Research Directions*

This investigation embodies certain unconventional limitations that beckon further scholarly pursuit. Primarily, the categorization of users into 'experienced' and 'inexperienced' was broad-brushed, which might have glossed over subtle yet significant variances within these cohorts. Future examinations might benefit from a more granular segmentation of user expertise. Moreover, the focal point on behavioral intentions offers merely a snapshot of the potential user interaction with the metaverse, bypassing the exploration of long-term engagement metrics. Upcoming studies could unfold richer insights by delving into longitudinal user engagement patterns. Additionally, the cultural context within which this study was nested might have swayed the findings significantly. Future academic endeavors could aim to transcend geographical boundaries, unearthing the possible variances in user perceptions and behaviors across diverse cultural terrains. Moreover, the rapidly evolving nature of metaverse technology may soon outpace the findings of this study, underlining the necessity for ongoing empirical scrutiny to keep pace with the dynamically shifting landscape of user–technology interaction within the metaverse. Further, the unbalanced sample sizes between inexperienced and experienced users, as well as the restriction to Korean internet users, limit the generalizability of the results. Future studies should aim for a more balanced sample across different user experience levels and consider cross-cultural comparisons to better understand global metaverse adoption and continuance behaviors. Expanding the research to other regions would provide valuable insights into the cultural and technological factors influencing user behavior. Lastly, the limitation of this study is the lack of direct metaverse experience for participants, leading to responses based on subjective perceptions rather than actual interaction with the technology. This may skew data related to ease of use, usefulness, and satisfaction, particularly among inexperienced users. Future research should employ experimental designs allowing participants to engage directly with the metaverse to ensure more reliable and generalizable results.

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**Institutional Review Board Statement:** This study adhered to the Declaration of Helsinki guidelines. The nature of the research and the type of data collected did not involve sensitive information, as defined under Article 23 of the Personal Information Protection Act of Korea. Consequently, this study was exempt from requiring ethical approval.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The raw data supporting the conclusions of this article will be made available by the authors on request.

**Conflicts of Interest:** Author Donghyuk Shin was employed by the company Secufind. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Appendix A

**Table A1.** List of constructs and items.

| Construct | Item | Description | Source |
|---|---|---|---|
| (a) Inexperienced users | | | |
| Perceived Ease of Use | PEOU1 | Using a metaverse would be easy for me. | Davis [62]; Lund [108] |
| | PEOU2 | Learning to use a metaverse would require less effort. | |
| | PEOU3 | The steps for using a metaverse would be simple. | |
| Perceived Usefulness | PUS1 | Using metaverse would help me accomplish things more quickly. | Davis [62]; Lund [108] |
| | PUS2 | Using metaverse would help me perform many things more conveniently. | |
| | PUS3 | Using metaverse would increase my productivity. | |
| Perceived Enjoyment | PEN1 | Using metaverse would be enjoyable. | Davis et al. [82] |
| | PEN2 | Using metaverse would be pleasurable. | |
| | PEN3 | Using metaverse would be interesting. | |
| Trust | TRU1 | I trust that my personal information will not be used for any other purpose. | Nguyen et al. [89] |
| | TRU2 | I believe that my personal information is protected. | |
| | TRU3 | I am confident that my personal information is secure. | |
| Innovativeness | INO1 | I like to experiment with new technology. | Agarwal and Prasad [66] |
| | INO2 | Among my peers, I am usually one of the first to try out new technology. | |
| | INO3 | If I heard about a new technology, I would look for ways to experiment with it. | |
| Satisfaction | SAT1 | I would be generally satisfied with the use of metaverse. | Wixom and Todd [109]; Lund [108] |
| | SAT2 | Overall, metaverse would satisfy my expectations. | |
| | SAT3 | I would be satisfied with my experience of using metaverse. | |
| Adoption Intention | ADI1 | I intend to use metaverse in the future. | Davis [62] |
| | ADI2 | I expect that I would metaverse in the future. | |
| | ADI3 | I plan to use metaverse in the future. | |
| (b) Experienced users | | | |
| Perceived Ease of Use | PEOU1 | Using a metaverse is easy for me. | Davis [62]; Lund [108] |
| | PEOU2 | Learning to use a metaverse requires less effort. | |
| | PEOU3 | The steps for using a metaverse are simple. | |
| Perceived Usefulness | PUS1 | Using metaverse helps me accomplish things more quickly. | Davis [62]; Lund [108] |
| | PUS2 | Using metaverse helps me perform many things more conveniently. | |
| | PUS3 | Using metaverse increases my productivity. | |
| Perceived Enjoyment | PEN1 | Using metaverse is enjoyable. | Davis et al. [82] |
| | PEN2 | Using metaverse is pleasurable. | |
| | PEN3 | I find using metaverse to be interesting. | |
| Trust | TRU1 | I trust that my personal information will not be used for any other purpose. | Nguyen et al. [89] |
| | TRU2 | I believe that my personal information is protected. | |
| | TRU3 | I am confident that my personal information is secure. | |
| Innovativeness | INO1 | I like to experiment with new technology. | Agarwal and Prasad [66] |
| | INO2 | Among my peers, I am usually one of the first to try out new technology. | |
| | INO3 | If I heard about a new technology, I would look for ways to experiment with it. | |
| Satisfaction | SAT1 | I am generally satisfied with the use of metaverse. | Wixom and Todd [109]; Lund [108] |
| | SAT2 | Overall, metaverse satisfies my expectations. | |
| | SAT3 | I am satisfied with my experience using metaverse. | |
| Continuance Intention | COI1 | I intend to continue my use of metaverse in the future. | Bhattacherjee [110] |
| | COI2 | I intend to increase my use of metaverse in the future. | |
| | COI3 | I will keep using metaverse as regularly as I do now. | |

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