Print ISSN: 1738-3110 / Online ISSN 2093-7717
JDS website: http://www.jds.or.kr/
http://dx.doi.org/10.15722/jds.19.11.202111.81

The Effects of User Experience-Based Design Innovativeness on User–Metaverse Platform Channel Relationships in South Korea* **

Joo-Eon JEON[1]

Received: August 19, 2021. Revised: September 14, 2021. Accepted: November 05, 2021.

Abstract

Purpose: The purpose of this research is that Metaverse platforms' UXBDI can be distinguished among Metaverse platform channel types. Metaverse platform represents a collective term signifying services that include augmented reality, lifelogging, mirror worlds, and virtual worlds. User Experience-Based Design Innovativeness (UXBDI) is characterized by novelty in product design and services that satisfy user experience. This study examined the effect of Metaverse platforms' UXBDI on user–Metaverse platform relationships. **Research design, data and methodology**: Metaverse platform users were selected as samples, and a marketing research institution known as a panel company conducted the survey. It used multiple regression to test the impact on platform identification and commitment based on a survey of 442 South Korean respondents. **Results**: The research confirmed that UXBDI sub-dimensional scales of attractiveness and interaction increased user–Metaverse platform identification and commitment. Also, a Metaverse platform identity increased user–Metaverse platform identification in virtual and mirror worlds. **Conclusion**: This study contributes to multiple academic fields. First, the UXBDI of Metaverse platforms appears to be a key component of ongoing user–Metaverse relationships. Second, UXBDI affects relationships differently based on the Metaverse platform type.

Keywords : Metaverse, UX, Design Innovation, Distribution Technology, Identification, Commitment

JEL Classification Code : M11, M15, M30, M31

1. Introduction

With the prolonged coronavirus pandemic declared in 2020, world culture has become non-face-to-face. As a result, a new paradigm for overcoming space-time limitations has led to the proliferation of non-face-to-face cultures using digital technologies. Given this trend, the "Metaverse," a 3D virtual world with collapsed reality and virtual boundaries, along with technological developments such as virtual reality and augmented reality, have been drawing attention (Choi & Kim, 2017; Hendaoui, Limayem, & Thompson, 2008). The Metaverse is spreading its influence in a way that is completely unique from previous global cultural influences. The global Metaverse market should grow to 280 billion U.S. dollars by 2025, and the global market for Metaverses-related VR (virtual reality),

* This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2020S1A5A8046099)
** The author would like to thank Eun Bin Cho, Jae Young Lee, and Hae Rin Lee.
[1] First Author. Assistant Professor, Department of Global Business Administration, Anyang University, South Korea.
Email: eric@anyang.ac.kr

ⓒ Copyright: The Author(s)
This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (http://Creativecommons.org/licenses/by-nc/4.0/) which permits unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

from 33 billion dollars in 2020 to 338.1 billion dollars in 2025, and 1.92.4 trillion dollars in 2030 (Kim, 2020; Lee, Trimi, Byun, & Kang, 2011).

The emergence of a robust Metaverse platform channels shapes the development of many Internet-related technological realms (Papagiannidls & Bourlakis, 2010). The Metaverse grows when technology opens up the possibility of seamless and pervasive access to computing (Lee et al., 2011). The Metaverse refers to a universe beyond the physical world. More specifically, this "universe beyond" refers to a computer-generated world, distinguishing it from metaphysical or spiritual conceptions of domains beyond the physical realm (Lee et al., 2011; Rehm, Goel, & Crespi, 2015). Metaverse platforms are a collective term for services such as augmented reality, lifelogging, mirror worlds, and virtual worlds.

This study examines the user experience-based design innovativeness (UXBDI) of Metaverse platforms channel. UXBDI is a multidimensional construct characterized by novelties in the design of existing products or services created to satisfy user experience (Desmet & Hekkert, 2007; Hassenzahl & Tractinsky, 2006; Jeon & Kim, 2021). Creating a fully-realized Metaverse platform will rest on its continuous progress in terms of five essential features of user experience: identity, attractiveness, novelty, usability, and interaction.

This research asks two simple but fundamental questions: Does the UXBDI of Metaverse platforms increase user–Metaverse platform identification? Does the UXBDI of Metaverse platforms increase commitment? This research should show that Metaverse platforms' UXBDI can be distinguished among Metaverse platform channel types. The research examines Metaverse platforms to analyze various UXBDI approaches. This study will provide useful insights for advancing the sustainability of the Metaverse platform lifecycle.

2. Literature Review

2.1. Metaverse Platforms

The Metaverse, previously imagined in fictional literature, has more recently been conceived as globally accessible and collectively used a multidimensional (3D) virtual space and computing infrastructure. Since Stephenson's novel, technological advances have enabled the real-life implementation of virtual worlds, and more complex and expansive conceptions of the Metaverse channels have developed (Kim, 2020).

The Metaverse is a complex concept. The Metaverse is a combination of the words "meta" (beyond) and "universe" and is a three-dimensional virtual space that uses the metaphor of the real world (Kim, 2020; Lee et al., 2011). It is a combination of virtual worlds, augmented reality, and the internet. Metaverseroadmap took the first step in defining the Metaverse in 2007 and set the academic background by classifying Metaverse of augmented reality, lifelogging, mirror worlds, and virtual worlds (Kim, 2020; Lee et al., 2011). The Metaverse consists of four major dimensions of augmentation versus simulation and external versus intimate (Kim, 2020).

The criteria for this typology are based on levels of augmentation versus simulation and external versus intimate user experience (Lee et al., 2011). Augmentation refers to technologies that add new capabilities to existing systems. These technologies superimpose information layers over the physical environment so that people can control it. Simulation refers to technologies that virtuality model realities. This process simulates the physical world as the locus for interaction. Intimate technologies focus inwardly on the identity and actions of an individual or object; technologies with which the user has agency in the environment. External technologies focus outward toward the world at large. This refers to technologies that provide information about and control the world around the user (Kim, 2020; Lee et al., 2011).

Combining these two critical uncertainties elicits four key components of the Metaverse future: virtual worlds, mirror worlds, augmented reality, and lifelogging. All four are already well into early emergence, and the conditions under which each will fully develop are far from clear.

2.1.1. Virtual worlds (*Intimate/Simulation*)

Virtual worlds (VW) increasingly augment physical world communities' economic and social lives (Hendaoui et al., 2008; Papagiannidls, Bourlakis, & Li, 2008). A key component of the VW scenario is the user's avatar, which represents the user's personification in the VW. Compared to users' physical persona, growth in an avatar's social and economic capabilities can be far more rapid, and learning experiences can be highly accelerated. In contrast to the general 3D web, MVR participants expected only a limited non-entertainment adoption (and by inference, social utility, and intelligence) of avatars and VWs over the near-term, ten-year roadmap horizon (Choi & Kim, 2017).

2.1.2. Mirror worlds (*External/Simulation*)

Mirror worlds (MW) are informationally-enhanced virtual models or "reflections" of the physical world. Their construction involves sophisticated virtual mapping, modeling, annotation tools, geospatial and other sensors, and location-aware and other lifelogging technologies (Lee et al., 2011). Unlike virtual worlds, which involve alternate realities similar to Earth's or wildly different, mirror worlds model the world around us. Google Earth is just one of a large class of mirror worlds, also known as geographic information systems (GIS). GIS systems capture, store, analyze, and manage data and associated attributes spatially referenced to the Earth (Kim, 2020).

2.1.3. Augmented reality (*External/Augmentation*)

In augmented reality (AR), Metaverse technologies enhance individuals' external physical worlds by using location-aware systems and interfaces that process and network layers of information on top of our everyday perception of the world (Adner & Kapoor, 2010). As GPS became increasingly commonplace, new services emerged to leverage this geographic information, from location tagging and logistics monitoring to location-based games and context-aware advertising (Hendaoui et al., 2008). AR depends on developing intelligent materials and the advancement of "smart environments" — networked computational intelligence embedded in physical objects and spaces.

2.1.4. Lifelogging (*Intimate/Augmentation*)

In lifelogging, augmentation technologies record and report objects and users' intimate states and life histories, supporting object- and self-memory, observation, and behavior modeling (Chu & Choi, 2011; Chung, Tyan, & Chung, 2017; Kang & Schuett, 2013). Object lifelogs overlap with the AR scenario and rely on both AR information networks and ubiquitous sensors. Lifelogging is the capture and storage of everyday experiences and information for objects and people. This practice can provide historical usability records or current status information, share unusual moments with others, or for art and self-expression. Lifelogging emerged from accelerating technological trends in connectivity, storage capacity, miniaturization, and affordability.

2.2. User Experience Based Design Innovativeness (UXBDI)

UX is defined here simply as users' emotions, attitudes, thoughts, behaviors, and perceptions across the usage lifecycle (Hinderks, Schrepp, Mayo, Escalona, & Thomaschewski, 2019). This framework emphasizes the psychological nature of UX, recognizing that many of the key categories of UX constructs are cognitive. UX is about technology that fulfills more than just instrumental needs in a way that acknowledges its use as a subjective, situated, complex, and dynamic encounter. UX is a consequence of a user's internal state (expectations, needs, and motivations), the characteristics of the designed system (complexity, usability, and functionality), and the environment within which the interaction takes place. From a professional practice perspective. This research recommends that the term UX be scoped to products, systems, services, and objects that a person interacts with through a user interface. These can include tools, knowledge systems, or entertainment (Shin, Im, Oh, & Kim, 2017).

Synchronizing technological innovation and product form design is important because the underlying technological change and the outer product form jointly determine the perceived novelty that a product innovation presents to customers (Mugge & Dahl, 2013; Veryzer, 1998; Wrigley & Bucolo, 2011). Novelty affects the cognitive and emotional responses that underlie customers' assessments of the value of a new product. Previous discussions on design have offered some definitions derived from the idea of innovation; however, neither design nor innovation studies have reached a consensus on the definition of design innovation. What is the best way to define design innovation? Very few existing studies define design innovation. It is difficult to define design and innovation together, as the fundamental meaning of each term varies depending on the context. This research attempts to find a link between design innovation and marketing to develop, validate, and define design innovation. Customer need is the bridge connecting both dimensions. Therefore, this paper defines design innovation as new or substantially improved product design and features to satisfy customer needs.

Combining UX and design innovation, Jeon and Kim (2021) conceptualized UXBDI as novelties introduced to designing an existing product or service to satisfy the user experience. They demonstrated that UXBDI could be broken down into five dimensions: identity, novelty, attractiveness, usability, and interaction. The first type UXBDI, identity, is defined as the essence of a Metaverse platform. Identity is the core image that Metaverse platform seeks to deliver to target users. Attractiveness refers to the pleasing look of a Metaverse platform, which is enjoyable and welcoming to users. Platform esthetics can attract users and evoke memorable sensory experiences. Novelty is defined as the innovativeness and creativity of a Metaverse platform. Such novelty affects the cognitive and emotional responses that underlie users' assessments of the value of a new Metaverse platform. Usability refers to the functional performance of a Metaverse platform regarding the quality of use. Usability implies that quality of use coincides with user-product interaction. It is the relationship that individual users have with a product, its characteristics, ways of use, safety, and reliability. Finally, interaction is defined as engagement with a Metaverse platform being predictable, secure, and meeting users' expectations. Interaction is a holistic concept that includes emotional, cognitive, and physical reactions. These UXBDI parameters conclude that Metaverse platforms are characterized by functional, symbolic, and esthetic dimensions that jointly determine users' responses and interactions.

2.3. User–Metaverse platform relationships

2.3.1. Identification

Identification is one social engagement aspect and occurs when users accept a product's influence to maintain a satisfying, self-defining relationship with another person (Sigerson & Cheng, 2018). Users' identification behavior is enacted under the conditions of an important relationship to a social network platform (Malhotra & Galletta, 2005). According to Chu and Choi (2011), social network platform users form strong relationships within a network that affect each user. Therefore, social influence has a strong impact on social networks. As one type of virtual social community, Metaverse platforms enable users to search for information, connect with others, and share various experiences. Other users can socially influence an active Metaverse platform user in terms of beliefs and advocacy for a particular behavior (Kang & Schuett, 2013). Users that experience innovatively designed Metaverse platforms will be more likely to engage in user–Metaverse identification.

Based on these delineations, this study identifies an aspect of Metaverse platform UXBDI, to examine the following hypothesis.

H1: Users who experience innovatively designed Metaverse platforms will engage in user–Metaverse identification.

2.3.2. Commitment

When individuals develop perceptions of an object within a particular community, social influence can profoundly impact this attitude formation (Chung & Han, 2017). Commitment refers to individuals' confidence that continuing affiliation with another entity is significant and worthy of considerable effort to guarantee the relationship's continuation (Goutam & Gopalakrishna, 2018). The commitment represents a high-level relationship type, resulting from long-term satisfactory communication between parties, in which comparative advantages of the present exchange party precludes the entry of competitors (Chu & Choi, 2011). Additionally, evoking user commitment represents an endogenous method in the arrangement of social exchange, as persistent exchanges raise individuals' knowledge of others, causing less susceptibility and trust in alternatives, which strengthens commitment (Chung et al., 2017). Subsequently, commitment and trust are essential factors that shape the personal conduct standards of social and economic interaction among people. In the context of Metaverse platforms, committed users intend to continue the relationship from a long-term perspective and are willing to maintain the relationship. Thus, users that experience innovatively designed Metaverse platforms will commit to the user-Metaverse relationship.

Based on this definition, this study investigates commitment in the UXBDI of Metaverse platforms through the following hypothesis.

H2: Users who experience innovatively designed Metaverse platforms will perceive commitment.

3. Methodology

3.1. Data Collection

Metaverse platform users were selected as samples, and a marketing research institution known as a panel company conducted the survey. Researchers collected data from panel members who agree to take part in surveys for compensation. The panel members are motivated by points that accumulate as they take part in surveys. Previous studies based on the Metaverseroadmap included the users who participated in VW (Roblox, Zepeto, Animal Crossing), mirror worlds (Kakao Map, Baemin), lifelogging (Instagram, Facebook), and AR (Pokemon Go, Snow App) over six months (Kim, 2020). The main motivation for selecting these platforms is that many users consider them to be Metaverse platforms. A total of 442 respondents participated in this online questionnaire, consisting of 167 males (37.8%) and 275 females (62.2%), with 172 (38.9%) aged 20-29 and 270 (61.1%) aged 30-39.

3.2. Procedures and Variables

Data were collected from panel members who registered with the research institute with their consent. The participants learned about the research purpose. A screening test was first administered to participants who expressed their interest in assessing their suitability for this study. Before answering the questionnaire, participants were asked to consider the Metaverse platforms they already used. After doing so, each question on UXBDI, identification, and commitment of the Metaverse platform selected were measured. When the survey responses were completed, the marketing research institute expressed their gratitude, and compensated for participating in the survey. The measurement items of the main constructs used in this study are detailed below.

UXBDI was defined by the novelties in designing an existing product or service that are created to satisfy user experience. These measurements distinguished several UXBDI dimensions and constructed a UXBDI scale. Jeon and Kim (2021) confirmed this scale to be reliable, valid, and distinct from other constructs in South Korea. *Identity* is defined as the essence of a Metaverse platform and measured by four items: "This service has its own identity," "The identity of this service is clear compared to its competitors," and "The identity of this service is well-conveyed to target customers." *Novelty* is a Metaverse platform's innovativeness and creativity, measured by three items: "This service is designed creatively," "I have never seen such a service before using this site," and "This service is novel." *Attractiveness* is a Metaverse platform that is aesthetically pleasing, enjoyable, welcoming, and pleasant, measured by four items: "This service is superior design," "This service is esthetic," "This service is attractive," and "This service look seems to grab me." *Usability* is the pragmatic functional performance of a Metaverse platform and measured by three items: "This service is usable," "This service is convenient," and "This service practical." *Interaction* is defined as the interaction with a Metaverse platform being predictable, secure, and meeting expectations, and measured by three items: "I experience an actual interaction while using this service," "I experience a mutual interaction while using this service," and "This product interacts dynamically." *Metaverse Identification* means individuals accept a Metaverse platform's influence to maintain a satisfying, self-defining relationship within the platform, measured by three items: "I see myself as part of this service," "I am very attached to this service," and "I feel I will fit into the service when I share my knowledge through service." *Commitment* is individuals' confidence that continuing their affiliation with another entity is significant and worthwhile, measured by three items: "I am proud to belong to this service," "I feel a sense of belonging to this service," and "I plan to visit this service regularly." These measures were adapted from Chung et al. (2017), and all questions presented a 7-point Likert scale.

3.3. Analysis

The data set consisted of individuals' responses. A multiple regression model was used to examine the hypotheses, assessing the impact of UXBDI on the Metaverse identification and commitment. The analysis included demographic characteristics, such as gender and age, as control variables (converted into dummy variables). Each consequence variable was regressed on the predictor variables to test the hypotheses, and all predictors were group-mean centered (individual mean).

Table 1 Descriptive results of factor

Metaverse	UXBDI	Mean	S.D.	S.E	n
Metaverse	Identity	4.85	1.13	.052	442
	Attractiveness	4.33	1.17	.053	
	Novelty	4.58	1.20	.055	
	Usability	4.75	1.14	.051	
	Interaction	4.30	1.18	.055	
Virtual World	Identity	5.01	1.18	.109	117
	Attractiveness	4.76	1.17	.108	
	Novelty	4.80	1.11	.102	
	Usability	4.48	1.02	.094	
	Interaction	4.68	1.16	.107	
Mirror World	Identity	4.68	1.07	.102	110
	Attractiveness	4.09	1.09	.103	
	Novelty	4.28	1.20	.114	
	Usability	5.40	.95	.091	
	Interaction	3.85	1.20	.114	
Augmented Reality	Identity	5.24	1.05	.101	109
	Attractiveness	4.57	1.04	.099	
	Novelty	5.08	1.15	.011	
	Usability	4.86	1.16	.011	
	Interaction	4.49	1.08	.103	
Lifelogging	Identity	4.44	1.06	.103	106
	Attractiveness	3.84	1.15	.112	
	Novelty	4.15	1.13	.110	
	Usability	4.28	1.12	.108	
	Interaction	4.14	1.12	.109	

4. Results

4.1. Analysis of Reliability and Validity

Reliability and validity were evaluated based on composite reliability and Cronbach's alpha, in which (α) should be greater than 0.7 (identity should be greater than .900, novelty should be greater than .829, usability should be greater than .898, interaction should be greater than .890, attractiveness should be greater than .939, identification should be greater than .897, and commitment should be greater than .806). Table 1 presents the values of the mean and standard deviation. The results indicate that the concept of Metaverse platforms' UXBDI could be considered on a multidimensional scale, including identity, novelty, attractiveness, usability, and interaction.

As shown in Table 2, the results of the correlation analysis between the dependent and independent variables suggest that UXBDI and identification have a significant positive correlation, confirming the effect of UXBDI (identity, novelty, attractiveness, usability, and interaction) on identification. The results of the correlation analysis also indicate that UXBDI and commitment have a significant positive correlation, revealing clear and significant positive correlations between UXBDI (identity, novelty, attractiveness, usability, and interaction) and commitment. The results demonstrate that UXBDI and user–Metaverse relationships (identification and commitment) are interrelated.

Table 2 Results of discriminant validity

	Identity	Novelty	Attractiveness	Usability	Interaction	Identification	Commitment
Identity	1						
Novelty	.694**	1					
Attractiveness	.611**	.521**	1				
Usability	.473**	.385**	.508**	1			
Interaction	.582**	.602**	.611**	.409**	1		
Identification	.446**	.463**	.552**	.378**	.668**	1	
Commitment	.513**	.486**	.573**	.493**	.648**	.834**	1

4.2. Hypothesis Testing

4.2.1. The main effects of UXBDI on Metaverse identification and commitment

This research proposes that Metaverse platforms' UXBDI positively affect identification and commitment. As shown in Table 3, the results reveal that attractiveness (b = .205, p < .001) and interaction (b = .509, p < .001) have a significant positive effect on identification, but the effect of identity (b = −.049, p = .364) is not significant. Novelty (b = .056, p = .274) and usability (b = .067, p = .106) are not significant. This path implies that users who interact with Metaverse platforms they feel are attractive are more likely to perceive user-Metaverse identification; thus, Hypothesis 1 was supported, in part.

It was predicted that Metaverse platforms' UXBDI would be positively correlated with commitment. The results reveal that attractiveness (b = .167, p < .05), interaction (b = .411, p < .001), and usability (b = .202, p < .001) have a significant positive effect on commitment. In contrast, identity (b = .048, p = .362) and novelty (b = .039, p = .429) are insignificant. These findings demonstrate that users who interact with Metaverse platforms perceived as attractive and useful are generally committed to the user–Metaverse relationship; thus, Hypothesis 2 was supported, in part.

4.2.2. The differences by Metaverse classification

To comprehensively investigate and validate the research of this study, the impacts of different Metaverse classifications were also examined (Table 3). For VW, the results reveal that identity (b = .229, p < .05) and interaction (b = .703, p < .001) have a significant positive effect on identification, whereas the effects of attractiveness (b = .107, p = .354), novelty (b = .056, p = .622), and usability (b = .131, p = .155) are insignificant. The results also reveal that usability (b = .152, p = .083) and interaction (b = .608, p < .001) have a marginal positive effect on commitment, whereas identity (b = −.108, p = .271), attractiveness (b = .157, p = .152), and novelty (b = .036, p = .736) are insignificant. The results indicate that interaction in VWs is a stronger predictor of user–VW identity.

In MW, the results reveal that identity (b = .363, p < .05) and interaction (b = .478, p < .001) have a significant positive effect on identification, and attractiveness (b = .142, p = .081) is marginally significant. However, novelty (b = −.025, p = .768) and usability (b = −.094, p = .232) are not significant. The results also reveal that both identity (b = .353, p < .05) and interaction (b = .352, p < .001) have a significant positive effect on commitment, whereas attractiveness (b = .051, p = .551), novelty (b = .019, p = .832), and usability (b = .138, p = .096) are not significant. The results reveal that identity and interaction are stronger predictors of user–MW.

In AR, the results reveal the only interaction (b = .506, p < .001) has a significant positive effect on identification, whereas identity (b = .008, p = .944), attractiveness (b = .084, p = .467), novelty (b = .000, p = .998), and usability (b = .054, p = .627) are not significant. The results also reveal the only interaction (b = .483, p = .001) has a positive effect on commitment significantly, whereas identity (b = .028, p = .799), attractiveness (b = .108, p = .309), novelty (b = .032, p = .767), and usability (b = .151, p = .145) are not significant. The results indicate interaction as a stronger predictor of user–AR relationships.

In lifelogging, the results reveal that attractiveness (b = .242, p < .05), usability (b = .366, p < .05), and interaction (b = .251, p < .05) have a significant positive effect on identification. However, both identity (b = −.172, p = .124) and novelty (b = .016, p = .883) are not significant. The results also reveal the only usability (b = .397, p < .001) has a positive and significant effect on commitment, whereas identity (b = .017, p = .882), attractiveness (b = .171, p = .127), novelty (b = −.044, p = .700), and interaction (b = .181, p = .093) are not significant.

Table 3: Multiple regression results

Total					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	−.680	.350		−1.944	.053
Sex	.110	.100	.038	1.099	.272
Age	−.134	.100	−.046	−1.345	.179
Identity	−.060	.066	−.049	−.908	.364
Attractiveness	.246	.059	.205	4.167	.000
Novelty	.065	.059	.056	1.095	.274
Usability	.082	.051	.067	1.621	.106
Interaction	.603	.057	.509	10.523	.000
	F = 59.026 (p = .000), R=.698, R^2 =.488, Adjusted R Square = .479				
	Dependent Variable: Identification				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	−.441	.314		−1.406	.160
Sex	.102	.090	.039	1.143	.254
Age	−.069	.089	−.026	−.776	.438
Identity	.054	.059	.048	.913	.362
Attractiveness	.184	.053	.167	3.480	.001
Novelty	.042	.053	.039	.792	.429
Usability	.228	.045	.202	5.018	.000
Interaction	.445	.051	.411	8.667	.000
	F = 64.187 (p = .000), R=.713, R^2 =.509 Adjusted R Square = .501				
	Dependent Variable: Commitment				
Virtual World					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	−.528	.640		−.825	.411
Sex	.105	.185	.035	.567	.572
Age	−.065	.181	−.023	−.360	.720
Identity	.273	.122	.229	2.235	.027
Attractiveness	.129	.139	.107	.931	.354
Novelty	.072	.145	.056	.494	.622
Usability	.181	.127	.131	1.431	.155
Interaction	.856	.136	.703	6.294	.000
	F = 22.744 (p = .000), R=.770, R^2 =.594, Adjusted R Square = .568				
	Dependent Variable: Identification				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	−.457	.558		−.819	.414
Sex	.118	.162	.043	.728	.468
Age	.022	.158	.008	.137	.892
Identity	−.118	.107	−.108	−.1.107	.271
Attractiveness	.175	.121	.157	1.444	.152
Novelty	.043	.126	.036	.337	.736
Usability	.193	.110	.152	1.750	.083
Interaction	.681	.119	.608	5.738	.000
	F 26.897 (p = .000), R=.796, R^2 =.633 =, Adjusted R Square = .610				
	Dependent Variable: Commitment				
Mirror World					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	−1.598	.686		−2.2330	.022
Sex	.300	.174	.107	1.726	.087
Age	−.072	.188	−.024	−.382	.703
Identity	.472	.136	.363	3.469	.001
Attractiveness	.183	.104	.142	1.761	.081
Novelty	−.029	.098	−.025	−.296	.768
Usability	−.138	.115	.−094	−1.202	.232
Interaction	.556	.095	.478	5.873	.000
	F 24.696 (p = .000), R=.793, R^2 =.629 =, Adjusted R Square = .603				
	Dependent Variable: Identification				

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	−.661	.597		−1.108	.270
Sex	.155	.151	.067	1.028	.307
Age	−.120	.163	−.048	−.737	.463
Identity	.380	.118	.353	3.209	.002
Attractiveness	.054	.090	.051	.598	.551
Novelty	.018	.085	.019	.213	.832
Usability	.167	.100	.138	.1680	.096
Interaction	.340	.082	.352	4.123	.000
	F = 21.023 (p = .000), R = .769, R^2 = .591, Adjusted R Square = .563				
	Dependent Variable: Commitment				
Augmented Reality					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.040	.807		.050	.961
Sex	.025	.234	.010	.109	.914
Age	−.131	.208	−.052	−.631	.530
Identity	.010	.142	.008	.070	.944
Attractiveness	.103	.141	.084	.731	.467
Novelty	.000	.129	.000	.003	.998
Usability	.060	.123	.054	.487	.627
Interaction	.597	.129	.506	4.636	.000
	F = 7.920 (p = .000), R=.595, R^2 =.354 =, Adjusted R Square = .310				
	Dependent Variable: Identification				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	−.781	.737		−1.060	.292
Sex	.292	.214	.112	1.368	.174
Age	.009	.190	.003	.045	.964
Identity	.033	.130	.028	.255	.799
Attractiveness	.132	.129	.108	1.023	.309
Novelty	.035	.118	.032	.297	.767
Usability	.164	.112	.151	1.468	.145
Interaction	.566	.118	.483	4.813	.000
	F = 12.046(p = .000), R=.675, R^2 =.455 =, Adjusted R Square = .417				
	Dependent Variable: Commitment				
Lifelogging					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	−.198	.712		−.278	.782
Sex	.180	.219	.064	.819	.415
Age	−.198	.214	−.073	−.923	.358
Identity	−.211	.136	−.172	−1.552	.124
Attractiveness	.273	.123	.242	2.221	.029
Novelty	.019	.128	.016	.148	.883
Usability	.425	.123	.366	3.443	.001
Interaction	.288	.121	.251	2.390	.019
	F = 10.191 (p = .000), R=.649, R^2 =.421 =, Adjusted R Square = .380				
	Dependent Variable: Identification				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.309	.715		.432	.667
Sex	−.049	.220	−.018	−.222	.825
Age	−.098	.215	−.037	−.454	.651
Identity	.020	.136	.017	.149	.882
Attractiveness	.190	.124	.171	1.539	.127
Novelty	−.050	.128	−.044	.386	.700
Usability	.454	.124	.397	3.667	.000
Interaction	.206	.121.	.181	1.697	.093
	F = 9.287(p = .000), R=.632, R^2 =.399 =, Adjusted R Square = .356				
	Dependent Variable: Commitment				

5. Discussion and Conclusions

5.1. Results

Building relationships with customers through Metaverse channel communication will have an important impact on companies' survival. This research expected to demonstrate that Metaverse platforms' UXBDI can be distinguished among platform types. Therefore, users who experience innovatively designed Metaverse platform will be more likely to perceive user–Metaverse identification and commitment. This study revealed several key findings in this regard.

First, as sub-dimensional scales of UXBDI, attractiveness and interaction were confirmed to increase user–Metaverse platform identification and commitment. The results indicate a clear and significant correlation of attractiveness and interaction to an enhanced user–Metaverse platform relationships. These two types of UXBDI were used because users are aware of these experiences, thus representing subjective rewards and expectations when using a Metaverse platform. Users pursue specific rewards or fulfillment of expectations to meet individual needs (attractiveness and interaction), and are willing to remain engaged with the preferred Metaverse platform relationship.

Second, platform identity increased user–Metaverse platform identification in VW and MW. A key component of the VW is users' avatars, and MWs reflect the physical world. Also, VW and MW are categorized in a Metaverse platform simulation, referring to technologies that model realities into virtualities, simulating the physical world as the locus for interaction. This research demonstrates that identity in a Metaverse platform is imperative for sustaining user–platform identification.

Third, the novelty of Metaverse platforms did not appear to significantly affect user–Metaverse platform relationships. The introduction of a novel innovation is likely to cause severe incongruity, as significant changes in underlying technological components and the links between them alter platform attributes' configuration. The more incongruous a Metaverse platform, the more difficult it is for users to assess its potential impact on their use and the more cognitive response to it. Perceptions of such changes may be negative if a novelty's incongruity results in disorientation and frustration. As a result, users may not be able to apply available schemas to make sense of the novel platform and may be more inclined to abandon it.

5.2. Implications

This study contributes to several academic fields. First, it the UXBDI of Metaverse platforms is a key component of user–Metaverse channel relationships. UX design has been widely used to examine Metaverse channels in the literature. Users pursue specific expectations that can meet their UX needs, so they are willing to remain engaged with the Metaverse platform relationship. This study confirmed that the attractiveness and interaction of UXBDI significantly increased user–Metaverse platform relationships. This empirically confirms the role of Metaverse platforms' UXBDI.

Second, the different relationships invoked in Metaverse platform types are shown to be affected by UXBDI. Users expect various experiences in advance. In this study, user–Metaverse platform relationships evoke users' personal identities in VWs and MWs. Thus, this assessment provides some insight into the effects of the identity of VW and MWs, offering prescriptive suggestions and providing practical insights for understanding how and why users commit to ongoing user–Metaverse relationships.

In terms of practicality, this study has several important implications. First, tracking users' engagement with Metaverse platforms' UXBDI can boost the intent to remain in ongoing relationships. Metaverse platform channels are challenged to establish prolonged loyalty, as the consumer product replacement cycle is relatively short. Users who expect and receive a variety of experiences from Metaverse platforms tend to stay in relationships. This study found that one of the approaches to encourage ongoing user–Metaverse platform relationships is to emphasize UXBDI management.

Second, for marketing managers, the findings suggest the need to develop long-term strategies through the management of UXBDI to enhance Metaverse platform loyalty. Many companies prefer an interaction strategy before, during, and after use to enhance Metaverse platforms' engagement, including all types of emotional, cognitive, and physical reactions. This strategy suggests that Metaverse platforms are characterized by functional, symbolic, and esthetic dimensions that jointly determine users' responses. It is a strategy that continuously provides new experiences and capabilities. Marketers can take advantage of the dynamic effect of UXBDI over time by planning and implementing incentive promotions with users they seek to commit to Metaverse platforms.

5.3. Limitations and Future Research

Some study limitations suggest caution in assessing the findings. First, it assesses various experiences of Metaverse platforms to explain how relationships might occur. The results indicated that attractiveness and interaction increase user–Metaverse platform relationships; however, according to existing research, such interaction may interfere with various experiences. Repeated experiences with Metaverse platforms should lead to enhanced identification and committed relationships.

Second, it is notable that differences in UXBDI can be affected by poor working memory, depending on the users' abilities (Jeon & Lee, 2020). This implies a difference in individual working memory and the speed at which users evaluate Metaverse platforms' UXBDI. This kind of "amnesia" regarding Metaverse platforms' experience is a concern, in addition to the constant exposure to external stimuli. Therefore, to more rigorously examine and explain the effect of individual characteristics on memory amnesia, future studies could consider other potential determinants as well as individual abilities.

Third, the study sought to assess whether a difference in design acumen affected by UXBDI based on the level of individual centrality of visual esthetics affects user–Metaverse relationships. Explicating the concept of esthetic centrality is potentially important in understanding decision making (Bloch, Brunel, & Arnold, 2003). In particular, esthetic centrality may determine how Metaverse platforms' UXBDI are evaluated and engaged. Researchers could conduct comparative studies classifying Metaverse types by the high or low centrality of visual esthetics.

References

Adner, R., & Kapoor, R. (2010). Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal*, *31*(3), 306-333. doi:10.1002/smj.821

Bloch, P. H., Brunel, F. F., & Arnold, T. J. (2003). Individual differences in the centrality of visual product aestheticsesthetics: Concept and measurement. *Journal of Consumer Research*, *29*(4), 551-565. doi:10.1086/346250

Choi, H. S., & Kim, S. H. (2017). A content service deployment plan for metaverse museum exhibitions—Centering on the combination of beacons and HMDs. *International Journal of Information Management*, *37*(1), 1519-1527. doi:10.1016/j.ijinfomgt.2016.04.017

Chu, S. C., & Choi, S. M. (2011). Electronic word-of-mouth in social networking sites: A cross-cultural study of the United States and China. *Journal of Global Marketing*, *24*(3), 263-281. doi:10.1080/08911762.2011.592461

Chung, N., & Han, H. (2017). The relationship among tourists' persuasion, attachment and behavioral changes in social media. *Technological Forecasting and Social Change*, *123*(C), 370-380. doi:10.1016/j.techfore.2016.09.005

Chung, N., Tyan, I., & Chung, H. C. (2017). Social support and commitment within social networking site in tourism experience. *Sustainability, 9*(11), 2102. doi:10.3390/su9112102

Desmet, P. M. A., & Hekkert, P. (2007). Framework of product experience. *International Journal of Design*, *1*(1), 57-66.

Goutam, D., & Gopalakrishna, B. V. (2018). Customer loyalty development in online shopping: An integration of e-service quality model and commitment-trust theory. *Management Science Letters*, *8*(11), 1149-1158. doi:10.5267/j.msl.2018.8.009

Hassenzahl, M., & Tractinsky, N. (2006). User experience—A research agenda. *Behaviour and Information Technology*, *25*(2), 91-97. doi:10.1080/01449290500330331Hendaoui, A., Limayem, M., & Thompson, C. W. (2008). 3D social virtual worlds: Research issues and challenges. *IEEE Internet Computing*, *12*(1), 88-92. doi:10.1109/MIC.2008.1

Hinderks, A., Schrepp, M., Mayo, F. J. D., Escalona, M. J., & Thomaschewski, J. (2019). Developing a UX KPI based on the user experience questionnaire. *Computer Standards and Interfaces*, *65*(5), 38-44. doi:10.1016/j.csi.2019.01.007

Jeon, J. E., & Kim, M. R. (2021). The scale development for conceptualizing of user experience based design innovativeness. *Journal of Korea Service Management Society*, *22*(2), 55-85. doi:10.15706/jksms.2021.22.2.003

Jeon, J. E., & Lee, E. M. (2020). The effect of sensory satiety on perceinced benefits: The case of aesthetic consumption in South Korea. *Sustainability*, *12*(20), 8637. doi.org/10.3390/su12208637

Kang, M., & Schuett, M. A. (2013). Determinants of sharing travel experiences in social media. *Journal of Travel and Tourism Marketing*, *30*(1–2), 93-107. doi:10.1080/10548408.2013.751237

Kim, S. K. (2020), Metaverse, Seoul, Korea: Plan B Design.

Lee, S. G., Trimi, S., Byun, W. K., & Kang, M. (2011). Innovation and imitation effects in Metaverse platform adoption. *Service Business*, *5*(2), 155-172. doi:10.1007/s11628-011-0108-8

Malhotra, Y., & Galletta, D. (2005). A multidimensional commitment model of volitional systems adoption and usage behavior. *Journal of Management Information Systems*, *22*(1), 117-151. doi:10.1080/07421222.2003.11045840

Mugge, R., & Dahl, D. W. (2013). Seeking the ideal level of design newness: Consumer response to radical and incremental product design. *Journal of Product Innovation Management*, *30*(1), 34-47. doi:10.1111/jpim.12062

Papagiannidis, S., & Bourlakis, M. A. (2010). Staging the New Retail Drama: At a Metaverse near you! *Journal of Virtual Worlds Research*, *2*(5), 425-446. doi:10.4101/jvwr.v2i5.808

Papagiannidis, S., Bourlakis, M., & Li, F. (2008). Making real money in virtual worlds: MMORPGs and emerging business opportunities, challenges and ethical implications in metaverses. *Technological Forecasting and Social Change*, *75*(5), 610-622. doi:10.1016/j.techfore.2007.04.007

Rehm, S. V., Goel, L., & Crespi, M. (2015). The metaverse as mediator between technology, trends, and the digital transformation of society and business. *Journal of Virtual Worlds Research*, *8*(2), 1-8. doi:10.4101/jvwr.v8i2.7149

Shin, Y., Im, C., Oh, H., & Kim, J. (2017). Design for experience innovation: Understanding user experience in new product development. *Behaviour and Information Technology, 36*(12), 1218-1234. doi:10.1080/0144929X.2017.1368709

Sigerson, L., & Cheng, C. (2018). Scales for measuring user engagement with social network sites: A systematic review of psychometric properties. *Computers in Human Behavior*, *83*(C), 87-105. doi:10.1016/j.chb.2018.01.023.

Veryzer, R. W. (1998). Key factors affecting customer evaluation of discontinuous new products. *Journal of Product Innovation Management*, *15*(2), 136-150. doi:10.1111/1540-5885.1520136

Wrigley, C., & Bucolo, S. (2011). Teaching design led innovation: The future of industrial design. *Design Principles and Practices*, *5*(2), 231-240. doi:10.18848/1833-1874/CGP/v05i02/38037