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Factors Influencing Resistance to the Metaverse: Focusing on Propagation Mechanisms

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Abstract

This study examines factors influencing nonusers' resistance to the adoption of the metaverse, focusing on propagation mechanisms. It elucidates the role of innovation resistance within the metaverse adoption process. We applied the Innovation Resistance Model in the context of the metaverse and considers three major groups of factors influencing resistance to the metaverse: innovation characteristics (perceived usefulness, compatibility, perceived risk, and complexity), consumer characteristics (personal innovativeness), and propagation mechanisms (mass media, online media, and personal communication). An online survey of college students who do not use the metaverse revealed that perceived usefulness, compatibility, personal innovativeness, and online media were negative predictors of resistance to the metaverse. Conversely, perceived risk, mass media, and personal communication were positive predictors of resistance to the metaverse. Furthermore, innovation resistance was found to play a mediating role in the metaverse adoption process. Drawing upon the findings, we suggested marketing strategies to decrease resistance to the metaverse.

Keywords: *Metaverse, Innovation Resistance, Propagation Mechanisms, Innovation Characteristics, Consumer Characteristics*

1. Introduction

The metaverse refers to a three-dimensional virtual space where reality and the virtual world interact and co-evolve, enabling various social, economic, and cultural activities that create value [1]. While the term originated from Neal Stephenson's 1992 novel, recent years have witnessed a notable increase in both industry and government interest in the metaverse, especially since the outbreak of the coronavirus pandemic [2]. The Ministry of Science and ICT announced the approval of the world's first 'Virtual Convergence Industry Promotion Act,' slated to bolster the metaverse industry, set for implementation by late August 2024 [3]. Universities have established metaverse campuses to welcome freshmen [4, 5]. McKinsey & Company estimated the metaverse to generate $5 trillion in value by 2030 [6]. Contrary to these optimistic outlooks and

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substantial investments in the metaverse industry, consumer responses are not entirely positive. Metaverse platforms created by local governments and major mobile carriers such as KT and LG U+ have seen low active user counts [7, 8]. Even consumers with prior metaverse experience often fail to perceive significant distinctions between the metaverse and existing games and hold somewhat pessimistic views regarding the metaverse's potential to replace reality [9].

With the metaverse emerging as an innovative media platform, initial scholarly attention has centered on its adoption and diffusion, employing frameworks such as the Technology Acceptance Model and the Value-based Adoption Model [10-12]. Research has largely focused on the positive aspects of metaverse adoption, examining factors influencing users' intentions to use it [13]. However, studies examining negative responses among nonusers, such as rejection or postponement, remain scarce [14]. This study seeks to fill the gap in the literature by examining negative responses to the metaverse through the lens of innovation resistance.

An innovation is defined as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 12) [15]. Numerous studies have employed the Diffusion of Innovation Theory and Technology Acceptance Model to understand factors influencing the adoption and diffusion of innovations [16]. These theories carry a pro-innovation bias, assuming that "all innovations are good for the consumer and are surefire improvements over existing product substitutes" (p. 208) [17]. However, not all innovations are perceived as valuable by consumers since the changes brought about by innovations can be disruptive and may lead to resistance to changes and innovations themselves [18, 19]. Innovation resistance, defined as "the resistance offed by consumers to changes imposed by innovations" (p. 208), is not simply the opposite of innovation adoption. Rather, it is a natural response within the adoption process [17]. While existing literature has placed a significant emphasis on the adoption and diffusion of innovations, scholarly understanding of why individuals resist adopting innovations remains limited [17, 19].

Ram's Innovation Resistance Model serves as an initial theoretical framework aimed at understanding consumer resistance to innovation [17]. The model proposes three key factors influencing innovation resistance: innovation characteristics, consumer characteristics, and propagation mechanisms. Ram's model classified innovation characteristics into consumer-dependent factors (e.g., relative advantage, compatibility, perceived risk, and complexity) and consumer-independent characteristics (e.g., trialability, divisibility, and communicability). Regarding consumer characteristics, the model suggested that psychological variables (e.g., perception, motivation, personality) and demographics (e.g., age, education, income) play a role in influencing innovation resistance. In terms of propagation mechanisms, the model posited that the type (e.g., marketer-controlled vs. non-marketer-controlled, personal vs. impersonal) and characteristics (e.g., credibility, clarity) of propagation mechanisms influence innovation resistance.

Since the 2010s, there has been a considerable increase in the number of studies on innovation resistance [20]. Previous studies on innovation resistance primarily focused on examining the relationship between innovation resistance and consumer characteristics [20]. For instance, perceived risk was shown to have a positive association with resistance to social media, whereas the relative advantage of social media negatively influenced resistance [21]. Similarly, compatibility and trialability were found to negatively influence resistance to Facebook, whereas complexity and perceived risk positively influenced resistance to Facebook [22]. Relative advantage and personal innovativeness were negatively associated with resistance to wrist-worn wearable devices, while complexity, physical risk, and financial risk were positively related to resistance [23]. In terms of individual characteristics, personality traits such as extraversion, conscientiousness, and neuroticism were found to positively influence resistance to YouTube, whereas openness had a negative effect [24]. Of the three factors influencing innovation resistance in Ram's model, propagation mechanisms received

relatively less scholarly attention.

Existing studies have indicated a negative relationship between innovation resistance and the adoption of new media such as YouTube, social TV, and e-books [25-27]. Recently, a small but growing number of studies have begun exploring the metaverse as an innovative new media platform from the standpoint of innovation resistance [13, 14, 28]. These studies have employed Ram's Innovation Resistance Model, examining how innovation and consumer characteristics influence resistance to the metaverse. For instance, Oh & Lee demonstrated that complexity and perceived social risk positively affect resistance to the metaverse [13]. Similarly, Kim & Lee found that personal innovativeness and compatibility have a negative correlation with resistance to the metaverse, while perceived risk has a positive effect [14]. To the best of the authors' knowledge, Lee & Lee's work is the only attempt to examine the influence of all three categories of factors (innovation characteristics, consumer characteristics, and propagation mechanisms) on resistance to the metaverse [28]. They classified the innovation resistance of the metaverse into postponement and rejection. Their findings revealed that compatibility was negatively related to both postponement and rejection, while complexity and perceived risk of personal information exposure were positively associated with both. Moreover, perceived usefulness exhibited a negative effect on rejection. Metaverse-related articles and promotional content, as diffusion mechanisms, were found to influence the rejection of the metaverse. Interestingly, consumer characteristics like self-efficacy and novelty-seeking tendencies showed no correlation with either postponement or rejection. While their study examined all three groups of factors influencing resistance to the metaverse, the authors acknowledged certain limitations, such as the inclusion of only mass media articles and promotional content as diffusion mechanisms. Additionally, their study did not measure the intention to use the metaverse, thus failing to provide a clearer understanding of the role of innovation resistance in the metaverse adoption process.

This study seeks to investigate the factors influencing nonusers' resistance to the metaverse, with a particular focus on propagation mechanisms. Moreover, it clarifies the role innovation resistance plays in the metaverse adoption process. As discussed previously, the influence of propagation mechanisms has received relatively less scholarly attention in the literature on innovation resistance and the metaverse. This study attempts to fill this gap by specifying the propagation mechanisms into mass media, online media, and personal communication and examining their impact on resistance to the metaverse. Applying the Innovation Resistance Model to the metaverse context, this study includes variables identified in the literature as relevant to metaverse adoption. Among the three main groups of factors influencing resistance to the metaverse, as for the innovation characteristics, perceived usefulness, compatibility, perceived risk, and complexity are considered. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320) [16]. Compatibility refers to "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (p. 15) [15]. Perceived risk is defined as "the risk associated with adopting the innovation" (p. 209) [17]. Complexity refers to "the degree to which an innovation is perceived as relatively difficult to understand and use" (p.15) [15]. As consumer characteristics, the study examines personal innovativeness ("an individual trait reflecting a willingness to try out any new technology," p. 677) [29]. Regarding propagation mechanisms, mass media, online media, and personal communication are examined. In addition, this study investigates the mediating role of innovation resistance in the relationship between the influencing factors and the intention to use the metaverse.

2. Methods

A total of 328 college students in South Korea participated in an online survey. Participants were recruited from advertising and PR classes. The dataset excluded 8 incomplete responses and an additional 31 students who answered using the metaverse, resulting in a final sample of 289 nonusers for analysis. The respondents' ages ranged from 18 to 28 (M= 21.04, SD=1.99). Among them, 213 (73.7%) were female and 76 (26.3%) were male.

Variables were measured using items adapted from previous studies. For innovation characteristics, the study measured perceived usefulness, compatibility, perceived risk, and complexity. Perceived usefulness was measured using 4 items (*M*=3.93, *SD*=1.37, Cronbach's α=.92). Sample items included "I find the metaverse useful in my daily life" and "I can do what I want more efficiently using the metaverse" [11, 30]. Compatibility was also measured with 4 items (*M*=3.39, *SD*=1.30, Cronbach's α=.86). Sample items included "Metaverse is compatible with my lifestyle" and "Metaverse does not fit with my preferences" (reverse coded) [31]. Perceived risk was measured using 4 items (*M*=5.21, *SD*=1.04, Cronbach's α=.76). Sample items included "I think using the metaverse in monetary transactions has potential risk" and "I think using the metaverse could not keep personal sensitive information from exposure" [32]. Complexity was measured with 5 items (*M*=3.65, *SD*=1.09, Cronbach's α=.86). Sample items included "Using the metaverse does not require a lot of my effort" (reverse-coded) and "I find the metaverse to be easy to use" (reverse-coded) [30, 33]. Each item was measured on a 7-point Likert scale (1=strongly disagree, 7=strongly agree).

As an individual characteristic, personal innovativeness was measured using 4 items (*M*=4.30, *SD*=1.14, Cronbach's α=.81). Sample items included "If I heard about a new information technology, I would look for ways to experiment with it" and "Among my peers, I am usually the first to try out new information technologies" [29]. A 7-point Likert scale (1=strongly disagree, 7=strongly agree) was used to measure each item.

Propagation mechanisms included three variables, namely mass media, online media, and personal communication. Mass media was measured using 4 items (*M*=2.37, *SD*=1.10, Cronbach's α=.77). Participants were asked, "How often do you hear information about the metaverse in the media listed below? TV, newspaper, radio, and magazine" [34]. Online media was measured using 3 items (*M*=4.25, *SD*=1.37, Cronbach's α=.75). Participants were asked, "How often do you hear information about the metaverse in the media listed below? Social media (YouTube, Instagram, etc.), online portal sites (NAVER, Daum, etc.), OTT services (Netflix, Wavve, TVING, etc.)." Personal communication was measured using 3 items (*M*=2.12, *SD*=1.10, Cronbach's α=.74). Participants were asked, "How often do you normally talk about the metaverse with the following people? Family, friends or peers, and other people around" [35]. A 7-point Likert scale (1=not at all, 7=very often) was used to measure responses for each item.

Innovation resistance was measured with 4 items (*M*=2.88, *SD*=1.23, Cronbach's α=.92). Sample items included "I will not comply with the change to the metaverse" and "I do not agree with the change to the metaverse" [36]. Intention to use the metaverse was measured using 3 items (*M*=3.52, *SD*=1.41, Cronbach's α=.91). A sample item included "I intend to continue using the metaverse in the future" [30, 33, 38]. A 7-point Likert scale (1=strongly disagree, 7=strongly agree) was used to measure each item.

3. Results

Regression and mediation analysis were performed using SPSS and Hayes' PROCESS Macro Model 4 to

examine factors influencing innovation resistance and intention to use the metaverse [39]. As shown in Table 1, regression analysis model 1 (F= 31.888, p<.001) with independent variables (innovation characteristics, consumer characteristics, propagation mechanisms, and innovation resistance) and a dependent variable (intention to use the metaverse) as well as model 2 (F= 20.347, p<.001) with independent variables (innovation characteristics, consumer characteristics, and propagation mechanisms) and a dependent variable (innovation resistance), were found to be statistically significant. Variance inflation factor (VIF) statistics (1.053~1.795) and Durbin-Watson statistics (2.030~2.033) indicated no violation of regression analysis.

Table 1. Direct and indirect effects of variables (N=289)

Path (direct effects)			***β***	***SE***	***t***	***F***	***R^2 ($_{adj}R^2$)***
Model 1	Innovation characteristics	Perceived usefulness → IN	.336	.055	6.243***	31.888***	.507 (.491)
		Compatibility → IN	.331	.061	5.877***		
		Perceived Risk → IN	.011	.060	.250		
		Complexity → IN	-.028	.063	-.574		
	Consumer characteristics	Personal innovativeness → IN	.031	.059	.636		
	Propagation mechanisms	Mass media → IN	-.044	.065	-.871		
		Online media → IN	-.009	.053	-.177		
		Personal communication → IN	.117	.065	2.292*		
	Innovation resistance	Innovation resistance → IN	-.131	.061	-2.487*		
Model 2	Innovation characteristics	Perceived usefulness → IR	-.228	.053	-3.846***	20.347***	.368 (.350)
		Compatibility → IR	-.249	.059	-4.019***		
		Perceived Risk → IR	.147	.058	3.023**		
		Complexity → IR	.056	.062	1.010		
	Consumer characteristics	Personal innovativeness → IR	-.293	.055	-5.704***		
	Propagation mechanisms	Mass media → IR	.122	.063	2.144*		
		Online media → IR	-.132	.052	-2.284*		
		Personal communication → IR	.161	.063	2.839**		

Path (indirect effects)		***B***	***SE***	***LLCI***	***ULCI***
Innovation characteristics	Perceived usefulness → IR → IN	.0309*	.0161	.0044	.0676
	Compatibility → IR → IN	.0354*	.0181	.0060	.0772
	Perceived Risk → IR → IN	-.0264*	.0142	-.0584	-.0027
	Complexity→ IR → IN	-.0095	.0112	-.0336	.0118
Consumer characteristics	Personal innovativeness → IR → IN	.0476*	.0230	.0083	.0983
Propagation mechanisms	Mass media → IR → IN	-.0205*	.0121	-.0485	-.0015
	Online media → IR → IN	.0178*	.0124	.0005	.0479
	Personal communication→ IR → IN	-.0271*	.0156	-.0631	-.0021

Note: *p < 0.05, **p < 0.01, ***p < 0.001, IN = Intention to use the metaverse, IR = Innovation resistance

In model 1, factors directly influencing the intention to use the metaverse were perceived usefulness (β=.336, p<.001), compatibility (β=.331, p<.001), personal communication (β=.117, p<.05), and innovation resistance (β= -.131, p<.05). In model 2, perceived usefulness (β= -.228, p<.001), compatibility (β= -.249, p<.001), perceived risk (β=.147, p<.01), personal innovativeness (β= -.293, p<.001), mass media (β=.122, p<.05), online media (β= -.132, p<.05), and personal communication (β=.161, p<.01) were predictors of innovation resistance.

The study explored the indirect effects of each variable on the intention to use the metaverse through innovation resistance using Hayes' PROCESS Macro Model 4. Indirect effects of perceived usefulness (B=.0309, 95% CI[.0044~.0676]), compatibility (B=.0354, 95% CI[.0060~.0772]), perceived risk (B= -.0264,

95% CI[-.0584~ -.0027]), personal innovativeness (B=.0476, 95% CI[.0083~.0983]), mass media (B= -.0205, 95% CI[-.0485~ -.0015]), online media (B=.0178, 95% CI[.0005~.0479]), and personal communication (B= -.0271, 95% CI[-.0631~ -.0021]) were found to be statistically significant. Since perceived usefulness, compatibility, and personal communication directly influenced the intention to use the metaverse, innovation resistance partially mediated the relationship between these variables and intention. On the other hand, perceived risk, personal innovativeness, mass media, and online media did not directly influence the intention. Therefore, innovation resistance fully mediated the relationship between these variables and the intention to use the metaverse.

4.Discussion

The purpose of this study was to examine factors influencing resistance to the metaverse among nonusers, with a particular focus on propagation mechanisms. Furthermore, the study sought to elucidate the role of innovation resistance in the metaverse adoption process. To this end, the study applied the Innovation Resistance Model within the metaverse context, focusing on three major groups of factors influencing resistance to the metaverse: innovation characteristics (perceived usefulness, compatibility, perceived risk, and complexity), consumer characteristics (personal innovativeness), and propagation mechanisms (mass media, online media, and personal communication). An online survey was conducted targeting college students who do not use the metaverse. Major findings and implications are discussed in the following.

First, among innovation characteristics, the study found that perceived usefulness and compatibility directly influenced innovation resistance, and both directly and indirectly influenced the intention to use the metaverse. Perceived risk also directly influenced innovation resistance, and indirectly influenced intention through innovation resistance. Complexity was not found to be a significant predictor of both innovation resistance and intention. The significance of perceived usefulness, compatibility, and perceived risk in predicting innovation resistance and the adoption of the metaverse has been substantiated in existing literature [13, 14, 28]. The findings indicate that to lessen resistance to the metaverse and bolster intentions to use it, it is important to emphasize its utility in improving users' lives and meeting their lifestyle needs and values. Efforts should be made to address potential risks associated with using the metaverse, such as financial and privacy concerns when promoting content through the metaverse platforms. While previous studies conducted with adult participants identified complexity as a positive predictor of resistance to the metaverse, interestingly, this study found that when study participants were restricted to college students, complexity did not influence innovation resistance or intention to use the metaverse [13, 28]. The findings suggest that college students familiar with new technologies may not perceive the metaverse as overly complex, as evidenced by the mean complexity score (M=3.57), indicating that they may not view complexity or difficulty using the metaverse as a major hurdle to adopting the metaverse.

Second, the study found that personal innovativeness as a consumer characteristic directly influenced innovation resistance and, indirectly, the intention to use the metaverse through innovation resistance. Previous studies have shown mixed results regarding the relationship between personal innovativeness and innovation resistance [14, 22, 28]. While personal innovativeness did not influence the continuous use intention among existing metaverse users, this study demonstrates that it remains an influencing factor in reducing nonusers' resistance to the metaverse and consequently enhancing their intentions to use it [14].

Third, regarding propagation mechanisms, personal communication showed direct effects on innovation resistance and both direct and indirect effects on intention to use the metaverse. Mass media and online media directly influenced resistance to the metaverse and, indirectly, intention through innovation resistance. Notably,

exposure to information about the metaverse through online media reduced resistance and consequently heightened intentions to use the metaverse. These findings suggest that online media such as social media, online portal sites, and OTT services can serve as effective channels to promote metaverse-related promotional content. On the other hand, exposure to metaverse-related information through mass media (TV, newspapers, radio, and magazines) and personal communication (conversation with family, friends, or peers) increased resistance to the metaverse. This implies that information conveyed through mass media may not be perceived as useful as that from online media and that opinions expressed by family and friends about the metaverse may not be positive. To gain a better understanding of the role of mass media and personal communication as propagation mechanisms, further research is needed that compares the characteristics of metaverse-related information disseminated through mass media, online media, and personal communication.

Consistent with existing literature on innovation resistance, this study revealed a negative effect of innovation resistance on the intention to use the metaverse [13, 24, 27]. This study is significant in that it elucidates the role of innovation resistance in the metaverse adoption process. Innovation resistance fully mediated the relationship between perceived risk, personal innovativeness, mass media, online media, and the intention to use the metaverse. Additionally, it partially mediated the relationship between perceived usefulness, compatibility, personal communication, and intention to use the metaverse.

Caution is warranted in interpreting the study's findings due to the utilization of a nonprobability sample consisting of college students and mostly females. Moreover, this study did not measure specific types of innovation resistance, which can be classified into rejection, postponement, and opposition [40]. Future research can identify the dominant type of resistance to the metaverse and the factors influencing these specific types of innovation resistance. Strategies to reduce resistance should be tailored to the specific type of resistance most prevalent among non-adopters.

5. Conclusion

This study examined factors influencing nonusers' resistance to the adoption of the metaverse, focusing on propagation mechanisms. The study also examined how innovation resistance mediates the relationship between the influencing factors and the intention to use the metaverse. In conclusion, drawing from the Innovation Resistance Model, we offer valuable insights into factors influencing nonusers' resistance to the metaverse. The findings of this study emphasize that for marketers of the metaverse platforms, developing strategies to decrease nonusers' resistance to the metaverse is still a primary task in accelerating adoption of it. Effective strategies include highlighting the usefulness and compatibility of the metaverse in daily life, providing clear information about associated risks, and targeting highly innovative influencers. We also recommend using online media, such as social media, online portal sites, and OTT services, as a primary channel for promoting metaverse-related information and content.

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