The Prospects of Metaverse in the Public vs. Private Sector by Millennials and Generation Z: Citizen/Customer Relationship Management

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Abstract

Purpose: The aim of this study is to examine the factors influencing prospects toward for the metaverse in both the public and private sectors, focusing on the perspectives of millennials and generation Z that were rarely examined in previous studies. **Research design, data and methodology:** This study employed an online survey as its research methodology utilizing factor analysis, ANOVA, and regression analysis to test the formulated hypotheses. **Results:** The findings of this study reveal that factors such as citizen/customer relationship management, the application of metaverse in both in the public and private sectors. Moreover, the effect size of applying the metaverse to cities on prospects toward the Metaverse was notably higher in the public sector. The effect size of metaverse management for customer relationship management showed a greater impact in the private sector. **Conclusions:** The results carry significant managerial and policy implications. They shed light on how millennials and generation Z perceive the applications of the metaverse in relation to cities, products, and brands. Notably, the results suggest that application of the metaverse for cities and management of customer relationships for products and brands emerge as key factors influencing the prospect of the metaverse in the public and private sectors.

Keywords: Prospects of Metaverse, Millennials, Generation Z, Citizen/Customer Relationship Management

JEL Classification Code: M10, M30, M20, M31

1. Introduction

The technological advancements in the era of the 4th industrial revolution have significantly enhanced human-computer interaction. This improvement is particularly notable in advanced services, including enhanced reality, interactivity, and customization. As a result, customer perceptions and behaviors in the online environment have undergone a transformative shift. In their study, Lee et al. (2021) asserted that technologies serve as the catalysts driving the transition from the current Internet to the metaverse. The metaverse ecosystem, as described by the Lee et al. (2021), enable human users to live and play within a self-sustaining, persistent, and shared realm.

According to Dionisio et al. (2013), virtual worlds represent a subset of virtual reality applications, a broader term encompassing computer-generated simulations of virtual reality that involves seemingly real, direct, or physical user interaction with integrated networks. Dionisio et al. (2013) highlight that 3D virtual worlds or the Metaverse, in particular, present a compelling alternative realm for human sociocultural interaction. Dwivedi et al. (2022) explored the potential of the

metaverse to expand world through augmented and virtual reality technologies allowing users to engage seamlessly in interactions within real and simulated environments, utilizing avatars and holograms.

The purpose of this study is to investigate the factors influencing prospects for the metaverse in both public and private sectors, focusing on the perspectives of millennials and generation Z. This study aims to provide implications for citizen and customer relationship management in light of their perceptions. In particular, this study addresses the following research questions: i) What is the awareness level of millennials and Generation Z regarding the application of the metaverse?; ii) How do millennials and Generation Z frequently use and experience the application of the metaverse?; iii) How does the perceived citizen/customer relationship management by applying the metaverse influence prospects among millennials' and Generation Z?; iv) How does the perceived application of the metaverse in cities/products affect prospects?; v) How does overall attitude affect prospects toward the metaverse; and vi) How do the perceived effects of citizen/customer relationship management by applying metaverse, application of the metaverse in other cities/products, and attitude on prospects toward the metaverse differ between public and private sectors. This study contributes to the existing literature by addressing a gap – previous studies have seldom explored the effects of the metaverse through a comparative analysis of both public and private sectors and across generations, specifically focusing on millennials and Generation Z.

2. Literature Review

2.1. Definition and Development of Metaverse

The term 'Metaverse' finds its origin in the novel 'Snow Crash,' initially published in 1992 (Stephenson, 1992). It denotes a realm where the virtual and the real coalesce through various social activities (Braguez et al., 2023). The concept of the metaverse drew inspiration from technological developments leading up to its inception in the early 1990s (Buchholz, 2022) and has garnered increasing attention in the tech world since 2020 (Kim, 2021). In their work, Dwivedi et al. (2022) highlighted that virtual environments and immersive games, including Second Life, Fortnite, Roblox and VRChat. have been identified as antecedents of the metaverse. These platforms provide insights into the potential socio-economic impact of a fully functional, persistent cross platform metaverse, capable of creating immersive, authentic, and natural experiences (Dwivedi et al., 2022). According to Xi et al. (2023), the metaverse, also known as extended reality,

facilitates novel forms of engrossing telepresence and has the potential to simply mundane tasks.

Smart et al. (2007) provided a comprehensive definition, chateristerizing the metaverse as a complex concept that has evolved beyond Stephenson's initial vision of an immersive 3D virtual world. The term now encompasses various elements, including physical world objects, actors, interfaces, and networks that construct and interact with virtual environments (Smart et al., 2007). In the definition provided by Lee (2021), the metaverse is characterized as an immersive 3D virtual environment that transcends commerce and entertainment. It aims to establish a genuinely virtual artificial community where digital users or avatars seamlessly integrate with their own identities, engaging in social and economic interactions within immersive three-dimensional virtual and multi-user online environments (Lee, 2021). As per Lee et al. (2021), the term 'metaverse' has been coined to catalyze digital transformation across all facets of our physical lives. At its core, the metaverse envisions an immersive Internet as a vast, unified, persistent, and shared realm (Lee et al., 2021). As outlined by Braguez et al. (2023), the Metaverse assumes the integration of a broad spectrum of new technologies, connecting to the internet, taking on a social form and offering an immersive experience through Augmented Reality (AR). The meratverse embraces various aspectss of life, including playful, social, economic, and more (Braguez et al., 2023). Zhao et al. (2022) encompassed that the metaverse represents a visual realm seamlessly blending the physical and digital worlds, despite of its potential, the development of the metaverse in its early stage.

2.2. Metaverse in the Public vs. Private Sector

Dwivedi et al. (2022) pointed out that organizations are now actively evaluating the potential of the metaverse and exploring its integration into their existing business models. The metaverse, much like the introduction of the Internet, is anticipated to fundamentally reshape our public, private, and professional live (Dwivedi et al., 2022). As per Allam et al. (2022), the Metaverse embodies the concept of a hypothetical 'parallel virtual world,' serving as an embodiment of alternative ways of living and working in virtual cities. This represents a potential shift in urban planning activities and service provisioning, with the capacity to redefine city design towards enhanced urban efficiencies, accountabilities, and overall quality performance (Allam et al., 2022). As an initiating example, the Seoul Metropolitan Government (SMG) initiated the pilot of Metaverse Seoul, a government-run metaverse, in 2022, involving the creation a virtual version of Seoul mayor's office (Weiss & Markowitz, 2022). The Seoul Metropolitan Government (SMG) is officially launching the initial service phase of its groundbreaking virtual

municipal world Metaverse Seoul (source: www.seoul.go.kr). This platform, the first of its kind globally, has successfully completed a beta test involving various administrative services, including those related to the economy, education, and tax affairs (source: www.seoul.go.kr). Distor et al. (2023) examined the concept of the metaverse and investigated the role of the government and the public sector in maximizing the potential of metaverse technology for public service delivery. The study focused on addressing opportunities for innovation and the transformation of public sector decision-making and service production (Distor et al., 2023).

In the private sector, Chen et al. (2022) explored the metaverse as an emerging field in marketing and observed that vaious companies are leveraging the concept of the metaverse to enhance their sales revenue. Buhalis et al. (2022) conducted an examination of the metaverse, highlighting its capacity to blend the physical and virtual worlds. Their study (Buhalis et al, 2022) emphasized the transformative impact on how customers and organizations engage in co-creation experiences and values with the perspective of hospitality and tourism management and marketing, particularly considered in this exploration. Nalbant and Aydin (2022) conducted an investigation into the impact of the metaverse on marketing. They emphasized that businesses must natigate and uphold their identities within the metaverse realm to effectively adapt to the various effects it will have on marketing strategies (Nalbant & Aydin, 2022). Joy et al. (2022) noted that leading luxury brands are integrating technologies to recreate their brand images and reinvent the consumer experience. Kim (2021) explored interactive advertising in the metaverse by investigating the role of advertising in the metaverse, delving into the role of advertising within this virtual environment and examining whether its dynamics mirror those observed in the real world. Shen et al. (2021) emphasized the significance of aligning application design paradigms with factors influencing consumer behavior in virtual commerce. Their research (Shen et al., 2021) specifically delved into strategies for promoting user purchase within the metaverse.

2.3. Adoption of Technology and Millennials and Generation Z Behavior

Bǎltescu (2019) asserted that each generation defines itself through distinct values and beliefs, attitudes and experiences, giving rise to unique characteristics of consumer behavior. It's worth noting that the classification of generation may vary across different studies. Dimock (2019) provided a definition, indicating that millennials are born between 1981 and 1996s, while Generation Z

spans from 1997 to 2012. Dimock (2019) also discussed the implications of growing up in an always-on technological environment for these two generational groups. Parker and Igielnik (2020) found that Millennials and Generation Z share similar viewpoints on many major issues of the day when compared to older generations. Francis and Hoefel (2018) conducted research on Generation Y and Z, focusing on terms such as emergence of internet, social network, and digital natives. Francis and Hoefel (2018) identified common characteristics shared by these generations as consumers. Turner (2015) provided a definition for Generation Z, also known as I-generation, net-gen, and digital natives. Members of this generation were born in the mid-1990s through the late 2010s and have grown accustomed to interacting and communicating in a world connected at all times, characterized by technological advances in multimedia, including smartphones and social media (Turner, 2015). Zhang et al. (2017) highlighted the rapid and widespread adoption of modern technological advances, including communication channels, among Generation Y consumers. Additionally, Nalbant and Aydin (2022) pointed out that Generation Z and Generation alpha are expected to have an easier time adjusting to virtual realms.

3. Hypothesis Development

3.1. Effects of Citizen/Customer Relationship Management on Prospects

Goldberg and Schär (2023) conducted an investigation revealing that numerous companies and organizations have already established a virtual presence and are utilizing the metaverse to engage with both new and existing customers. Goldberg and Schär (2023) also suggest that the metaverse presents an opportunity for businesses to create more immersive and engaging points of contract. Ramadan (2023) explored how the pace of digital socialization has significantly accelerated drastically in the past decade and suggested that the metaverse offers substantial opportunities for brands in terms of building and nurturing customer relationships. Han and Cho (2022) investigated that the application of augmented reality technology, highlighting its role in enhancing interactivity and decision-making through technology-enabled experiences. Han and Cho (2022) also suggested that augmented reality cab ne an effective tool for firms' CRM strategies. Cho (2023a) examined how citizens perceive the application of metaverse platforms for city marketing and explored strategies for applying the metaverse to provide public services and enhance engagement with citizens.

Lee (2021) focused on the sustainable growth of the metaverse by identifying and analyzing the hype surrounding the metaverse to ascertain factors contributing to the stable success of metaverse transformation Nalbant and Uyanik (2021) emphasized that the metaverse is an essential and promising topic today. Nalbant and Uyanik (2021) also suggested that the metaverse approach shift its focus on how this technology will be adapted to people's lives. Building on these considerations, this study hypothesized the effects of perceived citizen relationship management in the public sector and customer relationship management in the private sector on prospects toward the metaverse.

H1a: The perceived effectiveness of citizen relationship management in the private sector has a significant impact on prospects toward the metaverse.

H1b: The perceived customer relationship management in the private sector has a significant impact on prospects toward the metaverse.

3.2. Effects of Application of Metaverse in Cities/Products on Prospects

Nalbant and Uyanik (2021) explored various metaverse domains, encompasing healthcare, military, real estate, manufacturing, education, and retail. Metaverse applications within these domains such as health applications facilitating accelerated procedures and real-time examinations of data obtained through 3D scans in augmented reality were highlighted (Nalbant & Uyanik, 2021). Xi et al. (2023) pointed out that metaverse technologies are increasingly playing a role in facilitating work, education, healthcare, consumption and entertainment, while they also highlighted that the metaverse brings a host of challenges. Nalbant and Uyanik (2021) also highlighted that one of the most significant recent developments in the metaverse is Meta plans to launch direct-to-consumer virtual stores utilizing virtual reality and augmented reality with promising news that plays an encouraging role in charting different routes within the metaverse. Braguez et al. (2023) conducted research on the evolution of metaverse application, particularly in the gaming sector and suggested that the possibilities created by the metaverse in gaming have extended to other fields, including education. Felice et al. (2023) explored that evolving significance of the metaverse, which, until recently, was an abstract concept. Felice et al. (2023) emphasized that it is now gaining substantial attention from consumers, investors, brands, and large global players. Additionally, in the public sector, cities have begun applying the metaverse by provide public services and enhance interaction with citizens. Through Metaverse Seoul, the city is dedicated to constructing a virtual world that offers users an immersive experience of reality, allowing them to access and enjoy

public services (source: https://seoul.go.kr). In the private sector, Joy et al. (2022) pointed out that a significant upcoming change is the expansion of brands into multiple metaverses, while the contemporary luxury brand customer experiences are heavily influenced by the utilization of AI and non-fungible tokens. Barrera and Shah (2023) highlighted that the metaverse, described as a hyper-connected digital universe, holds the promise of fundamentally changing how consumers, brands, and firms transact and interact within a seamlessly interconnected space of virtual realities. Building on these considerations, this study hypothesized the effects of perceived application of the metaverse in other cities within the public sector and products within the private sector on prospects toward the metaverse.

H2a: The perceived application of the metaverse in cities has a significant impact on prospects toward the metaverse.

H2b: The perceived d application of the mtaverse in products has a significant impact on prospects toward the metaverse.

3.3. Effects of Attitude toward the Metaverse on Prospects

According to Olufemi (2012), attitude refers to feelings, beliefs, and reactions of an individual towards an event, phenomenon, objects or person. Ajzen (1993) defined attitude as an individual's disposition to react with a certain degree of favorableness or unfavorableness to an object, behavior, person, institution, or event or to any other discriminable aspect of the individual's world. Cho (2023b) investigated how customers' perceptions of various factors influence the overall attitude toward the application of the metaverse. Applying the classical model of consumer decision making (Zhang & Benyoucef, 2016) and the stimulus-organism-response model (Jacoby, 2002), Shen et al. (2021) asserted that purchase decisions can be considered the response, and the characteristics of virtual commerce, whether related to immersive technologies or consumer behaviors, can be captured as either stimulus or organisms. Building on these considerations, this study hypothesized the effects of overall attitude toward the metavers in both public and private sectors on prospects toward the metaverse.

Based on the consideration, this study hypothesized effects of attitude on prospects toward the metaverse.

H3a: Attitude toward the public sector has a significant impact on prospects toward the metaverse.

H3b: Attitude toward the private sector has a significant impact on prospects toward the metaverse.

4. Methodology

This study employed an online survey with the assistance of a reputable research institution. The questionnaire was structured with three main sections: demographic and warm up, and major questions. The major questions encompassed items related to proposed factors, including perceived citizen/customer relationship management, application of metaverse on cities/products, and attitude toward the metavers, and prospects of the metaverse. All major questionnaire items were rated using a 5-point Likert scale. This study employed stratified sampling, taking into account demographic factors. The survey was originally developed in English and then translated into Korean. Back translation will be applied to assess the reliability of the different language versions. The survey was collected anonymously and voluntarily with participants' agreement. The data will be stored confidentially and used solely for research purposes. The survey was distributed to citizens/customers, seeking their perceptions about the application of metaverse platforms in the public and private sectors. This study provided additional explanations in the survey, illustrating the application of the metaverse through examples such as Metaverse Seoul in the public sector and diverse brands like Gucci's Metaverse in the private sector. A total of 534 respondents participated in the survey. The inclusion of fashion brands such as Gucci and the trending concept of the metaverse has ignited discussions and shaped people's expectations regarding the future of metaverse (Chen et al., 2022). The survey was distributed and data were collected from seven major metropolitan cities in S. Korea (Table 1). This study utilized factor analysis, ANOVA, and multiple regression analysis to test main hypotheses. This study employed generation classification based on previous studies (Dimock, 2019; KPMG, 2017; Williams & Page, 2011) and the definition provided by Dries et al. (2008) that millennials are born from the early 1980 to the mid-1990, and Generation Z comprises individuals born after the mid-1990. Despite having similar characteristics, such as being digital natives, Table 1 summarized demographics of respondents.

Table 1: Demographics of Respondents

		#	%
Gender	Male	270	50.6
	Female	264	49.4
Age	20-24 years old	88	16.5
	25-29 years old	116	21.7
	30-34 years old	109	20.4
	35-39 years old	101	18.9
	40-44 years old	120	22.5
Education	Middle School	1	0.2
	High School	91	17.0
	In College	73	13.7
	Bachelor's Degree	336	62.9
	Graduate Degree	33	6.1
	Agriculture, Forestry, or Fisheries	2	0.4

		#	%
Job	Self-Employed	27	5.0
	Sales/Service	50	9.3
	Skilled Workers	16	3.1
	Blue-Collar	30	5.6
	White-Collar	206	38.5
	Professional	46	8.6
	Student	67	12.5
	Housewife	34	6.3
	Not-Employed	55	8.6
	Others	2	0.4
Residential Area	Seoul Metropolitan City	245	45.9
	Busan Metropolitan City	73	13.7
	Daegu Metropolitan City	52	9.7
	Incheon Metropolitan City	71	13.3
	Gwangju Metropolitan City	33	6.2
	Daejeon Metropolitan City	35	6.6
	Ulsan Metropolitan City	25	4.7
Annual Income	Below 2,000,000 KRW	68	12.7
	Between 2,000,000-5,000,000 KRW	152	28.4
	Between 5,000,000-10,000,000 KRW	41	7.6
	Between 10,000,000-20,000,000 KRW	12	2.2
	Between 20,000,000-50,000,000 KRW	90	16.9
	Between 50,000,000-100,000,000 KRW	89	16.7
	Between 100,000,000-200,000,000 KRW	10	1.9
	More than 200,000,000 KRW	5	0.9
	Other	68	12.8
	TOTAL	534	100

5. Data Analysis

5.1. Perceived Scope of the Metaverse

The majority of respondents indicated awareness of the metaverse. Among them, 57.4% reported having experienced the metaverse, while 42.5% stated that they lacked experience with it. Additionally, 23.3% of respondents mentioned being quite familiar with the metaverse, whereas 57.0% expressed general awareness. Smart et al. (2007) proposed a metaverse roadmap, classfying four scenarios – virtual worlds, mirror worlds, augmented reality, and lifelogging – emphasizing different functions, types, or sets of metaverse technologies. Smart et al. (2007) categorized these dimensions based on the following criteria: i) virtual worlds being more intimate than external and providing simulation rather than augmentation; ii) lifelogging being intimate rather than

external and providing augmentation rather than simulation; iii) mirror worlds being external rather than intimate and providing simulation rather than augmentation; and iv) augmented reality being external rather than intimate and providing augmentation rather than simulation. In this study, respondents were asked their frequency of using advanced technology-driven services in real life, categorized by the four scenarios proposed by Smart et al. (2007). Table 2 summarized the agreement level regarding the frequent usage of advanced technology-enabled services including virtual world, lifelogging, mirror worlds, and augmented reality.

Table 2. Usage of Advanced Technology-enabled Services

		Str. Dis	Dis	Ag	Str. Ag
1	Virtual World (e.g., Virtual fashion show, online game like Maple story, etc.).	10.0%	24.9%	23.3%	10.0%
2	Lifelogging (e.g., SNSs, i-Watch, etc.)	6.9%	17.4%	32.4%	14.7%
3	Mirror Worlds (e.g., Naver map, Kakao map, Google map, etc.)	0.5%	14.0%	32.4%	20.1%
4	Augmented Reality (e.g., Use of IKEA app for furniture selection Sephora Virtual Artist etc.)	14.0%	27.7%	17.9%	6.6%

* Str. Dis: Strongly Disagree; Dis: Disagree;
N: Neutral; Ag: Agree; St. Ag.: Strongly Agree

Regarding the application of the metaverse for the public sector by the Seoul metropolitan city. Among respondents, 5.2% of respondents indicated being very much familiar with it, 18.6% of respondents reported being quite familiar, and 25.0% stated being somewhat familiar. This study also inquired about respondents' awareness of the application of the metaverse for products and services provided by the private sector. Among respondents, 8.5% claimed to be very familiar with it, 34.7% indicated being quite familiar with it, and 34.3% indicated being somewhat familiar. Consequently, overall, customers are more aware of the application of the metaverse though products and services provided by the private sector compared to the public sector.

In the case of the private sector, 44.6% of respondents reported having experienced metaverse application for products and brands, while 55.4% indicated no such experience. Additionally, 60.5% of respondents expressed a preference for receiving information via metaverse application about the products that are relatively expensive and require a higher level of involvement, such as luxury products and brands. In contrast, 39.5% favored receiving information about relatively low-priced and lower-

involvement products, such as commodity items. When asked about preferences related to brand awareness in metaverse applications, 14.4% of respondents indicated a preference for strongly recognized brands, 39.0% for products with higher brand awareness, 30.3% were neutral, 10.8% preferred products with lower brand awareness, and 5.5% favored products with strongly lower brand awareness.

5.2. Hypotheses Testing

To ensure the reliability of the proposed variables, including citizen/customer relationship management by applying metaverse, application of metaverse, overall attitude toward the metaverse service and prospect toward the Metaverse, this study conducted Cronbach's alpha. The results of Cronbach alpha are as follows: 0.850 for management of metaverse for citizen relationship management, 0.863 for application of metaverse for cities, 0.883 for overall attitude toward the metaverse, and 0.908 for prospect in the case of public sector. Additionally, for the private sector, and 0.926 for customer relationship management by applying metaverse, Cronbach's alpha values were 0.847 for application of metaverse for products and brands, 0.896 for overall attitude toward the metaverse, and 0.872 for prospect. As depicted in Table 3~4, this study performed factor analysis to assess the validity of constructs. Scale items were extracted based on the constructs using factor analysis. Principal component analysis was employed as the extraction method with maximum interactions, and factors with eigenvalues greater than 1 are extracted. VARIMAX with Kaiser normalization was applied as the rotation method with maximum iterations for convergence.

Table 3: Component Matrix for Citizen Relationship Management, Application to Other Cities, & Attitude: Case of Public Sector

		Component		
		1	2	3
CRM1	I think that the government and businesses should put sustainable effort for better application of metaverse service for citizen relationship.	.94 .93		
CRM2	Government and businesses need to make efforts to increase application of the metaverse service for citizen relationship management.	.		
APP2	I think that the metaverse application to public service will help increase satisfaction of local residents in many cities.		.94	
APP1	I think that the metaverse service should be applied in other cities.		.93	
ATT1	I believe that use of metaverse helps build a positive image on city.			.87

		Component		
		1	2	3
ATT3	Overall, I have a better attitude toward cities, if I have a chance to use the applications of metaverse public service.			.85
ATT2	I think that the application of the metaverse for the city will help evaluate local society.			.82

*CRM: Citizen Relationship Management; APP: Application to Cities; ATT: Overall Attitude

Table 4: Component Matrix for Customer Relationship Management, Application to Other Products, & Attitude: Case of Public Sector

		Component		
		1	2	3
CRM3	The businesses should put sustainable effort for better application of metaverse service for customer relationship.	.94		
CRM1	The businesses should put an effort for better application of metaverse service for customer value creation.	.93		
CRM2	The businesses need to make active efforts to increase application of metaverse service for customer relationship management.	.91 .		
APP2	The metaverse application will help increase satisfaction with other products and brands.		.94	
APP1	I think that the metaverse service should be applied in other products and brands.		.93	
ATT3	I evaluate the brand better if I experience it with the metaverse applications.			.87
ATT1	I might have a better overall attitude on products/brands/service, if I experience the metaverse.			.85
ATT2	I believe that use of metaverse help build a positive image on products/brands/service.			.82

*CRM: Customer Relationship Management; APP: Application to Products and Brands; ATT: Overall Attitude

Table 5: Component Matrix for Prospect: Public vs. Private Sector

		Component	
		1	2
PRO5	Public service applied by the metaverse will provide positive impact on sustainability of local residents.	.89	
PRO2	Public service applied by the metaverse will help enhance development of society of residential area.	.88	
PRO3	Public service applied by the metaverse will help enhance positive impact on social interaction among residents.	.86	
PRO4	Public service applied by the metaverse will help contribute the technological development for the society.	.85	
PRO1	The application of the metavers in the public sector will grow continuously.	.79	
PRO2	Customer service applied by the advanced technology will help contribute to develop the metavese applications.		.90
PRO1	The application of the metavers in the private sector will grow continuously.		.89
PRO3	I think that the metaverse service shold apply to other products and brands continuously.		.87

*PRO: Prospects of Metaverse

Table 6~7 represent a summary of the results of multiple regression analysis. In the public sector, this study utilized management of metaverse for citizen relationship management, application of metaverse for cities, and overall attitude toward the metaverse service as independent variables. Conversely, in the private sector, management of metaverse for customer relationship management, application of metaverse for products and brands, and prospect toward the Metaverse were employed as independent variables, with prospect to the metaverse serving as the dependent variable. The results of ANOVA indicated that the overall model is significant, with $F = 837.850$ (significant at alpha 0.01) and R-square = 0.826 in the case of public sector, and significant with $F = 351.886$ (significant at alpha 0.01) and R-square = 0.769 in the case of private sector. This study found that in the public sector, the effect size of application of metaverse for cities on the prospect toward the Metaverse was higher, followed by overall attitude toward the metaverse service and management of metaverse for citizen relationship management. In contrast in the private sector, the effect size of management of metaverse for customer relationship management was higher, followed by overall attitude toward the metaverse service and application of metaverse for products and brands.

Table 6: Effects of Proposed Factors on Prospects to the Metaverse: Public Sector

Independent Variables => Dependent variable	Standardized Coefficient

	(t-value/sig)
Citizen Relationship Management by applying Metaverse => Prospect	.273 (8.530 ***)
Application of Metaverse for Cities => Prospect	.387 (10.436***)
Overall attitude toward the Metaverse Service => Prospect	.314 (9.317***)

*** p < 0.01 denotes statistical significance

Table 7: Effects of Proposed Factors on Prospects to the Metaverse: Private Sector

Independent Variables => Dependent variable	Standardized Coefficient (t-value/sig)
Customer Relationship Management by applying Metaverse => Prospect	.668 (17.204***)
Application of Metaverse for Products/Brands => Prospect	.119 (2.941***)
Overall attitude toward the Metaverse Service => Prospect	.130 (3.483***)

*** p < 0.01 denotes statistical significance

6. Conclusion

The purpose of this study is to explore factors that influence the prospect of the metaverse in both the public and private sectors from the perspectives of millennials and Generation Z. Specifically, this study aims to investigate the following aspects: i) how millennials and Generation Z frequently engage with different types of metaverse including virtual worlds, mirror worlds, augmented reality, and lifelogging (Smart et al., 2007); ii) how millennials' and Generation Z's perceived importance of citizen relationship management, application of metaverse to cities, and overall attitude affect their prospects toward the metaverse in the public sector; and iii) how millennials' and Generation Z's perceived importance of customer relationship management, application of metaverse to products/brands, and overall attitude affect their prospect toward the metaverse in the private sector.

Firstly, in terms of the usage of different types of metaverse, millennials and Generation Z strongly agreed with usage of mirror worlds such as Naver Map, KaKao Map, and Google map, followed by lifelogging, virtual worlds, and augmented reality. Overall, 48.3% of millennials' and Generation Z are familiar with the application of the metaverse in the public sector, while 77.5% are familiar with its application in the private sector. Consequently, these results suggest that there is a higher familiarity with the application of the metaverse in the private sector for products and brands compared to the public sector or cities. this indicates a potential need for increased application in the public sector to further the development of the metaverse, considering millennials and Generation Z's higher familiarity with its the application in the private sector. In the private sector, 44.6% of respondents reported having experienced metaverse

applications for products and brands, while 55.4% indicated no experience. This suggests that there is room for experiential marketing strategies in both the public and private sectors to enhance the application of the metaverse, particularly, among millennials and Generation Z. Furthermore, in the private sector, millennials and Generation Z express a preference for using metaverse applications with luxury products rather than commodity products and products that require a higher level of involvement rather than a lower level of involvement. Jiang et al. (2023) conducted research on the metaverse experience in luxury brand value, metaverse content, and experiential aspects, with consumer happiness associated with fantasies, feelings, and fun. Chen et al. (2022) explored the perspective that most luxury brands view the metaverse as a new opportunity to rebrand themselves to attract the young generation of customers from online communities. The findings of this study imply that the application of the metaverse plays a role in enhancing brand awareness and familiarity.

Furthermore, the results of this study indicate that the perceived importance of citizen relationship management, application of the metaverse to cities, and overall attitude significantly influences prospects toward the metaverse in the public sector. Conversely, in the private sector, the perceived importance of customer relationship management, application of the metaverse to products/brands, and overall attitude were found to significantly impact prospects toward the metaverse. Specifically, in the public sector, the effect size of the application of the metaverse to cities on prospect showed a higher impact, followed by overall attitude and the importance of citizen relationship management. On the other hand, the effect size of customer relationship management had a higher impact, followed by overall attitude and the application of the metaverse to products and brands. Barrera and Shah (2023) suggest the need for policy formation to address socially-driven issues, data privacy, inclusiveness, equity, and fairness, as the metaverse presents unique economic, social, and legal challenges. Weiss and Markowitz (2022) also highlighted the various risks associated with the metaverse, including concerns about security, privacy, governance, safety, and regulation.

The findings of this study offer valuable managerial and policy implications. In the public sector, the application of the metaverse can be bolstered by improving public services for citizen relationship management. Additionally, in the private sector, leveraging the metaverse for products and brands can contribute to increased awareness and familiarity, enhancing customer relationship management. Beyond the application of the metaverse in the Seoul Metropolitan City, extending its use to other cities can be beneficial. This expansion could involve diverse public services, such as sharing information for job creation, and

career counseling, addressing the specific needs and preferences of millennials and Generation Z in their daily lives. Taking Metaverse Seoul as an example, it offers a range of public services, emphasizing core values such as freedom, inclusion, and connection to create a hyper-realistic community space to enhance user experiences (source: https://seoul.go.kr). The metaverse application in Seoul encompasses elements like ecosystem development, customized open communication, cultural marketing strategy, virtual administration, and a complaints system (source: https://digital.seoul.go.kr), all of which play crucial role in citizen relationship management. In the private sector, the application of the Metaverse proves beneficial for establishing stronger relationships with customers through the provision of diverse services via virtual experiences. It is essential to formulate appropriate policies to ensure the successful integration of the metaverse into our society. These policies should address ethical considerations and prioritize the protection of security and privacy issues. From an academic standpoint, this study contributes by expanding the research landscape through the application of metaverse, particularly, in the context of enhancing citizen and customer relationship management.

While this study provides valuable insights, it is not without limitations. Future studies could benefit from an increased sample size to enhance the generalizability of the findings. Additionally, exploring and comparing perspectives and effects across different generations could be a fruitful avenue for further research. Future studies may delve into the analysis of metaverse applications in various cities and across different products, providing a more comprehensive understanding of these dynamics.

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Online Resources:

https://english.seoul.go.kr
https://digital.seoul.go.kr/eng2025/smart-seoul