

## A Study on Metaverse Usability in the Fashion Industry

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### Abstract

*Since the 21st century, the internet has been an essential existence due to the 4th industrial revolution and the development of IT technology, but the focus of the existing development direction has changed a lot over the past three years. COVID-19, also known as a pandemic, first occurred in 2020 escalating rapidly and cutting off society existing as an off-line form in every country. As non-face-to-face life continues, everyday technologies using online such as hybrid work have promptly developed, and an online virtual world called Metaverse excelled and became a phenomenal topic. In this study, theoretical considerations and the current status of the metaverse, which are being highlighted as global trend keywords, are examined, and the utility of the metaverse in the fashion industry was studied. Based on this study, it is expected that the work is recognized and brings helpful intuitions as a way to revitalize the shrinking fashion industry by using the metaverse, which is still in its infancy.*

**Keywords:** Metaverse, Augmented Reality(AR), Life Logging(LL), Mirror World(MW), Virtual Fashion(VR),. Proto Hologram

### 1. INTRODUCTION

Recently, the word ‘Metaverse’ has emerged as a keyword in the global trend. The gaining fame of the word is due to the distinction between the ‘real’ has become vague since virtual reality intervened deeply into human civilization and deformed the traditional understanding of what is ‘real’ due to the complete disconnection of face-to-face contact including schools, works, and social engagement for the past three years as COVID-19. In particular, the Internet has been essential since the 4th industrial revolution and the development of IT technology, but the focus of the existing development direction has changed entirely over the past three years. COVID-19, also known as a pandemic, first occurred in 2020 escalating rapidly and cutting off society existing as an off-line form in every country. For human beings whose social life is essential, the disconnection of the offline world had a great impact. As non-face-to-face life continues, daily technology using online, such as hybrid work, has developed and an online virtual world called Metaverse has spread and become a hot topic [1]. Because the consumption culture shrinks due to the non-contact lifestyle, it is being sought as a new marketing strategy in the ‘Metaverse’, a virtual space, in order to target the MZ generation (millennials + generation Z) who have grown into the main consumption class in the fashion industry. Fashion brands can provide fresh marketing channels, and the metaverse industry is also using fashion brands to broaden consumer contact points [2]. This study intends to examine the theoretical and global status of the metaverse, which has

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been highlighted as a global trend keyword, and to seek ways to utilize the metaverse in the fashion industry. Based on this, the study aims to be utilized as basic data in preparing a plan to revitalize the deflating fashion industry by actively utilizing the metaverse, which is still in its infancy.

## 2. THEORETICAL BACKGROUND ON METAVERSE

### 2.1 Concept of Metaverse

Metaverse is a portmanteau of “Meta” and “Universe” that also can be translated into above or beyond as a prefix with the Greek meaning virtual and transcendental as a suffix. It refers to a virtual world where the real and the unreal coexist. The concept of metaverse has not yet been precisely defined as various scholars and institutions characterize it individually. However, in general, the word ‘metaverse’ is used to define a virtual three-dimensional space where social and economic activities are possibly identical to the real world. Furthermore, the word is used as a more evolved and advanced concept compared to the existing definition of Augmented Reality (AR) and Virtual Reality (VR) [3]. The term metaverse was first used in the 1992 science fiction novel Snow Crash by Neal Stephenson. It refers to a three-dimensional (3D) virtual world that operates through an avatar representing oneself in the novel [4]. Also, the ‘Internet Business Association’ defined the metaverse as a “virtual space that interacts with me” where another ‘me’ can exist and live [5]. It is described as a global internet that provides social space, avatars, and a virtual economy as 3D computer graphics. Therefore, it could be stated by one that the metaverse has the characteristics of a fusion of a physically extended virtual reality and a physically permanent virtual space [6].

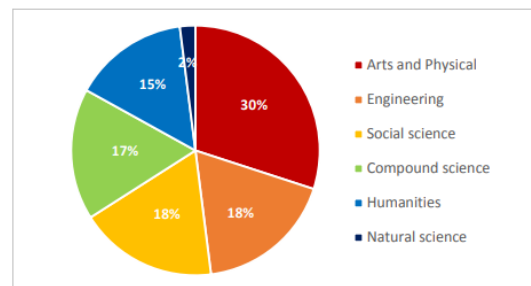
Although this metaverse is a virtual world for modern people, one might argue it to be another extended virtual digital world that interacts with the real world, and it is developing into a new paradigm that is thriving daily with the technology of the 4th industrial revolution.

### 2.2 Current Status of Metaverse Prior Research

In the early stages of domestic metaverse research before 2010, as shown in <Table 1>, 'Design and implementation of a 2.5D metaverse game engine using Java' and 'Metaverse development trends and development prospects' were mainly studied in technical features. The field of research has been gradually expanded to include practical aspects such as 'research on the types and development direction of the metaverse virtual world' and 'research on the destination-oriented narrative structure of the virtual world' [7].

**Table 1. Metaverse research in Korea**

| Year | Paper  |
|------|--|
| 2007 | 2.5D Metaverse Game Engine using Java [8]                                  |
|      | A study on R&D trends and prospects of Metaverse [9]                       |
| 2008 | A Study on Typology of Virtual World and its Development in Metaverse [10] |
|      | A Study On The Goal-Oriented Narrative Structure In The Virtual World [11] |
|      | Study on Self-Reference in Digital Media Arts [12]                         |
| 2010 | The Forecasting of Augmented Reality Service with Scenarios [13]           |
|      | A Study on Virtual Reality Remediation [14]                                |



**Figure 1. Proportion of metaverse research by academic field in Korea**

Since 2021, domestic metaverse research is being conducted in various academic fields, and it was found that metaverse is being studied in 6 major academic fields in KCI as shown in Figure 1.

The proportion of domestic metaverse research by academic field is: Arts and Physical Education (30%), Engineering (18%), Social Sciences (18%), Complex Studies (17%), Humanities (15%), Natural Sciences (2%) appeared in that order [15].

### 2.3 Metaverse Fashion Industry Status

Recently, global companies are competing to lead the metaverse industry. Mark Zuckerberg changed his company name from Facebook to Meta, focusing on the metaverse, and introduced Horizon World, an avatar-based virtual world [16]. Microsoft developed a mesh platform that provides 3D conference and cloud services, and recently acquired Activision Blizzard, a game developer, accelerating the competition for dominance in the metaverse [17]. Nvidia, a hardware company, is trying to expand into a metaverse company by developing Omniverse, which enables real-time collaboration and simulation, and ‘Toy Me,’ an artificial intelligence-based avatar [18]. In Korea, R&D on Metaverse is being conducted mainly by companies. Naver is servicing Zepeto, a virtual reality-based metaverse, and is in the process of upgrading it to a metaverse closer to reality [19]. Metaverse combines the virtual world with reality to break down the boundaries of time and space, enabling cultural experiences and activities in virtual reality as it is in the real world that was highly restricted only in gaming to further the use of metaverse in the cultural industry to cultural contents, performances, and exhibitions [20].

## 3. METAVERS TYPES AND USE CASES

In 2007, the Acceleration Studies Foundation (ASF), the American foundation for acceleration Studies that studied metaverse with an academic approach, proposed and explained two key axes in the report of a project called ‘MetaVerse Roadmap (MVR)’. The study was a form of a prediction about the future that is divided into intimate factors, external factors, augmentation, and simulation [21].

However, the metaverse types do not appear to be separated from each other, but rather show the characteristics of being connected and complementary to each other. As shown in Figure 2(a, b, c, d) the metaverse types are roughly divided into four areas: Augmented Reality, Life Logging, Mirror world, and Virtual World.

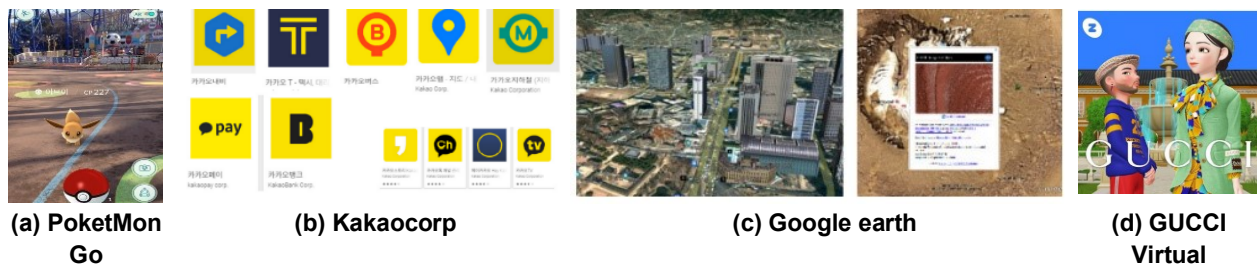


Figure 2. Metavers types

### 3.1 Augmented Reality

The ‘‘Augmented Reality’’ metaverse appeared in games before the metaverse became a full-fledged interest, and ‘PokemonGo’, which was used worldwide, can be cited as an example [22]. ‘PokeMonGo’ is a mobile game in which users use virtual maps and location information to find and catch monsters whilst moving, creating a Pokemon Encyclopedia. Users can catch various monsters in a virtual/augmented reality environment while moving and improve their abilities during item securing < Figure 2(a)>.

### 3.2 Life Logging

“Life logging” is a type of augmentation of the inner world and projects one’s life into a virtual space. In other words, it is a technology that stores and describes the information that has been experienced every day about people and objects. Technologies that process, share, and trade everyday information that occurs in real life and stores the information online through wearable devices such as the ‘Apple Watch’ and ‘Samsung Watch’ are good examples. As it can be observed from examples in Life Logging, if you log into Kakao, a personal ID and personal data can recommend private optimization data and share information with Kakao Taxi, Maps, etc. [23] < Figure 2(b)>.

### 3.3 Mirror World

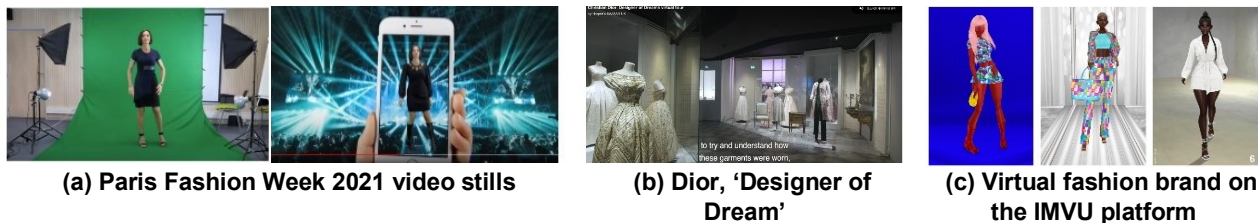
“Mirror World” is a world that easily processes substantial information by adding efficiency and scalability to the real world. It simulates the external world, meaning ‘information-enhanced virtual models’ or ‘reflections of the real world’. For example, Google launched Google Earth, a three-dimensional map as shown in <Figure 2(c)> with real spaces of cities around the world that are constructed in 3D based artificial satellites and aerial photos. Furthermore, various contents such as videos and photos are connected to enable guidance and virtual experiences of major cities in the world [24]. This can be said that it is a metaverse that transfers the appearance and information of the real world to the virtual world as if reflected in a mirror. Recently, it is accelerating the construction of a global mirror world by providing a 360-street view and a view of Mars.

### 3.4 Virtual World

The “Virtual World” is a virtual space constructed similar to the economic and social environment of the real world. It is an environment where various individuals and entities can engage in activities such as education, shopping, and work. The virtual world is a type of simulation of the inner world, which allows various activities. The virtual world applies virtual reality technology, including sophisticated 3D graphics, avatars, and instant communication tools, so that one can explore and act on his/her own in the virtual world and communicate with other users. It is a computer simulation environment that allows numerous users to access it [25]. Italian luxury fashion brand Gucci (GUCCI) launched the 'Virtual Collection' < Figure 2(d)>., which implemented some of the new S/S products in 2021, and officially launched a total of 60 products including clothes, handbags, and accessories on Korea's representative metaverse service, Zepeto [26].

## 4. METAVERS USE AND PROSPECTS IN THE FASHION INDUSTRY

### 4.1 Metaverse Utilization in the Fashion Industry



**Figure 3. Metaverse fashion**

From 2020, prestigious fashion shows such as London, Paris, and Milan Fashion Weeks are also introducing

a “virtual fashion show” <Figure 3(a)>. In addition, as individual brands participate in the virtual fashion show project, the ‘virtual fashion show’ is considered a big trend. 'Dior' presented “Designer of Dream” <Figure 3(b)>, a documentary about the work sites of designers planning virtual fashion shows, and 'Paloma Wool', a women's brand in their teens and twenties, selects ordinary customers of the target age group and places them in a virtual environment. The runway plan was well-received by the public [27].

IMVU in the US is a fashion metaverse platform where 50 million items created by over 200,000 creators are traded. In IMVU, all terms and conditions are determined according to the supply-demand of sellers and buyers without any external intervention. Even with the same design, there are frequent cases where the price is formed differently depending on the buyer. The popularity of IMVU has grown more popular, with a growth rate of 44% in 2020 alone and 7 million monthly active users. As of the end of April 2021, IMVU has established itself as a representative fashion metaverse platform, with more than 27 million monthly transactions and an average monthly transaction value of \$14 billion (about 17 trillion Korean Won) [28] <Figure 3(c)>.

In addition, in collaboration with I.T, a luxury fashion retailer based in Hong Kong, pop-up boutiques selling I.T virtual costumes were established in Hong Kong, Beijing, Shanghai, and Paris. At the I.T virtual costume pop-up store, customers can run the interactive player and view digital virtual clothing and shoes created by The Fabricant from various angles through a web browser, a smartphone equipped with an AR player, and a VR headset. Product orders were made through the app [29].

## **4.2 Market Prospects of Metaverse**

Although the digital design has yet to yield significant returns compared to traditional clothing, the fashion industry sees the metaverse as a potentially lucrative new market. Morgan Stanley estimates that the digital fashion industry will be worth \$50 billion by 2030, while CrunchBase Insights estimates it to be over \$3 trillion. Going forward, the market's attention will focus on how the Metaverse will change the way consumers dress, shop, and embrace fashion. The consumer of the future may be roaming a virtual city in a winged dress. You might start your day by browsing your digital wardrobe. The latter is still somewhat feasible today, thanks to the numerous applications that can record and store clothing. This is because advances in technology have made it possible to try on virtual clothing or accessories before purchasing them. The metaverse can bring about a total change in the fashion system. Attempts to circumvent major brands and centers are likely to emerge. Fashion makers don't have to be in New York or Paris to build a metaverse brand. This is because digital fashion production is possible simply with a computer and design software (SW) [30].

As interest in 3D fashion increases, Korea's status as an IT powerhouse is changing worldwide. Accordingly ‘Proto Hologram’ has recently been attracting attention as a metaverse program developed in Korea. This program is content that is implemented by integrating advanced shooting, communication, and algorithm technology. The program outputs to various audio channels including dedicated monitors and Bluetooth earphones. By transmitting and exchanging the output data through wired and wireless communication networks such as Ethernet, Wi-Fi or live interaction with others who are thousands of kilometers away is possible in real-time, Nine Communication explains. In addition, the completed hologram can be expressed in the same form as a 3D animation character, or it can be implemented as a virtual influencer or digital human, so it has a higher degree of completeness and reproduction than VR (virtual reality) and AR (augmented reality) [31]. Through direct experience at the ‘5G Proto Hologram’ site during the ‘Seoul Fashion Week’ event, the researcher was able to feel the metaverse scene through virtual experience as well as enjoyment to users as ‘virtual’ reality and ‘actual’ reality coexist <Figure 4>.



**Figure 4. 5G Proto Hologram**

However, despite the optimistic outlook for metaverse fashion, consumers' actual fashion demand will not disappear abruptly. Not everyone is crazy about dressing up in an avatar or buying a jacket that doesn't exist. People still need clothes to wear for work, to go out, and be physically active. Nevertheless, it is reasonable to view the metaverse as supporting the great potential of the fashion industry.

## 5. CONCLUSION

The conclusion of this study is as follows.

First, the convergence with the metaverse in the fashion industry is a new way to elicit customer interest and communication through virtual fashion and it will be able to develop products and services from various aspects.

Second, the differentiation of brand examples to secure the competitiveness of products and contents is varied and developed as the realm of virtual fashion is further diversified and subdivided.

Third, it cannot be said that only using the metaverse is the final goal for responding to future strategies, but establishing a channel strategy suitable for each company and brand will be a way to survive.

Lastly, the convergence of various hybrid digital fashions with the sustainable fashion process of the fashion industry is considered to be the turning point in the idea that can revitalize the fashion industry.

As this study is a case study, there is a limitation of this study in that it did not interview the person in charge of the company or the consumer in the case analysis. Therefore, as a follow-up study, data analysis and virtual fashion research on more practical metaverse fashion through consumer interviews will be in process. It is hoped that this study will be helpful in understanding metaverse fashion, and it is expected that design development and research on metaverse fashion will be more active in the future.

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