

# Metaverse in fashion industry development: applications and challenges

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**Abstract.** This article studies the peculiarities of using metaverse in fashion industry. Given the technical limitations, the metaverse is being considered as a marketing tool in this industry. There are several key areas for fashion brands in virtual worlds: branding, goods, virtual fashion, and digital skins, distribution channels and logistics, interaction with consumers, and customer information. Fashion companies using the metaverse are aiming to promote their products and connect with consumers by creating and/or expanding product concepts in a virtual world, building brand trust and attracting new customer groups. Increased costs of customer acquisition through paid digital marketing increase brand interest in the metaverse as an alternative channel. Benefits of the metaverse for the fashion industry include limitless online format for product and brand concept development, reaching new customer groups, a new level of multi-channel approach companies are developing, expanding the space for testing new products, developing customer experience, holding their attention, etc. In spite of metaverse's advantages for the fashion industry, at the moment it doesn't have a mass application in the sphere of fashion brands, there are only a limited number of active clients in virtual worlds. The article marked some problems of the development of the technology in the industry. The results of the research let us conclude that the metaverse is perspective for the fashion industry development, and it is necessary to solve the mentioned problems, as well as to work out concrete mechanisms on the legislative level and on the level of company strategy, which minimise the risks of fashion brands' presence in metaverse and maximally will satisfy the consumers' desire in virtual reality.

## 1 Introduction

The digitalisation of various areas and spheres of the economy [1] contributes to significant changes in the fashion industry. The Covid-19 pandemic has further reinforced the key role of digital technology in the industry [2-5], increasing the digital interaction of fashion shoppers with brands online: 72% of shoppers in 2021 interacted with brands online. Of the shoppers who switched from offline channels to online shopping in 2021, 48% stated that they did so due to the Covid-19 pandemic, 27% cited convenience, 11% cited product availability and another 11% cited promotions [2, 6]. McKinsey predicts that fashion brands

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will increase their investment in technology from 1.6-1.8% of their revenue in 2021 to 3-3.5% by 2030 [7].

The most promising innovations for the development of the fashion industry include metaverse, which includes a number of technologies - expanded reality (XR) (avatars, virtual (VR) and augmented reality (AR)), blockchain, non-interoperable tokens (NFT), game "skins", etc. Growing interest in the metaverse determines the relevance of studying the characteristics of digital substitutes and digital fashion [8]. Thus, it is pointed out that the importance of the meta universe is growing in all areas of retail, but at the same time, very little is known about it from a customer, retailer, or brand perspective. There are therefore several dimensions of the metaverse: online collaboration, high immersive consumers, unique digital assets and digital identities [9].

The metaverse is an extension of the online presence of fashion brands, which began with mobile devices, online sales, and social media. A number of authors emphasise the various benefits of the metaverse.

- Customer interaction with a fashion brand in a unique immersive environment that tells the brand's story and differentiates it from its competitors. The virtual environment, taking advantage of the limitless possibilities and advantages of the online format, maintains the brand look and makes it accessible to more consumers;
- The metaverse is a promising marketing platform for presenting brands in an interactive 3D digital space where users come together through avatars that look like them [10];
- allows customers to interact with an immersive retail experience by seamlessly navigating between virtual and physical environments, fostering a multi-channel approach for companies [11];
- unlike conventional websites and mobile apps, detailed, interactive 3D spaces encourage shoppers to linger longer when shopping in an immersive environment [12]. Consumer evaluation of products in a metaverse is more profitable for companies than in 2D environments;
- companies have almost limitless options for designing virtual retail environments, thereby enhancing the consumer experience;
- testing digital designs on avatars in virtual worlds before investing in production for physical shop sales; and developing the ability to co-create products with consumers, thus increasing the level of personalisation of brands [13, 14].

In spite of the fact that the meta universe has obvious advantages for the development of companies in the fashion industry, there are also some problems, including data security issues, privacy of consumers, the negative impact of technology on the mental and physical health of consumers [15]. Among other problems of fashion brands development in the meta-virtual reality are the high cost of equipment and technologies of virtual reality for end users, the security of intellectual property rights in the virtual world, and potential competition between brands for consumers' attention.

The first part of the paper investigates the possibilities and directions of metaverse development in the fashion industry, and considers the problems associated with its use in the activities of fashion brands. The second part of the paper presents key conclusions and results, as well as directions for further scientific research on the selected topic.

## **2 Applications and challenges for the fashion industry companies in the metaverse**

Bloomberg Intelligence estimates that by 2024, the metaverse market will reach \$800 billion, forcing fashion retailers to look for ways to effectively adapt their strategies to compete in

the 'virtual' future of the metaverse [16]. By 2030, metaverses could reach 5 billion permanent users, with commercial opportunities estimated at around \$13 trillion US.

For companies in the fashion industry, the potential of the metaverse relates to the creation and customisation of virtual retail spaces, attracting new consumer groups. In the metaverse, they can adapt the virtual world to emphasise their brand vision, engage consumers in the retail environment and break down the boundaries between the physical and online spaces. A strong sense of realism and immersion allows companies to draw customers into a positive and personal online experience that keeps users coming back to the virtual world. For example, luxury brands are creating a stronger online and digital footprint by developing a metaverse as they seek to engage with younger consumers.

According to McKinsey's research, the metaverse is seen in the fashion industry as a marketing tool. A fully formed metaverse, including an interconnected virtual ecosystem that intersects or offers an alternative to physical reality, is not yet possible due to technological limitations [7].

Current developments of fashion brands in existing virtual worlds (virtual fashion, games, NFT, digital skins, etc.) such as The Sandbox, Decentraland, Roblox, etc. suggest several key areas of company development in the metaworld (Table 1) [7, 17]. As follows from the data presented in Table 1, the activities of fashion brands in the metaverse boil down mainly to various marketing activities.

Companies' interest in the metaverse as a marketing tool is growing against the background of stricter privacy rules and technological changes, as well as the rising cost of paid digital marketing.

**Table 1.** Key areas of fashion brand development in the metaverse.

N	Development sector	Features
1	Branding	Expanding real-world positioning, moving a brand into a new virtual environment that allows for a new appreciation of its benefits, interacting with potential and current customers, engaging consumers by providing virtual products, building brand equity through gamification, creating synergies between the virtual and real worlds.
2	Product	NFTs enable the acquisition, possession and trading of unique virtual artefacts that are identified using blockchain technology. NFTs expand brands' product portfolios with virtual offerings and increase interaction between the virtual and real worlds. NFTs as digital twins that store information about the history, authenticity and ownership of a physical or digital product, which is especially important for the luxury segment in the fight against counterfeits. NFTs as "loyalty tokens" offering additional benefits to consumers, such as access to new NFT releases and physical products.
3	Virtual fashion and digital skins	Generating sustainable revenues in the short term by changing the appearance of avatars in gaming and online platforms. In many countries (US, China), more than 70% of consumers show a high demand for creating and adapting online identities, acquiring virtual assets.
4	Distribution channels and logistics	Breaking down the boundaries between the physical and virtual worlds through NFT
5	Interaction with consumers	Interaction with artificial intelligence designed for learning through repeat customer interactions. Personalised customer interactions through virtual 3D agents of artificial intelligence in VR or a hologram in AR.
6	Customer information	Data availability - in terms of quality and quantity - on consumers. Extensive opportunities for experimentation in order to obtain information on consumer reactions to new product concepts or ideas.

Source: *The State of Fashion Technology 2022, McKinsey & Co. 2022. Dwivedi Y.K. et al. (2022).*

In 2022, for example, brands spent more than three times as much per customer on popular social platforms as they did in 2013: respectively, \$29 in 2022 compared to \$9 in 2013. [18]. The metaverse is seen as an alternative marketing channel. As of August 2022, the online gaming platform Roblox has attracted almost 60 million active users per day, an increase of 24% over the previous year. Leading fashion brands, such as Vans, are launching virtual worlds on the platform. Several brands have experimented with NFT collections such as NFT Adidas' 'Into the Metaverse' and NFT Prada's 'Timecapsule'. Companies are also implementing projects in the metaverse aimed at extending metaverse users' offers of added value or utility, such as rewards in the form of exclusive access to limited-edition collections or experiences, which in turn creates a stronger brand affinity [19].

Recognising the benefits of a metaverse for brand development, companies in the fashion industry are now actively investing in virtual worlds, creating and developing them. For example, luxury brands are inviting shoppers to explore and play in innovative virtual spaces. For the fashion brands themselves, the metaworld can be profitable. For example, Gucci promoted a virtual handbag on the popular and well-established Roblox gaming platform and sold it for US\$4,100, well above its physical price [20]. Other fashion brands - Louis Vuitton, Dior - also go along the way of developing their own virtual games, virtual shops, etc., thus expanding their presence in the meta universe.

In 2021, global spending on virtual goods by the fashion industry reached around US\$110 billion, more than doubling the total in 2015. In the first few months of 2022, investment in the metaverse more than doubled compared to 2021 (\$57 billion), exceeding US\$120 billion. [21]. By 2024, spending is expected to be at least \$135 billion. Innovative fashion brands could get as much as 5% of their income from the metaverse over the next five years. Virtual skins in digital worlds will be a big driver of this revenue stream, while NFT can help address industry pain points (e.g. authentication of goods) and increase customer loyalty.

In March 2022, one month after Real World Fashion Weeks, Decentraland held its first Fashion Week (MFW): a four-day digital fashion week with virtual shows, talks, events and collections available for purchase directly from the runway or pop-up galleries. Dolce & Gabbana, Etro, Tommy Hilfiger, Philippe Plein and Estée Lauder are just some of the 60 brands attending MFW, proof that more and more luxury and premium brands are seeing the potential of this virtual dimension and that it can become as important as the physical.

The fashion industry's increased focus on metaverse technologies (NFT, blockchain, Web 3, etc.) is due to the fact that they are exclusive and scarce in addition to their functional characteristics, thus matching the nature of fashion brands. Blockchain provides a more secure and transparent record of transactions, which reduces the risk of fraud and provides greater visibility and sub-accountability in the premium buying process. Balmain announced in 2022 the creation of the Non-Fungible Thread, a fashion ecosystem supported by NFT, catering to Balmain clothing owners [22].

Some pioneering fashion companies are collaborating with video game developers to retail in a metaverse world. For example, fashion brand Uniqlo worked with Minecraft developer Mojang Studios to create a line of Minecraft-themed T-shirts, which they then also made available in Minecraft digital shops and physical Uniqlo shops [23]. Gucci collaborated with Zepeto, a social network and avatar modelling app, to create paid digital skins [24].

There is a growing interest among fashion brands in mergers and acquisitions to expand opportunities to enter the world of the metaverse. These focus on brands exposed to the younger generation [25]. Nike has acquired RTFKT, which offers cutting-edge innovations to create next-generation collectibles that integrate culture and gaming, NFT, blockchain authentication and augmented reality, as it seeks to expand the metaverse [26].

Despite the fact that the concept of metaverse is being actively implemented in the development strategies of fashion brands, there are also some challenges to the mass adoption of this technology in the industry.

Firstly, for fashion brands, especially premium and luxury brands, consumers who have come to them through regular interaction with video games will be an unfamiliar or even non-target audience for them.

Secondly, as more and more brands adopt the metaverse in their strategies, there will be more competition between them to attract and retain new consumers.

Thirdly, the cost of VR equipment (glasses, tactile gloves, headsets) and the level of telecommunication networks development (5G, speed of connection) will have a significant impact on the metaverse development. A survey in 2022 showed that half of US consumers are not ready to use the metaverse because of expensive VR technology [27]. In addition, XR technologies are at a relatively early stage of development, and often glitchy or cumbersome applications have a negative impact on the user experience.

Another problem is that the concept of digital assets and associated intellectual property rights is not fully understood in the metaverse [17]. For example, brand, design, use of avatars to represent and/or act on behalf of people as their digital twin in the metaverse environment and hence related human rights, legal and ethical issues. In addition, brands, especially in the luxury sector, need to be aware of the sale of 'cheap' digital goods that can weaken the exclusivity of their brand image.

The lack of physical interaction can also hinder the mass adoption of metaverses in the fashion industry. This problem is already being pointed out by 78 % of customers who are present in virtual worlds.

Another concern is ensuring the security and privacy of personal data in virtual worlds. Personal information and content stored on a metaverse platform can be stolen. For example, avatar information such as voice and video recordings can be hacked while the user is using the platform, or an intruder can tamper with the avatar and abuse it. The metaworld also has the potential to accumulate more sensitive information than traditional systems, which can significantly compromise user privacy: headsets with live microphones can record all conversations; HMDs with always-on cameras can record video in private spaces; eye-tracking technology can record what a user looks at [28]. Security breaches in the metaverse involve not only personal data, but also financial assets, including crypto-assets [29].

### 3 Results

As technology advances, virtual environments become more compatible and socially accepted, the metaverse will increase the revenue opportunities for fashion companies. At the moment, only a few fashion brands are using this tool to promote and communicate with a still limited number of active consumers. Technology players, as well as start-ups and fashion brands, need to develop technologies that can help transform today's raw virtual experience into a mature, immersive reality [7].

The future development of the fashion metaverse clearly depends on a number of factors and conditions:

- increasing the number of active customers, including through public recognition of the virtual world as an important part of human life;
- solving the problems of metaverse development with regard to the risks of fashion brands' presence in the virtual environment;
- Increasing cooperation between fashion brands and gaming and technology start-ups, as well as mergers and acquisitions - where a fashion brand acquires a technology start-up or company that has some kind of advantage in the virtual environment;
- More active targeting of companies' strategies towards the younger generation, including Z and millennials;
- Identifying the competencies that fashion brands need to develop or acquire in the metaverse;

- Developing companies' own ability to attract people with technology-related skills, along with a deep understanding of the metaverse and its communities. For example, Balenciaga created a metaverse business unit, which is actively engaged in marketing and commerce of the metaverse [30].

These factors require the development of specific mechanisms, both at the legislative level (intellectual property rights protection, security and data privacy, etc.) and at the level of companies (metaverse strategies) that would minimize the risks of fashion brands' presence in the metaverse, and maximize consumer satisfaction with effective applications and available technologies. Because of the close relationship between fashion brands and consumers' self-expression, status and creativity, the fashion industry is well placed to benefit from interaction with virtual worlds.

## 4 Conclusion

The study has shown that the metaverse is currently a promising direction for the development of fashion brands in the virtual world. Considering its technical capabilities and limited number of active users, the metaverse at this stage appears to be a marketing and communication tool for fashion companies with specific groups of consumers (mainly the younger generation who are into online games). Companies also show a growing interest in the metaverse as the efficiency and costs of targeting consumers through digital marketing technologies diminish. We are talking about the rising cost of engaging customers through social networks.

Fashion brands are using the metaverse as a marketing tool to achieve greater cost-effectiveness in marketing spend and to collect personal and unique data about their target group, which can be used to deepen customer relationships and develop personalisation. Among the key areas of fashion brand development in the metaverse are branding, merchandising (NFT, digital assets), virtual fashion and digital skins, distribution channels and logistics, customer interaction and customer intelligence.

Despite the promise of the metaverse for the fashion industry, there are risks and problems that prevent it from being used on a mass scale. Problems concern different aspects, such as the protection of intellectual property, the risk of reducing the brand image by selling cheap fakes, the security and confidentiality of personal data in a virtual world, etc. There are significant risks of technical failures, consumers are also stopped by the high cost of technology and the cumbersomeness of virtual reality applications. Existing problems allow us to determine that the usefulness of the metaverse for the end consumers of the fashion industry should be natural. Not only in the physical world, but also in the virtual world, fashion brands need to stand out (have a distinct competitive advantage) and broadcast to consumers the reason why they want to associate with them. It is important to maintain the uniqueness and identity of the brand within the metaverse.

Growing economic uncertainty in developed and developing countries, as well as the competition of fashion brands for consumers' attention and attraction, increases the importance of metaverse strategies. The latter provides a unique opportunity to enrich the existing fashion companies' relationships with customers and to attract new ones (above all from the younger generations - millennials, Generation Z). Various forms of cooperation with gaming and technology start-ups as well as mergers and acquisitions in this area look promising. Regardless of the path chosen for entering the virtual world, companies should clearly define their competencies and the expected benefits of their presence in the metaverse.

The conducted research doesn't pretend to fully explore all issues and areas of fashion brands development in the meta universe, which is due to relative novelty and lack of study of some aspects of this topic. The vector for further research seems to be in the direction of specifying the rent-benefit areas of development and systematization of new opportunities

for marketing fashion brands in the metaverse, as well as assessing the potential consequences of business transformation in virtual world.

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