

# A Sustainable Fashion Industry Business Model Revolution Based on the Metaverse: Practices and Reciprocal Processes

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**Abstract.** The technological breakthrough of the metaverse makes it accessible as an online social environment where customers can socialize and reside in the form of avatars, as well as able to possess virtual property in the same manner they own physical property. The incorporation of the fashion industry into the metaverse can contribute to the development of its sustainability by revolutionizing the design, production, and communication stages of the supply chain, enabling circular economy business models, and minimizing environmental damage while satisfying customer needs. Through a review of relevant theoretical literature and an analysis of practices, this paper intends to illustrate a mechanism, describe how digital fashion based on the metaverse benefits industry sustainability, consumers, and the environment, and serve as a reference for practitioners seeking to advance their business strategies.

**Keywords:** Metaverse; Fashion industry; Sustainability; Circular economy; Digital business strategy.

## 1. Introduction and background

Sustainability and the circular economy are gaining the interest of academics, business leaders, and governments. Sustainability refers to the equilibrium and systematic integration of economic, social, and environmental performance within and between generations, as well as adaptability to different environments and reflective, with the intention of benefiting the environment, the economy, and society as a whole. On the other hand, modern understanding of the circular economy and its practical implementation in industrial processes prefer to realize the concept of a shared closed loop, reducing waste and emissions through a circular manufacturing-use-disposal rather than linear system, with the primary beneficiaries being the economic actors implementing the system. Given that a circular economy is a prerequisite for sustainable development[1], this research will follow this theoretical logic and investigate circular economy practices with an eye toward the sustainable growth of the sector.

The fashion business is regarded as the archetypal symbol of consumerism since it promotes and supports material desire[2]. In recent years, the fashion industry, including luxury and fast fashion companies, have reached an agreement on resource use, namely that the fashion industry is in a state of sustainability crisis[3-5] Faced with such challenges, adopting the paradigm of the fourth industrial revolution, embracing web 3.0, and executing a digital transformation of business models has become a driving force for many fashion businesses [6]. The metaverse is projected to aid in the revitalization of the fashion business as part of these efforts to transform the fashion industry towards a dematerialized, non-traditional economic and virtual reality dimension. There are two perspectives on the reasons. First, with technological support, the metaverse better serves the rapidly expanding consciousness and self-expression of consumers of the Z generation. In addition, the metaverse assists the fashion industry in establishing new channels of presentation, production processes, and forms of commerce, which benefits both economic stakeholders and community members.

Through a review of the relevant theoretical literature and practices already made in the fashion industry, as well as an illustration of the reciprocal mechanisms that drive stakeholder, consumer, and environmental friendliness, this paper seeks to explore how the metaverse can empower the fashion industry's circular economy business model in the context of sustainability issues. This study may

provide insights for enterprises in the fashion industry as it continues to explore the potential of digital transformation and makes modifications to their business strategy.

## 2. Literature review

In recent years, with the advent of web 3.0, fashion industry practitioners and marketing scholars have focused their attention on the digital world, primarily on three levels: communication and marketing, design and production, and culture and society [7-11]. Several scholars have focused on the factors that drive and influence Gen Z consumers' social media interactions on purchase behaviour [12, 13], arguing Gen Z, particularly females, are more susceptible to being positively influenced by opinion leaders and peers, these social interactions in the digital world promote the desire to buy. In the design and production phase, research studies such as Larsson [14] and Huynh [15] demonstrate that virtual fashion can reduce waste in the textile value chain, thereby minimizing energy consumption and supporting sustainable business models, and that digital innovation of pull-demand-driven business models in blockchain-based supply chain models can transform the entire process of fashion product forecasting, production, presentation, and use. Some studies have examined the implications and value for brands of developing technologies and related products such as blockchain technology, especially Non-Fungible Tokens (NFTs), while others have analyzed the compatibility with customer groups. At the brand level, NFTs are depicted as being indicative of brand components, sparking higher perceived ownership of particular brands characteristics by consumers and building a highly engaged brand community through connecting customers [16]. At the consumer level, research suggests that consumer groups must have a level of financial literacy, awareness, and appreciation of the value of NFTs, with Generation Z consumers, who are more familiar with the new technology, being a viable category [17, 18]. In addition, on a cultural and social level, researchers have examined the meaning and desire of consumers to experience virtual reality, including personal expression, the search for democratization, escapism, and reality anxiety, as well as how the fashion industry can fulfil daydreams and consumer desires in the digital world [19]. These studies note trends in the fashion industry's advancement in digital production practices concerning industry sustainability and consumer demand awareness. Still, there is no complete mechanism for how the fashion industry's entry into the digital marketplace can benefit its sustainability and meet consumer demand while reducing environmental damage, a gap that this study will fill.

## 3. Metaverse technological innovation support and fashion industry practices

After identifying keywords and systematically reviewing 116 relevant literature, Baek et al [20] define digital fashion as "the virtual creation, production, and representation of a person's identity through computer-generated design," which naturally points to the metaverse as the site of practice. The concept of the metaverse dates back to Neal Stephenson's 1992 novel *Snow Crash*, which was described at the time and for a long time after as virtual reality (VR) space that uses the internet to augment reality (AR) through avatars and software agents [21]. As forerunners to the metaverse, several immersive and interactive multimedia style online games and 3D interactive platforms, such as *Second Life* and *Roblox*, *Fortnite*, launched after 2003, allowed users to experience social interaction in virtual worlds using VR headsets and avatars, but were limited by the need for PC-based access and a primary focus on VR/AR technology, subject to device, platform. The metaverse enables more immersive environments and natural motion by leveraging the rapid development of deep learning for improved visual and speech recognition accuracy, as well as multimodal models as an E2E (end-to-end) solution to reduce processing time and complexity. Simultaneously, the metaverse has a scalable environment that can accommodate multiple people through hardware improvements, accompanied by program coding that can be done in the metaverse world, and with cryptocurrency as an economic bridge between the metaverse and the real world, the metaverse expands on immersive interaction with various social implications (e.g. fashion, events, games,

education, and office) that can take on long-term content and deeper socially [22]. With these technological dimensions in place, Mark Zuckerberg describes an integrated, immersive ecosystem in which the user perceives no distinction between the virtual and real worlds, allowing the use of avatars and holograms to work, interact, and socialize through simulated shared experiences[23]. The business press is described as enthusiastically welcoming the metaverse, and professional analytical journals are urging marketing scholars to focus on aspects such as the impact on shopping and service scenarios, advertising research, and consumer studies [24].

**Table 1.** Fashion industry practices in metaverse

Practice Method	Practice Content	Group or Brand	Date
Investing in Blockchain	Investment in blockchain company "Aura"	LVMH, Richemont, Prada	2022.04.20
Collaboration with game companies to launch virtual goods, virtual characters, and virtual stores	Gucci collaborated with Snapchat to release an online try-on filter; Louis Vuitton launched a metaverse episodic handheld game "Louis the Game"; Balenciaga collaborated with Fortnite to design virtual clothing and game props, open a virtual store, and independently launch the game "Afterworld: The Age of Tomorrow" to showcase the 2021 fall collection; Burberry launched a unicorn character named Minny B in the game "Blankos Block Party"	Kering Group brands Gucci, Balenciaga; LVMH Group brands Louis Vuitton; Burberry Group	2020-2022
Launch of NFT Digital Collection	Gucci collaborates with Superplastic for a digital collection; Louis Vuitton launches NFTs with artist Beeple for the "Louis 200" celebration; Burberry launches limited edition NFTs for the game Blankos Block Party; Dolce & Gabbana Group Launched "The Doge Crown" NFT collection	Kering Group brands Gucci; LVMH Group brands Louis Vuitton; Burberry Group; Dolce & Gabbana Group	2021-2022
On-line virtual interactive platform or digital services based on metaverse technology	Gucci buys virtual land from The Sandbox; Gucci APP launches Sneaker Garage feature to support users in creating digital products; Gucci launches Gucci Town virtual interactive center	Kering Group Brands Gucci	2020-2022
Launch of virtual ambassadors	Metaverse Virtual Ambassador	LVMH Group	2022.03
Metaverse Fashion Week	The first metaverse Fashion Week	60 groups or brands	2022.03
New Digital Fashion Brand	Virtual fashion ready-to-wear; multi-platform collaboration to buy and wear	The Fabricant, DressX, Pheagee of Tiktok Group	2018-2022

Researchers in the fashion industry are debating how metaverse can reconfigure with the industry and enable its sustainability. The fashion industry has a long history of environmental crises. The first is the alarmingly high ecological cost of its material dimension, which stems from high water consumption in textile production, pollution from chemical treatments used in dyeing and preparation, and the scale of landfill generated by disposal processes [25]. Second, moral and ethical debates, such as unequal working conditions and pay, and questions of the rights of animals [26]. Furthermore, fashion is criticized for being perceived as consumerist, making the fashion industry associated closely with the negative impression of waste [27]. Faced with these challenges, fashion practitioners and stakeholders are actively working to revitalize the industry through effective initiatives that take on corporate social responsibility and avoid harmful behaviors. Various sustainability and circular economy topics have gained traction in the industry, ranging from novel business model concepts to practices and methods of communicating with customers [3]. Global health issues have severely limited human interaction in the real world in the last two years, while stimulating virtual interaction on various social media sites, and with the advancement of technology related to the metaverse, the fashion industry has a vision and related practices based on it. Gucci, a Kering Group brand, recently

launched what it calls "the world's first virtual sneaker," the Gucci Virtual 25, which can be "worn" in augmented reality (AR); LVMH and the Richemont Group's Cartier and Prada groups have invested in the blockchain company "Aura" intending to create long-term connections with consumers by providing transparency and traceability. The Dolce & Gabbana Group has created a series of NFTs, the most expensive of which is known as "The Doge Crown" and costs nearly \$1.3 million. Furthermore, from March 24 to 27, 2022, the metaverse platform Decentraland hosted the world's first metaverse fashion week, with over 60 fashion brands participating, including Dolce & Gabbana, Selfridges, Jacob&Co, Franck Muller, Garrett Leight Cavalli, and digital fashion company The Fabricant, among others. The table below summarizes the metaverse-based practices employed by the fashion industry over the last two years:

#### **4. Reciprocal mechanisms for environment, consumers and fashion industry based on metaverse**

Although the meanings that potential stakeholders assign to Metaverse may vary, certain commonalities are identified. Metaverse is a shared social space for users represented by avatars for them to inhabit and interact with, allowing them to own virtual property as if it were physical property[28]. Some academics have provided a roadmap of possibilities from a marketing point of view. They argue that metaverse business emphasizes transparency, traceability, ownership, anti-fraud mechanisms, and targeted trust and loyalty with consumers [29]. The Metaverse-based business world is a new consumer space without precedent. Practitioners need to make it clear that Gen Z consumers are already establishing their identities in the metaverse world and adapting to virtual social interactions, such as in the games Roblox, My World, and Fortnite, where in addition to the games themselves, Gen Z socializes, spends time with friends, tracks news trends, and consumes content through apps, websites, and podcasts., websites, and podcasts[30]. The Gen Z consumer is also a community that is concerned about business ethics and requires social responsibility in the fashion industry, which means this group is a key communication target for businesses operating at these levels. One of the prerequisites for the development of sustainable fashion based on the Metaverse and the existence of reciprocal mechanisms for stakeholders and the environment is the existence of Gen Z consumers who have characteristics such as embracing the Metaverse and being concerned about corporate social responsibility. Second, in the Metaverse, the advancement of pertinent technologies to the point where they are mature enough to help the fashion industry's sustainable claims has made this possibility viable. For instance, in the production stage, virtual design and product release can significantly reduce the traditional textile industry's heavy use of water, water pollution, landfill poisoning of soil, and animal rights violations, as well as effectively improve the poor working environment of employees and reduce the pollution of logistics in the supply chain. This is in keeping with the sustainability concept's ultimate goal of developing a circular economic system that recycles and reuses its materials in a close-loop. And blockchain technology and NFTs can guarantee things like ownership, preserving the interests of consumers while also protecting the core value of products, especially luxury goods, which is the vision of luxury brand stakeholders who have been plagued by counterfeits. In addition, the consumers that initially enter the Metaverse do not reflect all of the sizes that can be covered by the digital fashion business. Rather, they represent a market as a potential size, also known as the total addressable market (TAM). Consequently, through a series of initiatives to enter the Metaverse, broaden the audience and increase engagement, interaction, and influence, engaging the customer base of the Metaverse business as a reachable and possible size, i.e. the serviceable addressable market (SAM), is also an effective marketing strategy for the fashion industry.

In conclusion, the development of technology in Metaverse affords the chance to introduce and expand the fashion sector. Metaverse may accommodate customers' personal expression in Second Life, and digital fashion based on Metaverse can suit consumers' aesthetic, artistic, and material preferences in the virtual world. Moreover, the extension of the fashion sector into the Metaverse is

advantageous for both its sustainability and the environment. Following is a flowchart illustrating the entirety of the reciprocal mechanism:

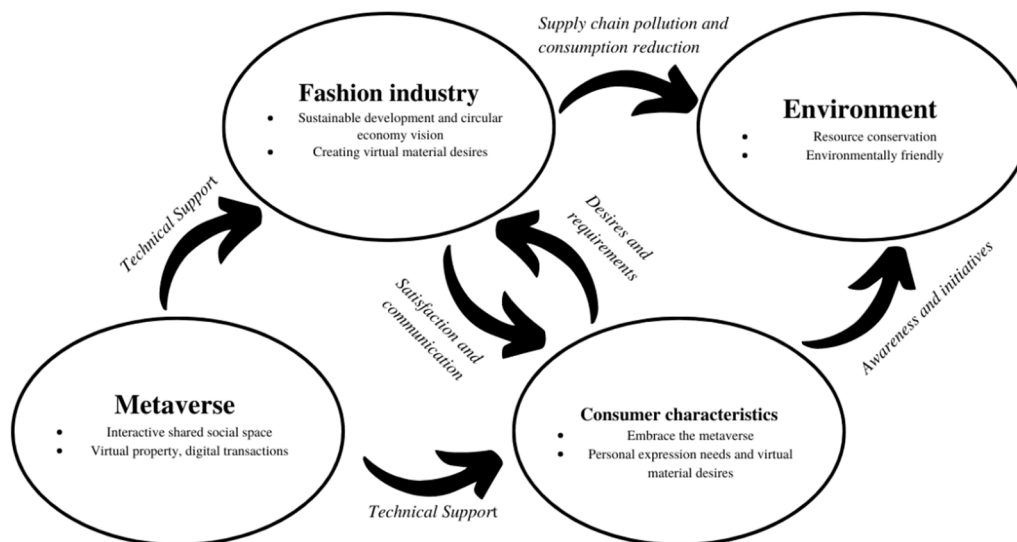


Fig. 1 Reciprocal mechanism

## 5. Conclusion and perspective

The technological invention of the metaverse offers customers with a space to live and interact in an online alter ego, hence giving rise to digital asset trading and related business models. The fashion industry's entry into the metaverse has demonstrated through practice that changes in design, production, display, and communication in the supply chain phase reduce environmental pollution and resource consumption, meet the requirements of the circular economy, and empower its own sustainable development, all while satisfying consumer desires. Supported by metaverse technology, this article illustrates the reciprocal process between sustainability in the fashion business, consumer satisfaction, and environmental friendliness. This mechanism will play a larger role in the future as consumers grow more knowledgeable about the financial aspects of digital assets, practitioners invest in the niche market, and technology continues to progress.

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