

# FROM MATERIAL FASHION TO VIRTUAL CO-CREATION: A STUDY ON THE PARADIGM TRANSFORMATION OF THE INDUSTRY DRIVEN BY DIGITAL FASHION

Jiahao LI<sup>1</sup>, Yixin ZOU<sup>1</sup>

<sup>1</sup>Guangdong University of Technology, China

## ABSTRACT

With the rapid development of the digital cultural industry, digital fashion, as a crucial branch of the digital industry, is essentially supported by 3DVD technology (encompassing 3D modeling, Virtual/Augmented Reality (VR/AR), 2D/3D scanning, Digital Twin (DT), etc.) as its core technical pillar. It runs through the entire fashion supply chain, including design, production, marketing, and retail, enabling "immaterialization" innovation, the reconstruction of product value, and the iteration of service process systems. From the perspective of immaterial design, digital technology breaks the physical limitations of the traditional fashion industry, drives industrial innovation and the upgrading of user experience. It leverages virtual fashion to penetrate traditional industries, enhances the growth attributes of these industries, and at the same time, better transforms the digital economy's fashion industry toward a "systematic thinking" approach.

*Keywords: 3DVD Technology, Immaterial Design, Virtual Fashion, Systematic Design*

## 1 INTRODUCTION

Virtual fashion is one of the emerging digital cultural industries. Defined as "the culture surrounding the design, wearing, and collection of clothing in the digital realm," it has become an industry of great strategic significance for the overall and long-term development of the economy and society, thanks to its high permeability, strong growth potential, and significant carbon reduction effect. According to statistics from McKinsey's The State of Fashion Technology, global spending on virtual goods reached approximately USD 110 billion in 2021.

## 2 THE DEFINITION OF "DIGITAL FASHION"

### 2.1 The core definition of digital fashion

The concept of digital fashion is not static. Its connotation has been continuously expanding with technological development. By sorting out the historical context, research has clarified the evolution logic of the definition. At the beginning of the 21st century (the nascent period of e-commerce), it was first bound to e-commerce, specifically referring to e-commerce platforms that sell fashion products. Digital fashion products are defined as "wearable computers (such as portable hardware)." From 2010 to 2020 (the 3D/ virtual technology period), with the development of 3D printing and body scanning technologies, the definition expanded to "a fashion concept integrating experimental technologies", covering scenarios such as 3D design and virtual fitting. After 2020 (the metaverse /NFT era), the COVID-19 pandemic has accelerated digital transformation. Technologies such as the metaverse, NFT, and AI have driven the definition to focus on "virtual identity expression", emphasizing that digital fashion is not only a "technology application", but also a "carrier of an individual's identity in the virtual world". For the first time in terms of academic value, a standardized definition was proposed through a systematic literature review (covering the two major databases of Scopus and Web of Science) and multi-method validation (Leximancer subject analysis and LIWC text analysis), filling the conceptual gap in the field of digital fashion. In terms of industry value, clearly define the full value chain coverage of digital fashion (from design, production to retail and user experience), providing direction for brands to layout digital businesses (such as metaverse stores and NFT clothing). In terms of user value, the core

of "identity expression" is highlighted, emphasizing that digital fashion breaks through the limitations of age, gender, and physical space, allowing users to explore diverse selves in the virtual world (such as trying out dressing styles that cannot be achieved in reality).

## **2.2 The support of digital fashion: Six thematic dimensions**

**Design Dimension:** Digital technologies drive innovation in the fashion design process, optimizing design efficiency and creative expression—examples include 3D design software, 3D scanning, parametric design, and virtual pattern making. **Consumer Dimension:** Digitalization reshapes retail experiences and empowers users to express their virtual identities, such as through AR/VR virtual fitting, metaverse digital clothing purchases, and virtual avatar styling. **Physiological Dimension:** It focuses on the adaptability between the "physical/virtual body" and clothing to enhance fit and immersion, covering technologies like 3D body scanning, virtual human modeling, and comfort optimization of wearable devices. **Virtual Dimension:** It breaks through the limitations of physical space to build fashion forms in virtual scenarios, including metaverse fashion shows, virtual stores, NFT digital clothing, and VR shopping environments. **Technological Dimension:** It features manufacturing innovation centered on 3D printing, enabling customized and sustainable production—applications include 3D-printed clothing prototypes, personalized accessory manufacturing, and zero-waste production. **Supply Chain Dimension:** Digitalization optimizes supply chain transparency, sustainability, and efficiency, with measures such as blockchain traceability (e.g., raw material tracking), on-demand production, and carbon-neutral supply chain management.

## **3 THE DEVELOPMENT TREND OF THE DIGITAL FASHION INDUSTRY**

### **3.1 The development trend of the digital fashion industry**

Currently, the global virtual fashion market size is projected to reach approximately USD 20 billion by 2025. The scale of China's virtual fashion market was RMB 1 billion in 2019 and is expected to exceed RMB 5 billion by 2025, with a compound annual growth rate (CAGR) of over 30%. These figures reflect the overall growth trend of the international market, indicating that virtual fashion is gaining increasing attention and anticipation worldwide. However, North America and Europe are the primary growth regions for the virtual fashion market, accounting for 60% of the global market. The Asia-Pacific region, particularly China and Japan, has shown strong growth potential and is expected to become a new growth engine in the future.

At present, China's domestic clothing design and sales industry belongs to the tertiary industry. Against the backdrop of industrial structure optimization and upgrading, extending to other industries and improving the industrial chain have become the development direction of the sector. How to break through the limitations of traditional models and achieve industrial upgrading is a key issue at present. Meanwhile, China has entered the era of technological informatization, and artificial intelligence (AI) technology has begun to be promoted and applied in various industries. In the field of clothing design, mechanical equipment and big data technology are already quite mature. For instance, designers use software to simulate garment sewing and preset patterns for collaborative mechanical mass production; they also use big data to summarize design experience and analyze the advantages and disadvantages in the design process, which provides technical support for the integration of AI and clothing design [3]. At the same time, the development of digital technology has further enriched the expression forms of digital fashion. In the product R&D stage, big data analysis and AI algorithms can be used to accurately grasp consumer preferences and realize the development of personalized products. For example, AI technology is utilized to design customized clothing based on parameters such as consumers' characteristic labels, and 3D printing technology is combined to meet consumers' personalized needs for clothing. In the design research stage, big data analysis of consumer behavior and market trends enables brands to better formulate marketing strategies and adjust production plans. For example, fashion brands use social media data analysis to target consumers and push personalized content; at the same time, they optimize product design and service processes through data analysis and market research, which aligns with the "data-driven" digital innovation orientation, thereby improving the industry's response efficiency to the market. From the user's perspective, digital technology builds social platforms for consumers, enhances users' social attributes, narrows the cultural differences

between users, strengthens the interaction between brands and consumers, and constructs a user relationship ecosystem in the fashion industry.

### 3.2 Audience Analysis and Consumer Psychology in Virtual Markets

Currently, AI-driven digital art technology has a diverse audience in the fashion industry. On the consumer side, young people who are enthusiastic about digital experiences have become the core audience group. This group pursues personalized shopping experiences, values sustainable consumption, and has a strong interest in innovative technologies. Data research shows that approximately 80% of consumers are satisfied with personalized recommendations generated by AI. On the one hand, virtual fitting technology has significantly reduced the return rate by 30%; on the other hand, it has increased the conversion rate of online shopping by approximately 30%. These facts vividly demonstrate that digital art is accurately capturing and meeting the needs and personalized demands of modern consumers [7].

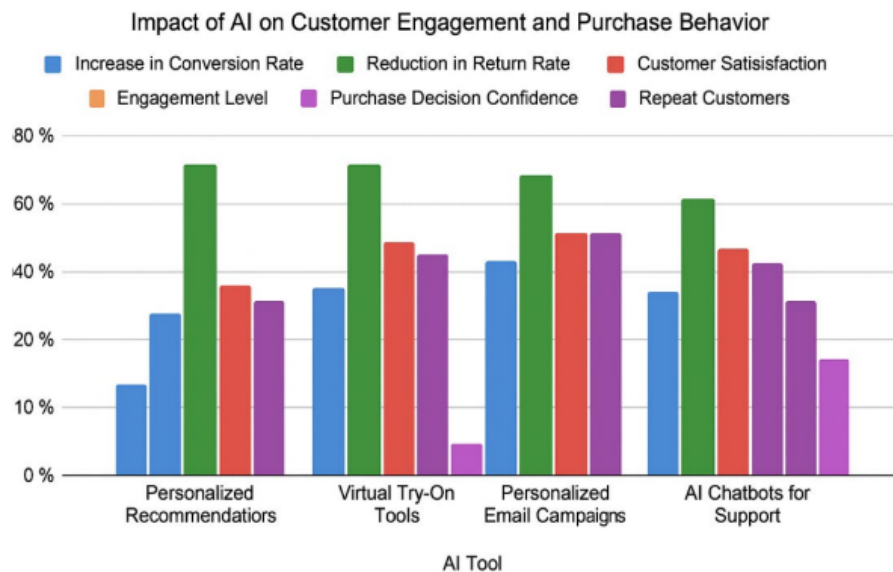


Figure 1. The impact of artificial intelligence on customer engagement and purchasing behavior

### 3.3 New market demands and content expansion

The flow of information carried by images or physical objects should enable the co-creation and dissemination of implicit content such as culture, emotions, and values. As a representative of the digital economy, digital fashion is not merely an outcome driven by technology; rather, it aligns with the new mainstream consumer mindsets and market demands fostered by social and natural factors. These new market demands have expanded the boundaries of the content and services offered by fashion brands.

A new market demand stems from the "sufficiency model" and four major consumer expectations, as consumer culture is undergoing a fundamental shift—from pursuing "abundance" to pursuing "sufficiency." The abundance model is a consumption concept centered on hedonism, status symbolism, and the constant pursuit of novelty, characterized by superficial and transient consumer-object relationships as well as massive resource waste. In contrast, the sufficiency model takes sustainable development as its core element: consumers have become more reflective and prudent. This mindset has given rise to four new consumption patterns, which in turn have generated four key consumer expectations—connection, functionality, excitement, and circularity.

Connection refers to the pursuit of deep resonance and identification with a brand's values, product backgrounds, details of how products are made, and who makes them. Functionality emphasizes the long-term use value, durability, and reparability of products, rather than mere ownership. Excitement is the desire to gain novel and pleasant experiences through consumption, while ensuring these experiences are "guilt-free" and do not contradict environmental values. Circularity involves paying attention to the entire life cycle of products, with the expectation that products can be reused, resold, and recycled to integrate into the circular economy. Thus, digital fashion meets these new demands and expands content boundaries. For example, digital technologies and digital products are ideal tools to

fulfill the aforementioned new needs. It is precisely to meet these demands that the content and forms of the fashion industry have undergone tremendous expansion—shifting from "purely physical" to "a fusion of physical and digital." Instances include purely digital goods like skins and outfits designed for virtual gaming worlds; receiving an exclusive NFT when purchasing a physical product (which may include access to digital artworks, permissions to attend exclusive events, or a "digital passport" for the product); gamified e-commerce platforms creating brand experience games that allow consumers to learn about products while having fun (satisfying both the "excitement" and "connection" expectations); and launching digital collections first to gauge market response before deciding which physical products to manufacture (greatly reducing waste and meeting the "circularity" expectation).

### **3.4 Analysis of the Driving Forces of the Main Groups for the Growth of Fashion Consumption**

This study explores the psychological needs and aesthetic characteristics of Generation Z and Generation X who are active on social media and in virtual markets. For Generation Z, who are digital natives, social media serves as an extension of their digital selves. Therefore, their psychological needs are mostly reflected in expressing their stances through consumption and sharing, and shaping their online personas to find groups with similar interests. The criterion for them to choose a brand lies in whether the brand's values align with their personal identity, and the essence of this behavior is identity construction and expression.

The need for social interaction is the fundamental driving motivation [11]. Generation Z aspires to integrate into specific circles, such as subcultural communities, and gain community recognition through active behaviors like liking, commenting, and sharing to consolidate their own identities, thereby satisfying their need for a sense of belonging. At the same time, their altruistic actions—such as sharing good products or "avoidance guides" (tips to steer clear of poor-quality items)—are also ways to build social capital and maintain community connections. For Generation X, however, who are digital immigrants, social media functions more as a practical tool. The core of their needs is how to make optimal purchasing decisions efficiently with minimal risk, which reflects their demands for pragmatism and risk avoidance. Generation X's trust in brands is more based on the long-term reliability, quality, and services that brands provide, rather than mere identification with brand values. Once trust is established, their brand loyalty tends to be high. Their behaviors, for instance, mostly involve sharing a "value-for-money" and reliable experience with friends. Their need for social interaction is manifested in maintaining existing social relationships; their sharing aims to provide valuable information to relatives and friends and sustain emotional bonds, rather than constructing a new identity—and this differs from Generation Z.

Given the mirrored relationship between digital scenarios and reality, we should consider the interactive relationship between information (as the object of behavior) and users (as the subject of behavior), as well as the new logic of social needs. This will lead to changes in fashion design methods and symbolic language, as shown in Figure 1. Digital scenarios are not a simple reproduction of reality, but are symbolically constructed through technical media such as social platforms, virtual fitting tools, and 3D design software. This relationship is reflected in two-way interactivity: digital scenarios can not only reflect real-world fashion practices (e.g., offline fashion shows and physical retail) but also inversely shape consumers' behaviors and aesthetic tendencies in reality. For example, feedback data from virtual fitting technology can influence the design and adjustment of physical products. As a result, symbolic language tends to become more dynamic and algorithm-driven. In this way, fashion symbols are no longer defined unilaterally by designers, but are continuously constructed through the interaction between users and information. Users have shifted from passive recipients to active participants, and influence fashion narratives through content creation and interaction in virtual communities. For instance, the rise of blogs and social media has turned consumers into "co-creators," prompting brands to adopt more open communication methods. Users can pursue identity expression, community belonging, and sustainable values—for example, the popularity of sustainable fashion labels has driven brands to integrate ethical symbols (such as eco-friendly material markers) into their designs. Essentially, the mirrored mapping between digital scenarios and reality is a process of symbolic reproduction. In the interaction between information (the object) and users (the subject), the power dynamics in fashion are reconstructed: users gain more discourse power through digital media, driving the evolution of design toward sustainability [8].

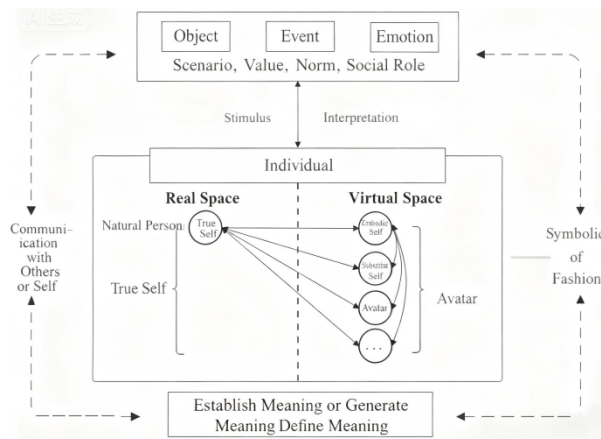


Figure 1. The social interaction influence mechanism superimposed by virtual reality

### 3.5 Analysis of the Driving Forces of the Main Groups for the Growth of Fashion Consumption

Nowadays, traditional B2B marketing in the fashion industry relies on physical samples (such as clothing prototypes), paper materials, offline trade shows, and face-to-face communication, which is plagued by problems like high costs, low efficiency, and limited information transmission. However, 3D virtual and digital technologies are driving the transformation of B2B marketing value toward digital collaboration and data-driven decision-making. Enterprises use technologies such as 3D modeling, digital lookbooks, and online virtual showrooms to convert traditional physical samples into real-time interactive digital assets, thereby reducing fabric waste, sample transportation costs, and time costs. For example, Stitch 3D, a subsidiary of the PVH Group, shortens the design and presentation cycle through digital modeling; brands like Gucci and Louis Vuitton replace some offline trade shows with digital ones to reduce carbon emissions from business travel [13].

B2C marketing in digital fashion no longer merely emphasizes the material and style of clothing. Instead, it conveys cultural inclusivity and sustainable concepts through technology to strengthen consumers' emotional identification. Meanwhile, 3DVD technology enables "size-free" personalized design. For instance, brands such as Atacac and The Fabricant launch gender-neutral digital clothing, breaking the constraints of traditional sizing on body types and aligning with the cultural trend of body diversity. At the same time, digital technology has spawned new B2C marketing business models, promoting the shift from short-term transactions to long-term value binding. Some brands offer digital clothing subscription services (e.g., monthly virtual wardrobe updates) or create limited-edition digital clothing using NFT technology. Additionally, platforms encourage consumers to participate in the design of digital clothing and share their designs on social media; consumers can purchase the designs or conduct secondary creations, while brands enhance user stickiness through a "co-creation ecosystem" [13].

Changes in brand value are not absolute, but depend on the differing needs of target consumers. For example, for trend-sensitive consumers, digitalization can shorten the time-to-market of products, allowing consumers to access trending products first and satisfying their "social/esteem needs," which in turn strengthens positive associations with the brand and drives positive changes in brand value. For consumers with classic needs, product styles are not affected by short-term trends, and "speed" is not a core demand; digitalization cannot match their perceived value, so it has a limited impact on brand value changes.

Digitalization indirectly drives changes in brand value through a "three-tier path": it does not directly lead to changes in brand value, but exerts an indirect effect through the three-tier path of "efficiency → demand matching → positive association." The specific chain is as follows: Digitalization optimizes the product development process (e.g., 3D design reduces sample waste and shortens cycles) → improves efficiency (shortens time-to-market and reduces costs) → matches the needs of target consumers (e.g., the "speed" demand of trend-seeking users, the "waste reduction" demand of eco-conscious users) → strengthens consumers' positive associations with the brand (e.g., "This brand understands me," "This brand is responsible") → enhances brand equity → drives positive changes in brand value.

Standalone digitalization cannot achieve sustained positive changes in brand value; it needs to be combined with other value dimensions that consumers care about. For environmental protection and social awareness, consumers prioritize brands that offer "speed + sustainability" (e.g., the environmental

attribute of digitalization reducing sample waste). If a brand only focuses on digitalization while neglecting environmental protection, the effect of brand value change will be diminished. For social media and brand image, the efficiency advantages of digitalization need to be communicated through social marketing to enable consumers to perceive brand value and drive changes. Digitalization is an "empowering tool" rather than a "determinant" of brand value changes. The core driver of changes in fashion brand value lies in "whether digitalization can match the perceived value of target consumers." When a brand identifies its target consumers, uses digitalization to meet their core needs (e.g., speed, environmental protection), and integrates factors such as social marketing and social awareness, digitalization can become an "empowering tool" for positive brand value changes. However, if a brand deviates from consumer demand positioning and pursues digitalization blindly (e.g., a brand specializing in classic styles forcing digitalization), it will fail to drive positive brand value changes and may even lead to value decline due to resource waste [16].

### **3.6 Analysis of the Driving Forces of the Main Groups for the Growth of Fashion Consumption**

Diverse channels supported by digital scenarios have enabled the expansion of marketing and service arenas. Among them, big data analytics and the Internet of Things (IoT) technology form the underlying support for digital fashion. Smart factories collect production data in real time, while clothing embedded with RFID continuously generates user behavior data. These data can be organized and analyzed through cloud computing platforms, enabling comprehensive digital presentation from the production end to the consumer end. IoT-enabled clothing uses sensors to monitor user activities, provide health advice, and offer design references, forming a new "product-service" model. With the core principle of transparency in basic real-time data, this model emphasizes optimizing supply chain response speed and accuracy in the decision-making process driven by data. Meanwhile, through 3D printing and digital manufacturing technologies, the combination of localized production and global distribution can be achieved, shortening supply chain levels.

At the social media level, the direct input of online data into the product development system can compress the design response cycle from a seasonal basis to a weekly basis. In terms of sustainable traceability, blockchain technology can record the entire life cycle of a product from raw materials to recycling, providing transparency in the concept of eco-friendly consumption. The essence of the expansion of digital fashion arenas lies in reconstructing the "person-product-arena" relationship through data and computing technologies. On one hand, it can break physical boundaries to integrate global resources; on the other hand, it can deepen local services through refined operations. This expansion not only improves efficiency but also reshapes the value distribution model of the fashion industry, shifting from a brand-centered value orientation to a dual-driver model led by users and data [12].

### **3.7 Analysis of the Driving Forces of the Main Groups for the Growth of Fashion Consumption**

Technological-driven changes — such as Augmented Reality (AR) and Mixed Reality (MR) technologies—embed digital capabilities into physical entities and integrate physical entities into the digital world, forming a dynamic interface that combines the virtual and the real. This suite of technologies serves as a prime manifestation of "digital materiality": they seamlessly overlay digital information onto the physical world or integrate physical environments into digital experiences. The tools used by designers have expanded from traditional CAD software to MR headsets like the Apple Vision Pro and Microsoft HoloLens. The design medium is no longer an isolated model displayed on a screen, but a holographic prototype integrated with real space, allowing designers to directly design dimensions, layouts, and interactions within actual scenarios.

Additionally, emerging physics and new materials—including flexible displays, electronic textiles, and shape-memory alloys—are themselves carriers of digital materiality. Their physical properties, such as shape, color, and transparency, can be controlled and modified via digital signals. From a design perspective, therefore, design no longer focuses solely on form and color, but more on the programming of physical behaviors. Designers need to collaborate closely with engineers and use simulation software

to predict how materials will behave under digital instructions; the design medium has evolved into an intelligent material that possesses both physical and digital attributes [10]. content such as culture, emotions, and values. As a representative of the digital economy, digital fashion is not merely an outcome driven by technology; rather, it aligns with the new mainstream consumer mindsets and market demands fostered by social and natural factors. These new market demands have expanded the boundaries of the content and services offered by fashion brands.

A new market demand stems from the "sufficiency model" and four major consumer expectations, as consumer culture is undergoing a fundamental shift—from pursuing "abundance" to pursuing "sufficiency." The abundance model is a consumption concept centered on hedonism, status symbolism, and the constant pursuit of novelty, characterized by superficial and transient consumer-object relationships as well as massive resource waste. In contrast, the sufficiency model takes sustainable development as its core element: consumers have become more reflective and prudent. This mindset has given rise to four new consumption patterns, which in turn have generated four key consumer expectations—connection, functionality, excitement, and circularity.

### **3.8 Analysis of the Driving Forces of the Main Groups for the Growth of Fashion Consumption**

The Product-Service System (PSS) of digital fashion is an innovative business model that takes digital technology as the core link and deeply integrates virtual fashion products with supporting services. It completely breaks the one-way linear chain of "production-sales-consumption" in the traditional fashion industry, and reconstructs the creation and transmission path of fashion value through the dual logic of "product dematerialization" and "service value-added".

In terms of specific forms, this system includes both digital native clothing fully created by 3D modeling and physical simulation technologies (such as the fabric drape simulation of Style3D)—for example, the encrypted fashion launched by The Fabricant, which exists as NFT code on the blockchain with uniqueness and tradability; it also covers virtual-real integrated products where virtual design links back to physical production, like the virtual sneakers released by Balenciaga in the game Afterworld, which users can choose to redeem for physical counterparts after purchase. Supporting the implementation of these products is a complete service system: from AI-assisted design tools (such as CLO 3D) that allow users to adjust clothing parameters in real time and AR virtual fitting rooms that provide immersive experiences, to the circulation network composed of rental platforms (such as ByRotation) and second-hand trading markets (such as virtual fashion transactions on OpenSea), and to the full-life-cycle management of digital product passports (DPPs) that record the design and circulation information of virtual clothing through blockchain. At the same time, technological infrastructures such as digital twins, VR/AR interaction, and data-driven optimization provide underlying support for the coordinated operation of products and services. For instance, AI will analyze users' dressing preferences in the metaverse to feed back to designers for optimizing virtual styles, forming a closed loop of "demand-design-iteration".

The core value of digital fashion PSS lies in completely changing the underlying logic of fashion consumption, shifting from traditional "material ownership" to "experience sharing" and "value co-creation". In terms of consumption models, it promotes "subscription-based" and "on-demand" consumption to become mainstream. Users do not need to buy physical clothing; they can rent virtual dresses through rental platforms to attend metaverse weddings, or switch outfits according to different virtual scenarios (such as the workplace in Decentraland and parties in Roblox) to achieve "one person, a thousand looks" for identity expression. In terms of sustainability, virtual products do not consume physical resources such as fabrics, water, and electricity, and it is estimated that they can reduce carbon emissions by more than 90%. Moreover, digital product passports can also promote the recycling, renovation, and material reuse of virtual clothing, building a circular economy closed loop. In terms of user roles, consumers are no longer passive recipients. They can design exclusive virtual clothing through UGC tools (such as Roblox's clothing editor) and sell them on platforms, and also feed back to design optimization by providing fitting data (such as body characteristics and matching preferences), becoming co-creators of fashion value.

From the perspective of practical cases, the implementation of digital fashion PSS has formed diversified scenarios: ByRotation integrates the rental of virtual and physical clothing, allowing users to rent virtual dresses of designer brands by the day at a cost as low as £6 per day; Rent the Runway launched a "virtual

wardrobe" service, where users can pay a monthly fee to change virtual clothing infinitely for social display; Style3D developed an AI fashion show short film for the Hong Kong Popular Culture Festival, which not only realizes digital display but also supports users to try on clothing through AR; Chloé implanted NFC chips in physical handbags, allowing users to scan them to view the corresponding digital product passports and learn about material sources and carbon footprints. In the future, this system will also be upgraded to a more in-depth experience—for example, combining haptic feedback (such as Meta's haptic gloves) and olfactory simulation technology to allow users to "feel" the fabric texture and "smell" the fragrance matching the clothing theme when trying on virtual clothing. At the same time, cross-platform ecological integration will realize the seamless circulation of virtual clothing among games, social media, and the metaverse, and AI-driven predictive services will automatically recommend outfit schemes according to users' schedules. It can be said that digital fashion PSS is not only a product of technological innovation, but also a key transformation of the fashion industry from "manufacturing-driven" to "demand-driven" and from "material consumption" to "digital ecology". Ultimately, it will reshape the relationship between humans and fashion, achieving a win-win situation between sustainable development and user experience.

#### 4 CONCLUSION

The rise of digital fashion is not merely a technological revolution, but a systematic reconstruction of the traditional fashion industry paradigm. Characterized by virtualization, intelligence, and interactivity, it drives structural transformation across the entire chain of design, production, marketing, and consumption. From the evolution of design tools to the reshaping of service systems, digital fashion is forming an entirely new ecosystem driven by data, centered on experience, and mediated by technology. First, by leveraging technologies such as artificial intelligence, virtual reality, and blockchain, digital fashion transforms the design process from single-dimensional creative generation to multimodal co-creation and algorithm-assisted design, altering the role and work logic of traditional designers. Second, the rapid expansion of virtual markets has given rise to new consumer psychology and aesthetic characteristics—users no longer solely pursue the ownership of physical products, but place greater emphasis on identity expression, emotional resonance, and immersive experiences. The emergence of digital clothing, virtual avatars, and NFT fashion assets marks the shift of fashion consumption from "consumption of objects" to "consumption of symbols and emotions."

At the same time, big data and computer vision technologies have made decision-making in the fashion industry more predictive and precise. Brands can leverage user data to gain trend insights and provide customized services, forming an intelligent closed loop from perception to response. New market demands have also driven the expansion of content and service boundaries, with digital fashion product-service systems gradually shifting toward a platform-centered model of ecological co-construction. Marketing value has accordingly transformed, moving from one-way communication to emotional and social communication dominated by algorithmic recommendations and community interaction.

In summary, driven by technological innovation and oriented toward user experience, digital fashion is redefining the value logic and development direction of the fashion industry through interdisciplinary integration and systematic reconstruction. It not only reshapes the industry's organizational structure and business models but also provides a new context and methodology for the dissemination and innovation of fashion culture. In the future, digital fashion will continue to build a symbiotic innovation pattern among technology, humanity, and society, becoming a key force in promoting the sustainable transformation of the global fashion industry.

#### REFERENCES

- [1] Baek, E., Haines, S., Fares, O. H., Huang, Z., and Hong, Y. Defining digital fashion: reshaping the field via a systematic review. *Computers in Human Behavior*, 2022, 137, 107407.
- [2] Casciani, D., Chkanikova, O., and Pal, R. Exploring the nature of digital transformation in the fashion industry: opportunities for supply chains, business models, and sustainability-oriented innovations. *Sustainability: Science, Practice and Policy*, 2022, 18(1), 773–795.
- [3] Li, J., Tian, J., Song, Y., et al. Research on the development status of virtual clothing in China. *Textile Report*, 2024, 43(5), 41–43.
- [4] Marku, E. AI–artificial intelligence and the growth of the creative potential of designers in the fashion industry. In *Forum A+P*, 2023, 27.

- [5] Jiang, J. The integration mode and requirements of artificial intelligence and fashion design. *Mass Standardization*, 2022, (19), 119–121.
- [6] Sayem, A. S. M. Digital fashion innovations for the real world and metaverse. *International Journal of Fashion Design, Technology and Education*, 2022, 15(2), 139–141.
- [7] Roy, A. Fashion innovation driven by AI: transforming design, manufacturing, and customer experience. *Applied IT and Engineering*, 2024, 2(1), 1–8.
- [8] Noris, A., Nobile, T. H., Kalbaska, N., *et al.* Digital fashion: a systematic literature review. A perspective on marketing and communication. *Journal of Global Fashion Marketing*, 2021, 12(1), 32–46.
- [9] Chun, J. H. A review of the characteristics of digital art expressed in contemporary fashion. *International Journal of Fashion Design, Technology and Education*, 2011, 4(3), 161–171.
- [10] Calabretta, G. and Kleinsmann, M. Technology-driven evolution of design practices: envisioning the role of design in the digital era. *Journal of Marketing Management*, 2017, 33(3–4), 292–304.
- [11] Wolny, J. and Mueller, C. Analysis of fashion consumers' motives to engage in electronic word-of-mouth communication through social media platforms. *Journal of Marketing Management*, 2013, 29(5–6), 562–583.
- [12] Bertola, P. and Teunissen, J. Fashion 4.0: innovating the fashion industry through digital transformation. *Research Journal of Textile and Apparel*, 2018, 22(4), 352–369.
- [13] Kalbaska, N., Sádaba, T., and Cantoni, L. Fashion communication: between tradition and digital transformation. *Studies in Communication Sciences*, 2018, 18(2), 269–285.
- [14] Anderhagen Holmes, K. *Digital Transformation in the Fashion Industry: Understanding Collaborative Technology Adoption*. 2023.
- [15] Abouzeid, J. *Does the Digitalisation of the Fashion Product Development Process Lead to Increased Brand Value?* 2020.
- [16] Batista, L. *New Business Models Enabled by Digital Technologies: A Perspective from the Fashion Sector*. 2013.
- [17] Baek, E., Haines, S., Fares, O. H., *et al.* Defining digital fashion: reshaping the field via a systematic review. *Computers in Human Behavior*, 2022, 137, 107407.