International Journal of Education and Humanities
ISSN: 2770-6702 | Vol. 21, No. 3, 2025

Exploring the Economic Value and Path of Empowering Fashion Consumption with VR AR Technology

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Abstract: Under the dual drive of digital economy and consumption upgrading, VR (virtual reality) and AR (augmented reality) technologies deeply penetrate the entire fashion consumption chain and reshape the industry's value creation model. This article relies on authoritative institutions such as iResearch's "2024 China Virtual Reality Consumer Application White Paper" and IDC's "Global VR/AR Market Forecast Report (2024-2028)", as well as top brand practice cases such as Zara AR fitting rooms and Etro immersive fashion shows, to systematically analyze the economic value and implementation path of technology empowerment. From industry practice and data research, it can be seen that VR/AR technology optimizes the consumer decision-making process through immersive experiences. Through the application verification of top clothing brands, the average return rate of clothing products is reduced by 30% -50% and the online conversion rate is increased by 30% -60%. According to publicly available practice data from fashion technology enterprises, virtual sample production can reduce design costs by over 60% and shorten research and development cycles by nearly 50%. The technology empowerment presents a "dual end drive" feature, which means that the consumer end reconstructs the experience scene through virtual fitting and immersive fashion shows. The industrial end relies on digital twins and AI modeling to innovate the production and marketing chain. Currently, technology applications face practical challenges such as high hardware costs at the consumer level and a digital divide among middle-aged and elderly users. This article proposes to provide practical reference for the digital transformation of the fashion industry by building a healthy ecosystem through technological sinking, industry standards and regulations, and policy support.

Keywords: VR/AR Technology, Fashion Consumption, Economic Value, Empowerment Path, Digital Twin.

1. Introduction

In 2023, the proportion of online retail sales of physical goods in China's total retail sales of consumer goods has risen to 27.6%. The experience gap of traditional e-commerce, where "what you see is not what you get," has led to a significant increase in the return rate of clothing products, which is generally between 10% and 30%, compared to the 5% -10% return rate of 3C products. This contradiction has become increasingly prominent in the context of consumer upgrading, driving the fashion industry to seek technological breakthroughs in experiential and personalized products [1].

VR/AR technology takes immersive interaction as the core advantage to provide a new solution to solve the industry's pain points. According to IDC's prediction, in 2025, the global VR head display device shipments are expected to reach 25 million -29 million units, accounting for more than 60% of the consumer market. The cost of consumer hardware for the domestic model PICO 4 Ultra, whose initial price is 4299 yuan, has formed market competitiveness. The improvement of technology maturity and popularity has made the application of fashion consumption field from concept to landing. In October 2024, Etro will become the first brand to broadcast immersive fashion shows through Apple Vision Pro. Tiktok will create "Ouruofeng AI Trend Show" in 2025, and the related topics will be broadcast 25.2 times billion times.

The existing research mostly focuses on a single application scenario and lacks systematic quantitative analysis and path system construction of economic value. This article combines the latest industry practices from 2024-2025 to analyze the economic value construction in dimensions such as cost control, experience upgrading, and brand appreciation from the perspective of technological adaptability. The empowering path of "consumer experience reconstruction industry efficiency innovation ecological collaborative evolution" provides theoretical and practical support for the sustainable development of the industry.

2. The Technological Foundation and Industry Adaptability of VR/AR Technology Empowering Fashion Consumption

2.1. Core Breakthroughs in Technological Maturity

The large-scale application of VR/AR in the fashion industry relies on the collaborative breakthrough of display, interaction, and modeling technologies. In terms of display technology, by 2024, the mainstream VR headsets will achieve a resolution of 4K, with single eye pixels exceeding 2000 × 2000 and a pixel density exceeding 22. The texture presentation clarity of the product is close to that of physical objects. Micro OLED technology reduces device power consumption by 30% and extends battery life to 4-5 hours. The gesture recognition accuracy in the interactive experience reaches 98.5%. Supporting 10 finger independent tracking and eye tracking technology improves operational efficiency by 40%. The Teslasuit tactile suit can simulate the tactile sensation of different materials such as silk, cotton, and linen. The improvement of modeling efficiency has become a key support for AI driven tools such as NVIDIA Omniverse to shorten the 3D modeling time of products from 3-5 days to 2-4 hours, reducing costs by 70%. Cloud rendering technology breaks through the performance limitations of terminal devices, allowing ordinary VR headsets to run complex virtual scenes. These technological breakthroughs provide the underlying support for immersive experiences in fashion

consumption.

2.2. Natural Adaptation Properties of the Fashion Industry

The experiential and personalized needs of fashion consumption are highly compatible with the characteristics of VR/AR technology. The purchasing decisions of clothing, beauty and other categories highly rely on visual perception and scene experience. Traditional graphic and textual displays are difficult to convey material details and matching effects. AR try on and try on can achieve "what you see is what you get" [2]. VR panoramic display can restore the immersive feeling of offline shopping. Data shows that the conversion rate of high experience products empowered by VR/AR technology is 40% higher than that of standardized products. The fast-paced iteration of the fashion industry also requires technological empowerment to improve efficiency. Under the traditional model, designers need to produce multiple rounds of physical samples for brands to hold offline shows. The cost is high and the audience is limited. VR virtual design can adjust the layout details in real time. Virtual shows can break through time and space limitations and reach global users. The Beijing Fashion Week metaverse intangible cultural heritage show has exceeded 200 million online topic readings alone. The compatibility between technology and industry lays the foundation for value creation.

3. The Multidimensional Economic Value of VR/AR Technology Empowering Fashion Consumption

VR/AR technology achieves bidirectional cost savings by reducing information asymmetry and optimizing the consumption chain. For consumers, AR fitting, VR fitting and other functions significantly shorten decision-making time. Some clothing brands have VR panoramic display to increase purchase rate, while beauty brands have AR color testing function to reduce lipstick return rate. After OOTDiffusion technology is integrated into virtual fitting, the opening rate of user product detail pages and order conversion rate have significantly increased, resulting in a significant reduction in single user fitting costs. For enterprises, the decrease in return rate brings direct cost savings. In the clothing industry, virtual fitting technology reduces the proportion of returns due to "size mismatch" and "physical differences". Some brands use this to reduce return costs, and virtual samples replace physical samples to reduce design costs. Some brands use VR technology to compress new product development cycles and reduce R&D investment.

Immersive experience significantly improves user stickiness and consumption limit. Virtual live streaming using VR/AR technology has a longer average viewing time than traditional live streaming, with increased interaction frequency and sharing rate. This high participation directly drives revenue growth. Etro's private reception unit price and conversion rate for immersive fashion shows through Apple Vision Pro are higher than traditional channels. The long-term value of user assets is formed by the accumulation of data such as try on preferences and interaction trajectories in virtual scenes, which results in higher accuracy in accurate recommendations than the industry average. Data from some e-commerce platforms shows that users who have used virtual try on have higher repurchase rates and average order prices than ordinary users. Innovative forms such as digital collectibles create revenue points for brands, and some brands use celebrity virtual images to release limited digital collectibles to generate sales.

VR/AR technology has become the core of brand differentiation competition. Tiktok Mall "Ouruofeng AI Trend Show" has joined hands with six major brands to achieve high exposure peak online number of people to promote Ouruofeng style and spread widely through XR technology to build a virtual reality blending scene. Beijing Fashion Week has expanded brand influence by demonstrating intangible cultural heritage skills such as Suzhou embroidery, Xiangyun gauze, etc. through digital models to help the post-00 designers to gain market attention and achieve better sales of virtual clothing. The application of technology helps to penetrate brand culture. Dior uses AR interactive advertising to tell the design stories behind clothing. Etro has continuously participated in the metaverse fashion week and promoted AI driven advertising campaigns, all of which strengthen the brand's innovative image. A certain antique clothing brand has achieved significant growth in physical store foot traffic and brand search volume through AR fitting and virtual shows, completing a leap from a regional to a nationally renowned brand [3].

4. The Consumer Path Empowered by VR/AR Technology for Fashion Consumption

Virtual fitting has been upgraded from basic image overlay to a digital twin level experience. Zara has launched an AR fitting room where consumers can scan tags on their mobile app to overlay clothing onto their own image and view the matching effect in real time. A leading domestic brand has achieved millimeter level precision fitting. After uploading body shape data, users can simulate the fitting and sagging feeling of clothing in different postures. OOTDiffusion technology supports high-frequency fitting and deep user participation to improve the conversion rate of additional purchases. In some virtual fitting cases, the conversion rate of products far exceeds the industry average [4].

VR/AR technology reshapes the presentation and reach of fashion shows, Etro became the first brand invited guest and global customers to live the immersive fashion show through Apple Vision Pro. After obtaining the "immersive" show experience show through head display, the equipment was retained in stores for customers to review and realize the value extension of the show. Beijing Fashion Week built the "Digital Fashion Universe" platform, digital human model "Small Brocade" dressed in heavy industrial Suzhou embroidery dress, and the fashion pattern of the show through dynamic rendering showed the wave light effect, which made the intangible cultural heritage technology gain global attention. Tiktok "Ouruofeng AI Trend Show" built theme scenes through AI, star talent AI image interpretation, clothing style, and XR technology to achieve virtual and real connection. The high broadcast volume of related topics promoted FILA, Hubei The sales of new products of Erdos and other brands surged in spring, and the "online immersion+social communication" mode made fashion shows move from professional circles to the mass consumer market.

Technological empowerment has transformed fashion consumption from one-way reception to two-way interaction. A beauty brand's AR interactive game allows users to stay for

a long time and collect preference data through virtual makeup experience to improve the hit rate of new product development. The virtual workshop of Beijing Fashion Week allows users to experience Su embroidery needlework, and young groups can derive new styles such as "Cyber Miao Embroidery" through secondary creation to form brand communication self driving force. A clothing brand has established a virtual dressing community through VR, where members can share try on plans and participate in design voting. The monthly activity of the community is high, and the repurchase rate of users is higher than that of ordinary users. AR filter social communication reduces customer acquisition costs. Consumers can shoot virtual try on videos and share them on social platforms to increase the brand's natural exposure.

5. The Industrial Path of Empowering Fashion Consumption with VR/AR Technology

VR technology overturns traditional design processes. Designers can use software such as Style3D from Lingdi Technology to adjust the material, color, and silhouette of clothing in real-time in a virtual environment, shortening the design cycle from several months to one week. A certain intangible cultural heritage clothing brand uses this technology to launch three new series of products per month, doubling efficiency compared to before. The combination of AI and VR enables trend prediction. A brand improves the accuracy of explosive product prediction by analyzing social media data through an intelligent generation model. International design teams can participate in design reviews through VR conference rooms and provide real-time annotation and modification suggestions. A luxury brand has reduced the cost of cross continental design communication and improved communication efficiency through this model. The rapid iteration of virtual samples reduces resource waste. Reformation uses VR technology to produce virtual samples, reducing fabric loss by about 12 tons per year while also practicing environmental protection concepts.

VR/AR technology realizes the visualization and flexibility of the supply chain in the production process. Enterprises use VR to simulate the production environment and discover pattern adaptation issues in advance. A clothing factory uses this to reduce the rate of defective products and inventory management. Based on virtual try on data, demand forecasting improves inventory turnover and reduces unsold inventory. Establishing a traceability system to build consumer trust. A certain grain and oil brand uses VR field live streaming to display the process of raw material cultivation, helping consumers intuitively understand the source of the product. A certain jewelry brand uses VR appreciation to present diamond cutting technology to increase the proportion of large orders. AR technology enables real-time logistics tracking. Consumers can view the status of products in production and transportation through their mobile phones to improve satisfaction.

The integrated online and offline experience is the core of marketing for brands such as Uniqlo and H&M to introduce virtual fitting mirrors in physical stores. After consumers try them on, they can directly scan the code to add purchases, achieving a seamless connection between offline experience and online purchases. Pilot stores have improved conversion rates. Etro has retained Apple Vision Pro devices in flagship stores such as Tokyo and New York for customers to revisit fashion shows and convert runway traffic into in store traffic. A certain brand has released digital clothing collections that combine intangible cultural heritage elements. After purchasing, users can wear them in the metaverse scene and obtain the right to exchange physical clothing to achieve a "virtual physical" consumption loop. The 24-hour uninterrupted live streaming of virtual anchors has become standard for a certain beauty brand's digital human live streaming, maintaining a high daily viewing rate and exposure higher than real anchors [5].

6. The Challenge and Optimization Path of Empowering Fashion Consumption with VR/AR Technology

The popularization of hardware and cost constraints have hindered the penetration of consumer grade VR headsets into the sinking market. The average price of VR headsets has dropped to 2000-3000 yuan, which is still higher than that of ordinary electronic devices. Some middle-aged and elderly users are excluded due to technological barriers, forming a digital divide. The high cost of content production also highlights the high cost of complex virtual scene production, which is difficult for small and medium-sized brands to afford, leading to the concentration of technology applications in top enterprises. Data security and ethical risks have triggered a crisis of trust. Some platforms have issues with excessive collection of user data, and there is a risk of leakage of privacy information such as body shape data and facial features involved in virtual fitting. The responsibility attribution of virtual spokespersons is unclear. A certain brand's virtual anchor has caused legal disputes due to false advertising, exposing the lack of industry norms and the increasing phenomenon of impulsive consumption, which has led to ethical disputes over technological manipulation of consumption [6]. The lack of industry standards affects the consistency of experience. The precision of virtual fitting technology varies greatly among different brands, and the consumer experience is uneven. The issue of device compatibility is particularly prominent, and some AR fitting functions only support some mainstream phone models that limit user coverage.

Technology sinking and cost control are the basic engineering hardware manufacturers need to further reduce costs through technological iteration. The practice of lowering the price of domestic models such as PICO 4 Ultra to within 2000 yuan has proven that cost performance improvement can significantly drive shipment volume. In 2024, the shipment volume of VR headsets in China will reach 8 million units, a year-on-year increase of 65%. The content side should promote modular production tools. The virtual scene template developed by a certain platform can reduce production costs by 60% and increase the usage rate of small and medium-sized brands by 40%. A certain clothing brand has set up VR fitting experience areas in 200 stores to enhance the awareness of middle-aged and elderly users. Optimize interaction design for different groups, simplify operation processes, and reduce virtual try on failure rates. Industry standards and policy support should be established to build a guarantee system. Enterprises should establish the principle of minimizing data collection. A VR live streaming room only collected 20 facial feature points, which is 60%

less than the industry average. The number of complaints has decreased by 80%. Industry associations need to establish technical standards to clarify indicators such as virtual fitting accuracy and data security. The government has introduced support policies to subsidize the technological transformation of small and medium-sized brands. In 2024, special policies for the virtual reality industry in multiple regions have driven over 2 billion yuan in social investment.

7. Conclusion

The empowerment of fashion consumption by VR/AR technology has evolved from a single point attempt to a systematic value creation. Its economic value is reflected in the improvement of consumption efficiency, revenue growth, and brand upgrading in all dimensions. Through virtual fitting and other scene optimization, the return rate is reduced, and the immersive experience is used to improve conversion rate. The use of digital twin technology to reduce research and development costs has been verified by brands such as Etro and Zara.

The empowerment path presents the two wheel drive characteristics of "consumer experience reconstruction" and "industrial efficiency innovation". The consumer side reshapes the decision-making link through virtual trial wear, immersive show and social interaction. The cases of Beijing Fashion Week Yuan Universe Show, Tiktok Ouruofeng Show, etc. prove that this path can effectively activate users to participate in the full chain penetration of the industrial end from design, production to marketing, so that the fashion industry can realize the transformation from "product driven" to "experience driven".

The current technological applications are facing challenges such as hardware costs, digital divide, and ethical standards. Through the coordinated efforts of technology sinking, user education, and policy support, these issues can gradually be alleviated. By 2025, the global VR headset volume growth will promote the development of the consumer market and provide broader space for technology landing.

The deep integration of VR/AR technology and fashion consumption in the future will promote the digital transformation of the industry and build a new consumption ecology of "virtual and real symbiosis" to inject sustained momentum into the digital economy.

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