Research on Digital Human Marketing Strategy

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Abstract

This paper focuses on the digital human marketing strategy, constructs a research framework with "technology-driven-content production-platform operation-ethical compliance" as the core, and systematically analyzes the application modes of large model semantic generation, multimodal interaction, templated content construction and personalized distribution mechanism in practice. Through in-depth analysis of typical cases such as JD Cloud Yanxi and Melatonin Virtual IP Renewal, the significant value of digital people in reducing costs and increasing efficiency, enhancing user engagement and achieving brand rejuvenation has been verified. The research points out that the coordinated development of technology, content and ethics will become a key factor in the success of digital human marketing. In the future, the focus should be on promoting the construction of emotional interaction capabilities and the integration of UGC ecology. This article can provide theoretical support and practical reference for enterprises to formulate sustainable digital human application strategies.

Keywords Digital Human; Brand Marketing; Large Model; Multimodal Interaction; Content Generation; Virtual IP

1 Introduction

1.1 Research Background

As the digital economy continues to deepen and the concept of the metaverse develops rapidly, the boundaries between virtual and reality continue to blur, promoting the widespread application of virtual image technology. Digital humans, as a product that integrates artificial intelligence, computer graphics, and human-computer interaction technology, are gradually evolving into a key tool in brand marketing. Especially in scenarios such as live e-commerce, social communication, and content production, digital humans, with their advantages of 24/7 controllability, high plasticity, and low operating costs, have become an important means for companies to enhance brand exposure, improve user stickiness, and achieve differentiated competition.

At the same time, enterprises are facing operational cost pressure and marketing efficiency bottlenecks in the process of digital transformation, and they urgently need to use new technologies to achieve the goal of reducing costs and increasing efficiency. Consumers' increasing demand for interactivity, personalization, and immersion also forces brands to innovate user reach and emotional connection methods. Driven by this dual role, digital human marketing came into being and became a key bridge between technological progress and market demand. Therefore, systematic research on digital human marketing strategies not only responds to the actual needs of the industry upgrading trend, but also provides important theoretical and practical support for the construction of a digital business ecosystem.

1.2 Research Significance

As digital humans gradually become new communication carriers, it is of great significance to systematically explore their marketing value. From a theoretical perspective, existing marketing theories mostly focus on traditional advertising, social media communication or KOL influence research. There is still a lack of systematic cognitive models and behavioral research frameworks for "digital humans", a new carrier that integrates AI, big data and communication psychology. Therefore, conducting this study will help enrich the theoretical system of digital marketing, especially in terms of consumers' acceptance

of virtual characters, interactive behavior, trust building and purchase intention, and provide new theoretical perspectives, filling the current academic research gap in the dimension of "virtual anthropomorphic communication".

From a practical perspective, digital human marketing is rapidly being implemented in multiple industries, especially in e-commerce, culture and tourism, finance, media and other fields, showing significant commercial potential. However, during the implementation process, companies generally face pain points such as unclear operating mechanisms, vague content delivery strategies, uncertain platform rules, and technical compliance pressure. Based on the strategic framework and case analysis constructed in this study, it will provide companies with a systematic "personality building-technology deployment-content generation-platform selection-risk response" methodology, enhance their practical capabilities and strategic foresight in the field of digital human marketing, and help achieve low-cost, high-conversion, and highly interactive marketing goals. The research will also provide theoretical basis and data support for policy formulation and industry standard establishment.

2 Theoretical Basis of Digital Human Marketing

2.1 Definition of Concept

Driven by the digital economy, "digital people" have gradually become an important carrier of brand marketing. Its core definition is: an anthropomorphic virtual image constructed through technologies such as artificial intelligence, computer graphics, speech synthesis and motion capture, with a certain degree of intelligent interaction capabilities and emotional expression characteristics. From a classification perspective, digital people can be divided into CG (computer-generated) digital people and AI-driven digital people according to the technical implementation method; according to functional applications, they include virtual idols, digital employees, and live streamers. Combined with Figure 1 , digital people are mainly divided into two categories: Digital Doubles and Virtual Humans . The former, such as parallel personalities, digital twins, deep fakes and holographic images, focus on the digital replication of real people; the latter includes virtual assistants, virtual opinion leaders and virtual individuals, which are mostly used for user interaction and brand communication.

Relevant research continues to reveal the value mechanism of digital people in the marketing field. Nuseir et al. (2023) systematically reviewed the impact of digital marketing strategies on customer experience and pointed out that virtual images enhance brand interactivity and perceived value [1]. Olson et al. (2021) further pointed out that the strategic deployment of digital tools plays a key role in the evolution of corporate marketing models, emphasizing the functional role of virtual images in brand strategy [2]. Purnomo (2023) focused on e-commerce platforms and proposed that the application of virtual characters in digital marketing can significantly improve conversion rates and user loyalty [3]. Veleva and Tsvetanova (2020) summarized the advantages and limitations of digital marketing, pointing out that virtual humans can help reduce labor costs and content duplication, but also face technical barriers and user trust issues [4]. Peter and Dalla Vecchia (2020) defined the channel composition of digital marketing from the perspective of platform and tool, emphasizing that virtual images can serve as an intermediary tool to connect content generation and dissemination platforms [5].

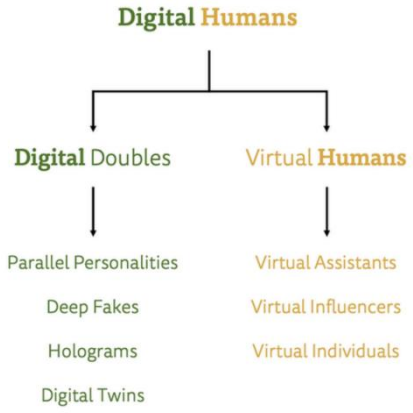

Fig. 1. Schematic diagram of digital human classification

2.2 Theoretical Framework

The theoretical basis of digital human marketing can be constructed from two aspects: consumer cognition and brand communication mechanism. First, in the consumer cognition model, digital humans can stimulate users' psychological identification and learning motivation with their anthropomorphic appearance, emotional interaction ability and celebrity mimicry effect, thereby affecting brand attitude and purchase decisions. Combined with the model shown in the figure, consumers' learning motivation is driven by multiple factors such as challenge, dependence on others' evaluation, and return expectations. These factors ultimately transform into brand loyalty by affecting the "brand image" and "brand awareness" in the brand cognition dimension. The interactive characteristics and visual expression of digital humans are the key triggers to stimulate these motivations. Especially in the context of serious content homogeneity, their "humanization" design has a significant promoting effect on user stickiness.

From the perspective of marketing effectiveness, the digital human marketing strategy can not only bring higher traffic acquisition efficiency, but also improve user retention and conversion efficiency through immersive content, and ultimately achieve sustainable improvement in brand value. Tien et al. (2020) pointed out that in the Vietnamese fashion industry, character anthropomorphism in digital marketing can significantly affect brand differentiation communication [6]. Saura et al. (2023) found through research on small and medium-sized enterprises that data-driven digital marketing strategies need to be embedded in user psychological mechanisms, emphasizing that "interaction" and "situational resonance" are core competitive points [7]. Kano et al. (2022) further proposed that if small businesses can use digital human technology to enhance brand storytelling, they will gain significant advantages in conversion and loyalty [8]. Zhang et al. (2023) verified the key role of digital human head features in user experience evaluation from the perspective of perceived quality, showing that its design quality directly affects trust [9]. Grimpe et al. (2023) revealed the strategic value of the "digital talent capital" behind digital human technology, and emphasized that enterprises need to build a complete digital talent retention and transformation mechanism [10].

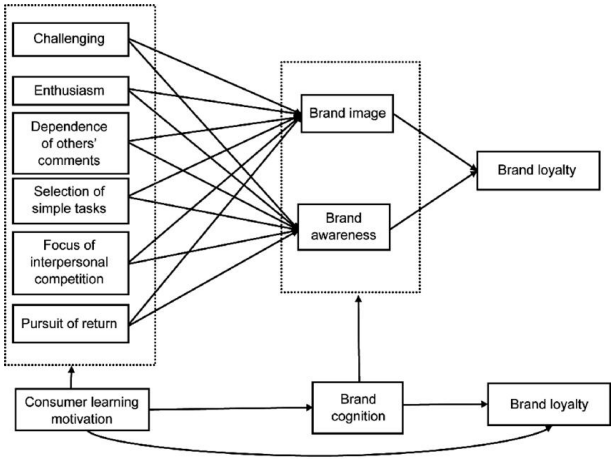

Fig. 2. The impact mechanism model of consumer learning motivation on brand cognition and loyalty

3 Current Status of Digital Human Marketing

3.1 Industry Status

According to data from authoritative organizations such as iMedia Research, China's virtual human industry has shown a significant growth trend in recent years. In 2022, the core market size of virtual humans will reach 12.08 billion yuan, driving the scale of related industries to 186.61 billion yuan. By 2023, the core market size will grow to 20.52 billion yuan, driving the market size to expand to 333.47 billion yuan. It is estimated that by 2025, the core market size will reach 48.06 billion yuan, driving the market size to reach 640.27 billion yuan. Table 1 below is a data table of China's virtual human core market and driving market size from 2017 to 2025:

Table 1. Data on China's core market for virtual humans and the market size it drives from 2017 to 2025

years	Core market size (100 million yuan)	Driven market size (100 million yuan)
2017	8.1	80.9
2018	12.4	125.8
2019	20.5	379.1
2020	34.6	645.6
2021	62.2	1074.9
2022	120.8	1866.1
2023	205.2	3334.7
2024E	339.2	4785.3
2025E	480.6	6402.7

In terms of technology, virtual humans have evolved from early static modeling to today's AI-driven real-time interaction stage. In the early days, computer graphics achieved static modeling of virtual humans, and motion capture technology gave them dynamic expression capabilities. With the application of generative adversarial networks (GAN) and multimodal technologies, virtual human image generation is more natural and expressions are more delicate. At present, natural language processing and deep learning technologies based on large models enable virtual humans to achieve more intelligent content generation and decision-making capabilities, and enhance the realism and immersion of human-computer interaction. For example, Baidu's AI full-stack digital human live broadcast solution "Huiboxing" enables merchants to achieve 24-hour uninterrupted intelligent live broadcasts, reducing labor costs and improving operational efficiency.

3.2 Application Scenario Analysis

With the continuous advancement of digital human technology, live e-commerce and content production have become its main application scenarios. In the field of live e-commerce, the Chinese market size will reach 4.9 trillion yuan in 2023, a year-on-year increase of 35.2%. The introduction of digital human anchors makes 24-hour unmanned live broadcasting possible, improving operational efficiency and reducing labor costs. For example, JD.com's "Huiboxing" platform and SenseTime's "Ruying" system have been widely used in the live broadcast rooms of multiple brands, realizing intelligent speech generation and multi-platform adaptation, and enhancing the user interaction experience.

In terms of content production, the application of AIGC (artificial intelligence generated content) technology has significantly improved the efficiency and quality of video production. According to data from the State Administration of Radio and Television, the total length of new video content in the country in 2023 was nearly 700 million hours, of which 550 million hours came from Internet platforms. The popularization of AI video generation technology has promoted the transition from the "shooting video" to the "shooting+AI generation" parallel mode. For example, the average daily video output of digital people on the Chanjing platform reaches 50, meeting the short video platform's demand for high-frequency content updates. Table 2 below shows the relevant data of China's live e-commerce and AIGC content production in 2023:

Table 2. Data on China's live e-commerce and AIGC content production in 2023

Index	Numeric
Market size of live streaming e-commerce	4.9 trillion yuan
Live e-commerce user scale	540 million people
Annual per capita consumption	8660 yuan
Length of new video content nationwide	700 million hours
Internet platforms add short video length	550 million hours
Potential market size of AI video generation industry	317.8 billion

4 Conclusion

4.1 Technology-driven Strategy

The underlying driving force of digital human marketing lies in the integrated application of high-precision semantic modeling and multimodal collaborative technology. Its key technical path consists of "large language model+multimodal interaction system", which aims to build an intelligent interactive body with semantic understanding ability and human-like expression ability. At present, the more representative system is "Baidu Huiboxing", which has deeply integrated the large model "Wenxin Yiyan 3.5" in the e-commerce scenario to realize context-based logical deduction and automatic generation of marketing words. Unlike the traditional preset script method, the system generates corresponding words within millisecond delays and outputs them by digital humans through real-time user comment capture and product attribute extraction. Its semantic generation module can achieve an average multi-round dialogue response frequency of 22 times/second under GPU accelerated reasoning, and supports cross-category live broadcast room content adaptation.

In terms of multimodal interaction, the system integrates the AISpeech intelligent speech recognition and synthesis module, the facial key point dynamic tracking algorithm provided by SenseTime (based on the 3D-FAN network structure), and the PoseNet variant model for motion capture, thereby building a "speech-vision-action" three-dimensional perception and expression closed loop. The facial emotion mapping part controls the animation engine frame drive strategy through the Affective Index score to achieve the synchronization of digital human emotions and language rhythm. Especially in scenarios with high interaction density (such as flash sale countdowns, barrage responses, etc.), this technical architecture ensures the natural fluency and contextual adaptability of digital human responses, significantly improving the user immersion experience.

4.2 Content Production Strategy

In digital human marketing, content production capacity determines the scalability and ROI conversion efficiency of the system. The current leading platforms generally adopt the parallel strategy of "modular video template library+personalized content scheduling system" to achieve the coordination of batch content production and precise content delivery. Taking the "Chanjing" digital human platform as an example, its content engine has built-in 2000+ structured short video templates, covering conventional template types such as category shopping guides, scenario recommendations, holiday marketing and brand personality communication. The template consists of three parts: structured script (Segmented Script), shot rhythm (Shot Plan) and voice command (TTS Path). It can automatically call the matching template according to the product ID, and directly execute the generated command after binding the digital human image. The platform adopts multi-threaded rendering and intelligent scheduling architecture, with an average daily video production capacity of more than 3,500, which is more than 8 times more efficient than the traditional team production.

More importantly, the content scheduling system is connected to the user portrait system of JD.com/Taobao's backend based on the DeepSeek semantic recognition engine to realize a dynamic content matching mechanism with "thousands of faces for thousands of people". The system constructs interest vectors through the user's historical behavior data on the site (such as browsing categories, dwelling time, purchase rate, etc.), and performs semantic matching with the platform content tag system. For example, for highly sticky users who prefer short videos of home scenes, the system will give priority to pushing style templates performed by female digital people with soft tones and warm-toned images to improve emotional resonance and conversion rate. In addition, the system also supports A/B testing functions, which can iteratively optimize the effects of different templates based on click-through rate and average playback time. This content strategy effectively solves the contradiction between high-frequency content updates and personalized reach, and provides a practical and feasible implementation path for enterprises to create an efficient and controllable digital human content ecosystem.

4.3 Platform Selection and Operation Strategy

In the current live broadcast operations of digital humans, there are significant differences in the compliance thresholds and technical support of different platforms. The choice of platform directly

affects the visibility and sustainable operation capabilities of digital human content. Content platforms represented by Douyin implement a flow-limiting strategy for the live broadcast of "public model digital humans", limiting their weighted exposure in high-concurrency push streams, mainly for the purpose of maintaining content originality and user trust. Therefore, at this stage, brand companies are more inclined to choose open platforms such as JD.com and Taobao that are relatively friendly to digital people. This type of platform not only provides API-level interfaces to support digital human image registration and script calls, but also encourages the use of AI live streaming tools in technical strategies to improve the efficiency of product promotion. For example, the digital human incubation solution launched by JD.com's "Yanxi" platform provides capabilities such as automatic generation of live broadcast scripts, speech synthesis, and intelligent control of marketing nodes, providing merchants with a complete closed-loop live broadcast operation support.

In terms of operating mechanism, more and more brands are adopting a hybrid model of "real people+digital people" collaborative live broadcast. Taking Skyworth TV as an example, its live broadcast room operation mechanism is 18 hours of digital people automatic live broadcast+6 hours of real people peak interactive live broadcast. It continuously maintains the traffic base through AI, and introduces real people anchors during peak traffic hours to supplement emotional value.

4.4 Ethics and Compliance Strategy

As digital human marketing develops rapidly, the ethical and compliance issues it brings have become a focus of continued attention in the industry. The first is the requirement for significant annotation of AI-generated content. According to the "Regulations on the Management of Identification of Generated Synthetic Content (Draft for Comments)" issued by the Cyberspace Administration of China in August 2023, all character images, voices and content generated by algorithms, models or rules must be marked in a prominent position to prevent users from mistaking them for real individuals. In actual operations, platforms such as JD.com, Taobao, and Weibo have clearly required prompts such as "AI digital human" or "AI generated content, please be careful to identify", and they should be clearly marked in live videos or product pages to ensure consumers' right to know and right to choose. Secondly, to address the risks of false marketing and infringement of portrait rights, companies must establish a copyright confirmation and portrait model registration mechanism during the use of digital humans. In particular, when using "real-life image modeling" technology, it is necessary to obtain a signed authorization agreement to clarify the ownership of images, sounds, and movements to prevent unauthorized infringements of public figures or deceased celebrities. At the same time, the platform content must comply with current laws and regulations such as the Advertising Law and the Consumer Protection Law to ensure the authenticity and verifiability of marketing content. Companies should also establish internal review mechanisms to manually review AI output content to prevent value bias, inappropriate language, or ambiguous misleadings caused by model training data.

5 Typical Case Analysis

5.1 JD Cloud Yanxi Digital Human

JD Cloud's Yanxi Platform is one of the most representative full-link digital human marketing infrastructures in China, with a complete closed-loop capability from character building, speech synthesis to multi-platform live broadcast distribution. Its core advantage lies in the introduction of a large language model and image generation engine to achieve high-precision "real-person anchor cloning". It can complete the customization of digital human image within 3 minutes, and drive voice generation through JD's self-developed LiveTTS model to ensure that the tone is consistent with the product type. The platform's supporting LiveInteraction system supports real-time interactive responses and logical jumps in product explanations, and is widely used in business lines such as JD's main site, Jingxi and JD Health. In actual operations, multiple brands have achieved significant GMV growth. As shown in Table 3, during the "JD 11.11" period in 2023, the average conversion rate of brands using Yanxi digital people increased by 34%, and the GMV of some live broadcast rooms increased by more than 50%. More importantly, the cost of live streaming with digital humans has dropped to 1/10 of that of live streaming with real people, especially in labor-intensive categories (such as maternal and child care, food, and home appliances).

Table 3. Typical operating data of JD cloud yanxi digital human platform (2023)

Brand	Digital human form	Average live broadcast duration	Transaction volume growth rate	Cost reduction ratio
Balabala	Single AI anchor	24 hours	+15%	90%
By-Health	President Digital Dual Broadcast	6 hours/day	+160%	88%
JD Health	Medical knowledge AI explanation	Permanent window	+40%	92%
Top 10 home appliance brands	Brand anchor cloning	12 hours	+38%	86%

Fig. 3. JD Cloud Yanxi Digital Human Deployment Framework

5.2 Melatonin Virtual IP Renewal

The Melatonin brand officially launched a virtual IP renewal project in 2023, with the goal of creating a digital human system based on the two original characters of "Old Man White" and "Old Lady Gold" to adapt to the current rhythm of social short videos and live broadcasts. Through cooperation with AI modeling and motion capture suppliers, Melatonin reconstructed its IP image based on three-dimensional digital modeling, and combined with AIGC technology to generate themed short videos for dissemination on social platforms. Especially in its linkage with the mobile game "Zhengtu", the IP characters used digital human images to realize voice broadcasts and facial expressions in the game plot, triggering intense discussions among young user groups and realizing the organic connection between cultural emotions and new media contexts. In addition, Melatonin also combined the layout of young brands to promote the integration with traditional offline retail resources, and landed a "Digital IP×Coffee" joint store in Shanghai, where digital people were responsible for welcoming guests, taking orders and interactive marketing to enhance the offline digital experience. The details are shown in Table 4:

Table 4. Melatonin virtual IP renewal action path and effect indicators (2023)

Dimensions	Initiative Content	Communication platform	Performance indicators
IP digital human modeling	Modeling of the old man and old lady, binding voice expression library	Tik Tok, Xiaohongshu	Video playback volume reached 15 million+
Game linkage	Cooperate with the mobile game "Zhengtu" to integrate IP characters into the plot	In-game & Weibo	Game registration conversion increased by 12.3%
Offline experience innovation	Shanghai "Meobaijin Coffee" digital image interactive store	Store+social topics	More than 20,000 users checked in, 1 hot search
Content-derived short videos	Release Melatonin IP emoticon package and interesting science popularization videos	Tik Tok, Bilibili	The number of fans increased by 52,000, and the interaction rate increased by 60%.

This project not only extends the IP life cycle, but also completes the panoramic communication model of "digital technology-physical consumption-content topics" in one.

6 Conclusion and Outlook

6.1 Research Conclusions

This study systematically discusses the application of digital humans in brand marketing scenarios, integrating the four dimensions of technical architecture, content strategy, platform operation and ethical regulation, and clearly points out that digital human marketing has become a key path for enterprises to achieve cost reduction, efficiency improvement and user experience upgrade. On the one hand, digital humans built based on large language models and multimodal perception systems have the ability to be continuously online, controllably express and generate semantics, enabling them to demonstrate significant cost-effectiveness in e-commerce live streaming, content distribution, and customer service; on the other hand, the interactive characteristics and plasticity of digital humans enhance user engagement and content dissemination efficiency in brand communication. The study further pointed out that the success of digital human marketing not only depends on the reliability of the technical foundation, but also requires the coordinated linkage between content generation mechanisms, platform adaptability and compliance supervision. At the practical level, typical cases have verified the path of deep integration of technology and business logic, proving that the combination of intelligent generation+personality communication+user data-driven is the core element of the sustainable commercialization of digital humans. Therefore, digital human marketing should be regarded as an important strategic fulcrum in the process of enterprise digital transformation, and its system construction and dynamic operation mechanism are expected to be promoted and applied in more industry scenarios.

6.2 Future Outlook

In the future, the development of digital human marketing will be promoted in parallel from the two levels of technology deepening and ecological construction. At the technical level, the enhancement of emotional interaction capabilities will become the core evolution direction. Models based on multimodal emotion recognition, semantic memory mechanism and generative feedback regulation will give digital humans a higher level of emotional perception and expression capabilities, enabling them to play a greater role in trust building, brand endorsement and community empathy in long-term user interactions. At the same time, the digital human system will pay more attention to the integration with the user-generated content (UGC) system to form a closed-loop ecology of "user interaction-digital human response-content co-creation". For example, through an open script interface and data adaptation middle platform, users are allowed to customize the digital human corpus style, role setting and interaction mode, thereby expanding the content boundary and user stickiness of digital human marketing. At the commercial application level, it is expected that virtual employees, virtual anchors, virtual customer service and virtual opinion leaders will constitute a new role spectrum, and will be connected to the brand's content supply chain system through AI-driven content adaptation and behavior scheduling mechanisms, becoming a normalized digital communication subject.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Biographies

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數字人營銷策略研究

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摘要：本文聚焦於數字人營銷策略，構建了以「技術驅動-內容生產-平臺運營-倫理合規」為核心的數字人營銷研究框架，深入剖析數字人在實際應用中大模型語義生成、多模態交互、模板化內容構建及個性化分發機製的應用模式。通過對京東雲言犀、Melatonin虛擬IP延展等典型案例的深入分析，驗證了數字人在降本增效、提升用戶參與度、實現品牌煥新方面的顯著價值。本研究指出，技術、內容與倫理的協同發展將成為數字人營銷成功的關鍵要素。未來應著重推動數字人情感交互能力的構建以及UGC生態的融合。本文可為企業製定可持續的數字人應用戰略提供理論支撐與實踐參考。

關鍵詞：數字人；品牌營銷；大模型；多模態交互；內容生成；虛擬IP

1. 管秀珍，學士，畢業於吉林工程技術師範學院，現任廣東省普寧職業技術學校會計系全職教師。她長期擔任班主任，在市級營銷微課比賽中多次獲獎。