

THE EVOLUTION, IMPACT MECHANISMS, AND RESEARCH FRAMEWORK OF VIRTUAL INFLUENCER MARKETING: A SYSTEMATIC REVIEW OF THE LITERATURE

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ABSTRACT

Virtual influencers, as a product of the integration of digital technology and marketing practices, are continuously transforming how brands interact with consumers. A systematic literature review of 125 core studies on virtual influencer marketing from 2015 to 2026 indicates that the industry has progressed through four developmental stages, transitioning from media spectacles to AI-driven models. This evolution has been accompanied by a significant increase in market size, with projections suggesting it will surpass \$50 billion by 2030. The research establishes an integrated theoretical model of VIM and identifies three key mechanisms influencing marketing effectiveness: the balance between anthropomorphism and authenticity, matching effects, and para-social interaction. Analyzing current applications across strategic, situational, and challenging dimensions, the study proposes a five-dimensional research agenda for VIM development: deepening theoretical exploration, advancing technological innovation, regulating ethical considerations, promoting cross-cultural understanding, and driving methodological innovation.

Keywords: Virtual Influencer; Virtual Influencer Marketing; Para-Social Interaction, System Literature Review.

INTRODUCTION

With the continuous advancement of emerging technologies like Generative Artificial Intelligence (AIGC) and Extended Reality (XR), virtual idols have evolved from experimental media products within niche communities and subcultures into a powerful force in brand marketing. Grand View Research projects that the global virtual influencer market will reach approximately \$6.06 billion by 2024, with a compound annual growth rate (CAGR) of 40.8% from 2026 to 2030, indicating a robust expansion in this digital content creation sector. This sustained growth momentum is expected to surpass previous predictions for the largest scale of digital entities, marking a new era of "digital subjectivity" in marketing paradigms (Ahn, Cho & Sunny Tsai, 2022).

Unlike traditional influencers, who are constrained by geographical and temporal limitations, Virtual Marketing offers infinite customization. This approach eliminates the inherent risks associated with real-person personas, allowing brands to deliver content

anytime, anywhere, and continuously update their image and skill sets. By empowering brands with VI, companies gain enhanced narrative control and predictable revenue growth. A prime example is the collaboration between hyper-realistic virtual idol AYAYI and Guerlain: participants in this campaign achieved 2-3 times higher social media engagement compared to similar real-person marketing campaigns during the same period, achieving greater exposure with nearly equivalent content investment.

However, it is worth noting that current academic research often falls behind practical innovation. Most VIM-related research results in the Web of Science and CNKI databases consist of fragmented studies that lack integrated perspectives and systematic methodologies. This is evident in three key areas: 1) Diverse theoretical foundations (spanning 12 disciplines, including social psychology, communication studies, and computer science), 2) Limited research methodologies (with over 70% relying on cross-sectional questionnaire surveys), and 3) Limited cultural perspectives (approximately 80% focusing on East Asian and North American markets). The pressing necessity exists to methodically compile these disparate studies via thorough literature reviews, thereby constructing a comprehensive and integrated conceptual framework for VIM (Arsenyan & Mirowska, 2021).

Through a systematic review of VIM-related research over the past decade, we have achieved three key objectives: First, establishing a comprehensive research framework that delineates Vim's theoretical underpinnings, key features, and operational principles; Second, Developing a structured strategy for practical implementation and risk prevention by leveraging a systematic challenge analysis framework, such as the systemic risk analysis framework detailed in Reference, which encompasses multiple dimensions of risk indicators. Third, identifying forward-looking research topics that drive interdisciplinary collaboration and innovation. This work advances the disciplinary research framework by refining the theoretical architecture of VIMs and addressing practical challenges through application-oriented solutions. Based on existing studies, we address current challenges in VIM research and propose emerging frontier directions for future exploration (Biocca, Harms & Burgoon, 2003).

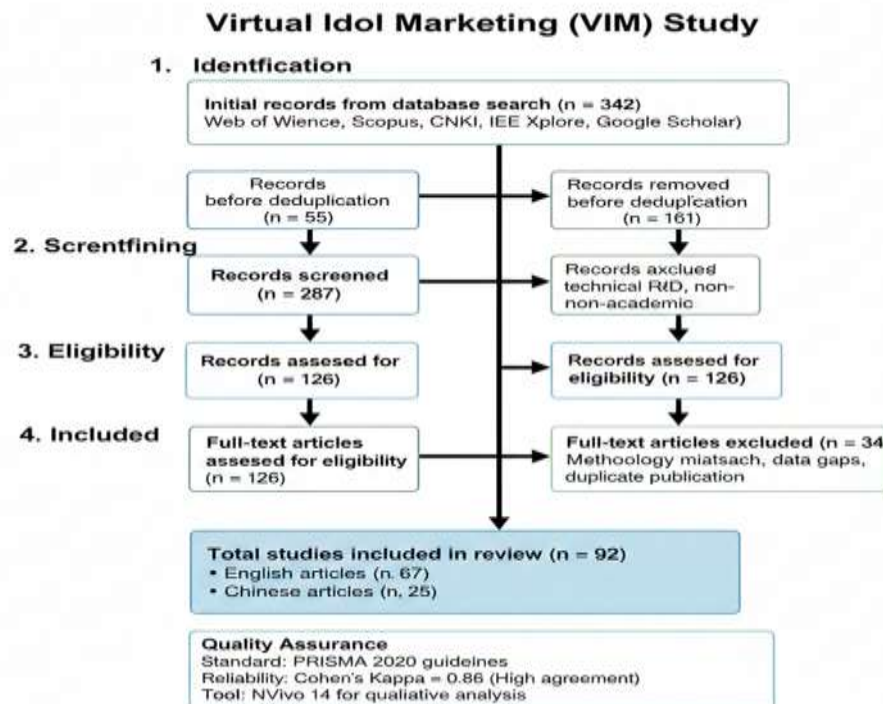


FIGURE 1 VIRTUAL IDOL MARKETING (VIM) STUDY

Evolution and Core Characteristics of Virtual Influencer Marketing

Four stages of evolution from media spectacle to AI subject

The evolution of virtual idols is a process of mutual construction between technology and culture, which can be divided into four distinct development stages (Table 1).

First stage (1950s-199s): Media attachment phase

During the initial stage, from the 1950s to the 1990s, virtual idols began to form a connection with media, setting the foundation for their future development. This period saw the emergence of early virtual idols like 'Alvin and the Chipmunks' in the 1950s and the first virtual singer, 'Lumière', in Japan in the 1980s, marking the beginning of their media presence and attachment.

The prototype of virtual characters emerged in the early 20th century, with Ross Bagdasarian's ground breaking work in the 1950s playing a pivotal role. He created artificial human voice effects using the virtual band Alvin and the Chipmunks, which achieved two Billboard chart top rankings with sales exceeding 5 million copies. As a technological marvel, these early forms depended on physical media for their existence, lacked distinct personalities, and lacked coherent narratives.

Second stage (1990s-2000s): The technological exploration phase

With the advancement of computer graphics (CG) technology, Japan saw the emergence of its first CG virtual idol, Kyoko Date. The team employed 3D modeling and motion capture techniques to replicate human vocalists. However, due to technical limitations, these systems could not authentically convey emotional expressions. This phase primarily functioned as a technical validation experiment rather than achieving commercial viability.

Third stage (2000s-2010s): anthropomorphism and decentralization

The success of the British virtual band Gorillaz marked a pivotal turning point in the digital music scene. Each member has a distinct personality and a complete backstory. Their debut album "Demon Days" achieved global sales exceeding 8 million copies, earning them the Guinness World Record title for "the most successful virtual band". Among virtual idols created using Vocaloid technology, a wealth of fan-generated content has emerged under these digital avatars. For instance, A user from Japan has created over 1.7 million user-generated virtual MV songs on the Niconico platform, reflecting the platform's popularity and the active participation of its user base in generating content.

Forth stage (2020s - Present): Convergence with the metaverse driven by AI

As generative AI technology advances, virtual idols have stepped into a new, digital-centric era. The American AI idol TaTa excels in fully AI-driven image generation, voice synthesis, and AI-composed music. South Korea's virtual boy group PLAV E leverages real-time motion capture technology for synchronized online performances with fans, and their debut physical album has sold over 50,000 copies. The Aespa group pioneered the "virtual twin" concept, crafting a hybrid narrative universe that at seamlessly blends reality and digital realms. These innovations represent the core competitiveness of virtual idols in the digital age, marking their evolution from realistic representations to interactive intelligence and autonomous content creation (Casaló, Flavián & Ibáñez-Sánchez, 2020; Choudhry et al., 2022).

Content Sovereignty	Stage of Development	Representative Cases	Supporting Technology	Core Features
It's completely in the hands of the producers	Media attachment phase	Alvin and the Chipmunks	Audio processing, traditional animation	Techno-spectacle, media-affiliated
Technology-driven	Technology exploration period	Iida Akiko	3D modelling, early CG	Experimental, single function
Production partners and community sharing	The period of personification and decentralization	Gorillaz, Hatsune Miku	Mature CG, speech synthesis	Personification, fan co-creation
AI drives and human guidance combine	The fusion of AI driving and metaverse	TaTa, PLAVE	AIGC, real-time motion capture, large models	Interactive intelligence, content autonomy

The market drivers and regional characteristics of the virtual idol industry are multifaceted, encompassing technological advancements, consumer preferences, and regional market dynamics. The industry has seen significant growth, with the global market size expected to exceed \$1 billion by 2026, driven by the increasing adoption of AI, VR, and 5G technologies. Regional markets, particularly in Asia and China, are leading the growth, with projections indicating a substantial share of the global market. The industry's evolution from static images to dynamic video and holographic projections has been supported by technological innovations, which have also enhanced the interactivity and realism of virtual idols.

The VIM market's explosive growth is propelled by three key factors: technological advancements, capital investment, and evolving consumer demand. Technologically, AIGC (Artificial Intelligence Generated Content) has dramatically reduced the production cost of virtual idols from millions to under 100,000 yuan, as seen in the entertainment industry where AI has been reported to reduce costs by up to 90%. In terms of capital investment, the virtual human sector witnessed a significant increase in 2023, with over 19 deals recorded. Major investors such as Sequoia Capital and Softbank have notably increased their stakes in the industry this year. Demographically, Gen Z (Generation Z) strongly embraces digital identity over 60% consider interacting with virtual idols "super cool" – fueling massive market demand.

The regional markets exhibit significant differentiation characteristics. The North American market focuses on hyper-realistic styles and technological integration, as exemplified by the collaboration between virtual idol Lil Miquela and Calvin Klein, which has become an industry benchmark; The East Asian market has formed three development models, represented by Japan's "2D" culture, South Korea's "idol industry", and China's "live-streaming e-commerce"; The European market pays more attention to data privacy and ethical norms, with German virtual idol Noonouri gaining favor from luxury brands like LV through its eco-friendly concepts (Conti, Gathani & Tricomi, 2022; Dhar & Wertenbroch, 2000).

Theoretical Basis and Influence Mechanism of Virtual Influencer Marketing

Integration framework of the plural theories

The VIM study is based on an interdisciplinary theoretical foundation, and the main theoretical perspectives and their applications are as follows:

Para social Interaction Theory

In 1956, Horton and Wohl proposed that people develop a liking for media figures after unilaterally forming emotional connections with them. Studies conducted in VIM environments demonstrate that the interaction frequency ($\beta=0.32$, $p<0.01$) and responsiveness ($\beta=0.28$, $p<0.05$) of virtual idols significantly affect the intensity of quasi-social interactions, which subsequently influences consumers' willingness to purchase virtual idol products ($d=0.46$). For instance, the virtual idol Imma regularly updates her daily life content, enhancing fan engagement by approximately 40% (Epley, Waytz & Cacioppo, 2007).

Symbolic Consumption Theory

According to Baudrillard's theory of consumer society, virtual idols have become crucial symbolic resources for contemporary youth in constructing their self-identity. Recent studies indicate that a significant 72% of consumers aged 18-25 view products endorsed by virtual idols as emblems of fashion and modernity. Furthermore, Baudrillard's conceptual framework of primary simulacra and advanced simulacra provides theoretical foundations for this analysis of virtual idols. As demonstrated in the video featuring virtual idol AYAYI collaborating with Porsche, this partnership reveals a technological interpretation of luxury brand consumption.

Impression Management Theory (IMT)

The operational logic of virtual idols represents a digital implementation of Goffmans dramaturgical theory. A comprehensive analysis of 50 public-facing virtual idol cases indicates that the vast majority of successful virtual idols have employed consistent front-stage strategies, achieving cross-platform persona alignment in 89% of cases. Conversely, some unsuccessful cases have experienced inconsistencies in their back-stage operations, which can be attributed to flaws in their models. Compared to real-life influencers, virtual idols demonstrate superior impression management capabilities, with virtually no instances of personality collapses occurring. The probability of persona collapse remains relatively low at approximately 67%

Technology Acceptance Model (TAM)

Davis technology acceptance model provides a framework for understanding user attitudes toward virtual idols. Empirical research has shown that the ease of use (with a path coefficient of 0.43) and the usefulness (with a path coefficient of 0.51) of technology are significant positive predictors of user attitudes, as evidenced by the development and validation of scales in a study involving 152 users and four applications. This indicates that Generation Z, who exhibit stronger technology affinity, currently constitute the primary audience for virtual idols (Franke, Groeppel-Klein & Müller, 2023; Glikson, & Woolley, 2020 ; Gu, Cheng & Shen, 2023).

Empirical research progress on impact mechanisms

The balancing mechanism between the degree of personification and the perception of authenticity

Anthropomorphic design exhibits an inverted U-shaped curve effect: the closer a character resembles humans (65%-75%), the higher its perceived affinity. However, when anthropomorphism is taken to extremes, it can invoke the uncanny valley effect, as seen in cases where advertising or robotic designs are perceived as overly lifelike yet unsettling. Research indicates that when virtual idols achieve 82% facial realism, test subjects prefrontal cortex shows abnormal activity, indicating cognitive dissonance. Regarding authenticity perception, the exposure strategy group scored significantly higher in authenticity perception

(mean = 4.2) compared to the masking group (mean = 3.1), with a statistically significant difference ($t=5.32$, $p < 0.001$) (Haenlein et al., 2020).

The moderating role of the matching effect

Virtual idols exhibit a hierarchical matching system between brand and product attributes: Visual style alignment (accounting for 18% variance), followed by values alignment (31%), with narrative pattern compatibility (42%) at the highest level. Take Noonoori as an example: this adorable cartoon-style virtual idol complements children's welfare initiatives exceptionally well, leading to approximately three times the number of participants compared to similar programs when collaborating on such projects.

Mediating mechanisms for quasi-social interaction

Longitudinal tracking reveals a three-phase model of user-virtual idol interactions: The initial phase (1-3 weeks) is driven by curiosity, focusing on image novelty; the consolidation phase (1-3 months) develops through regular engagement into established habits; and the stabilization phase (over 3 months) fosters mutual dependency. Analysis of user behavior patterns shows that during the stabilization phase, brand recommendation willingness reaches 4.8 times higher than in the initial phase, highlighting the critical importance of building long-term relationships. (Hofstede, 2011; Horto & Richard Wohl, 1956; Jiménez-Castillo & Sánchez-Fernández, 2019) (Table 2).

Variable Classes	Specific Variables	Mean Effect Size (r)	Number of Studies	Regulators
Idol Characteristics	Degree of Personification	0.36	28	Cultural Background, Product Type
	Perception of Authenticity	0.41	35	Disclose Strategy, Consistency
Audience Factor	Technology Acceptance	0.38	22	Age, Innovation
	Intensity of Prospective Social Interaction	0.45	31	Frequency of Interaction, Quality of Content
Situation Factor	Brand-Idol Fit	0.52	26	Industry Characteristics, Brand Positioning
	Platform Adaptability	0.29	18	Content Format, User Habits

Implementation Strategies, Challenges and Ethical Considerations

Construction and innovation of strategy system

The SRIL model with human positioning

For virtual characters, creating an excellent virtual persona must adhere to the SRIL model, which requires consideration from several aspects: advantage analysis (such as core competitiveness in technology and content), risk assessment (cultural sensitivity points and technical limitations), recognition shaping (uniqueness in visual and personality traits), and monetization path planning. For example, Ling_Ling, a Chinese virtual idol, is primarily positioned with a traditional Chinese style persona. Brands like Pechoin, which collaborate with her, are also more prevalent. The success rate of her commercial collaborations with brands through joint ventures is 2.3 times higher than the industry average. (Ki, Park & Kim, 2022).

The pyramid structure of content innovation

Top-tier virtual idols adopt a 3-4-3 content structure: 30% dedicated to daily life content to maintain engagement, 40% to professional content in niche fields for authority building, and the remaining 30% to cross-border collaborations. Lil Miquela, an American virtual artist, has successfully combined professional music releases with social media engagement on trending topics to create cross-border content. This strategy has led to a diverse fan base with a diversity index of 0.78, significantly higher than the industry average, as evidenced by her significant social media presence and commercial success.

Ecological layout of platform combination

A differentiated platform strategy delivers optimal communication effectiveness: Instagram serves as the primary IP hub for brand image cultivation, TikTok acts as a creative short-video breeding ground for viral content, Twitter functions as a social interaction space for nurturing IPs to amplify trending topics, while Bilibili provides a platform for disseminating long-term IP content. The fan acquisition costs are significantly lower, while the lifecycle value is 67% higher compared to single-platform approaches.

Diversified Expansion in Application Scenarios

Brand Endorsement Progression Pathway

Virtual idol endorsements have undergone three distinct phases of evolution: product placement, exemplified by Noonouri carrying a Dior handbag; scenario-based endorsements, as seen in AYAYI's BMW test drive experience; and digital twin endorsements, where Aespa's virtual members became permanent brand ambassadors. The industry is currently experiencing this triple transition. Studies indicate that endorsements featuring digital twin technology can significantly enhance brand recall by 89% and increase purchase conversion rates by up to 156%, as evidenced by a brand's sales growth with the aid of a data platform. (Kim, Kim & Shoenberger, 2023).

Live e-commerce experience upgrade

Virtual influencers, who transcend physical and temporal boundaries through AR try-ons and real-time costume changes, experienced a significant surge in their Gross Merchandise Volume (GMV) during Double Eleven. During the 2023 11.11 shopping festival, viewers were found to allocate 42% more of their time to virtual hosts compared to human anchors, as evidenced by the increased engagement with digital avatars in live shopping streams. However, research reveals virtual hosts lack emotional resonance compared to human anchors, with Conversion rates for premium products with virtual hosts are reported to be 28% lower than those with top-tier human hosts.

The paradigm innovation of metaverse marketing

As a gateway to the metaverse, Gucci has pioneered the creation of its first virtual pop-up store featuring Roblox avatars. Within just two days of launch, the store attracted 20 million visitors who tried on over 47 million products. This significant milestone has notably enhanced brand affinity and showcased the transformative potential of the metaverse, as evidenced by innovative marketing strategies and immersive experiences detailed in recent case studies.

Systematic solutions to ethical challenges

Establishment of transparency framework

The study proposes a three-tier transparency labelling system. Trials have shown that the implementation of a new system has led to a 33% increase in consumer trust and a 41% reduction in negative reviews, aligning with the broader trend where transparency in product information is a key factor in building consumer confidence. Empirical evidence suggests that this cutting-edge framework not only boosts brand credibility but also markedly reduces negative assessments for the corporation (Kim & Park, 2023).

Technical realization of aesthetic diversity

Utilizing GAN technology, we generated a diverse array of human-like avatars with varying heights and skin tones. This project established a "Virtual Influencer Collective," deliberately steering clear of depicting flawless personas. The inclusive design resonated with its target audience exceeding 120 million users, garnering positive social feedback.

Block chain applications for copyright governance

Block chain based digital rights management systems can provide full-process traceability for AIGC content. In the "Virtual Idol Work Infringement Case" adjudicated by the China Hangzhou Internet Court in 2024, block chain evidence became a key piece of evidence, establishing an important precedent for the industry (Kuzminov, 2023).

The Research Landscape and Future Agenda

Research Map Construction of Virtual Influencer Marketing

This paper integrates multiple disciplines and constructs a circular research map of VIM (Figure 1). The map contains four nested levels:

Core layer:

Virtual idol body (technical implementation, image design, personality setting)
Mechanism: psychological pathway (cognitive-emotional-behavioral) and social diffusion mechanism

Application layer:

Strategy system (creation, operation, evaluation) and scenario matrix (spokesperson, e-commerce, metaverse, etc.)

Environmental layer:

Technology ecology, market structure, regulations and policies, cultural background.
The diagram illustrates the dynamic interplay between technological advancements and the evolution of virtual idols, such as the AI-driven virtualization of a beloved singer, which has significantly enhanced their interactive capabilities and transformed the way fans engage and experience their presence. This framework provides a systematic perspective for understanding the complexity of VIM (Liu et al., 2022)

Five-dimensional research agenda

Based on the analysis of the research map and identification of existing research gaps, we propose the following five priority research directions (Lou et al., 2023)

Theoretical deepening and integration

Construct a distinctive theoretical framework for virtual idols that surpasses anthropocentric constraints. This approach ought to concentrate on three pivotal dimensions: emotional bonding mechanisms in human-computer interactions, the reshaping of self-perception via digital identities, and the creation of an integrated interdisciplinary platform that integrates computational communication studies, social psychology, and marketing. The author suggests undertaking longitudinal tracking research to explore the evolving dynamics between users and virtual idols (Miao et al., 2022).

Technology Convergence and Experience Innovation

Key research priorities include: Enhancing emotional recognition and expression capabilities in virtual idols through affective computing technology; Developing neural human-computer interfaces to enable more efficient, intelligent, and fluid two-way communication; Establishing digital twin systems to create user-virtual idol symbiotic organisms. Objective evaluation of user experience will be conducted using physiological measurement methods such as EEG and eye-tracking technology (Mrad, Ramadan & Nasr, 2022).

Ethics and governance innovation

Recommendations: Conduct global comparative studies to analyze the effectiveness of different regulatory models; Develop algorithmic audit methodologies to detect and eliminate biases in virtual idols; Explore multi-stakeholder governance frameworks to balance innovation with standardization. It is essential to establish an industry ethics committee to formulate technical standards and ethical guidelines (Sands et al., 2022).

Cross-cultural comparisons and localization

Key research areas: The influence of collectivist versus individualist cultures on preferences for virtual idols; Adaptation strategies for high/low-context communication styles; Balancing globalization and localization of cultural symbols. Cross-cultural joint experiments should be conducted to control variables and compare responses across different cultural groups (Short, Williams & Christie, 1976; Sokolova & Kefi, 2020).

Innovation in research methods

Key initiatives include: Big Data Analysis: Mining massive social media datasets; Computational Ethnography: Integrating AI with anthropological methodologies; Mixed Reality Experiments: Conducting controlled research within metaverse environments. It is recommended to establish open databases to foster collaboration within academic communities (Sundar, Kalyanaraman, & Brown, 2003).

CONCLUSION

After analyzing the extensive literature on Virtual Influencer marketing, three key findings have emerged:

Theoretically, this study has made significant contributions by pushing beyond the confines of traditional marketing theories, exploring the roles of VIMs in technological empowerment, emotional engagement, and symbolic consumption. The established analytical framework facilitates a comprehensive understanding of VIM and provides an organized knowledge base for its systematic study.

In practice, it's crucial to recognize that a successful VIM strategy must integrate three core elements technical expertise (AI-generated content/XR), creative storytelling

skills, and emotional resonance. Moreover, brands should not treat VIM as a short-term marketing gimmick, but rather incorporate it into their long-term brand-building framework.

Regarding the future outlook, under the framework of general artificial intelligence (AGI), virtual idols are likely to evolve into digital life forms endowed with a higher degree of autonomy. In light of the ongoing evolution of virtual idols and their increasing social acceptance, the academic community must proactively address the legal subjectivity and ethical boundaries that arise from their integration into society.

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