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Exploring the Integration of the Metaverse Within the Fashion Industry: A Bibliometric Analysis

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Abstract

Immersive technologies such as blockchain, augmented reality, and virtual reality are revolutionizing the fashion industry through the metaverse, influencing traditional retail, marketing, and consumer experiences. This study employs bibliometric analysis to trace the scholarly development of this emerging area by reviewing 149 publications from 2009 to 2025, sourced from the Scopus database. Utilizing the Biblioshiny interface from the Bibliometrix R package and applying the PRISMA framework for systematic article selection, the research identifies trends in annual scientific output, key contributing nations, influential journals, and notable affiliations. Findings indicate a significant increase in scholarly production post-2021, with Italy, South Korea, and India recognized as leading contributors. Prominent themes identified from keyword co-occurrence analysis include digital fashion marketing, consumer behavior, technology adoption, and virtual retailing. The study highlights the interdisciplinary nature of this field, intertwining information systems, design, psychology, and marketing. Theoretically, it is a foundational reference for future integrated frameworks exploring digital consumer engagement. Practically, it provides valuable insights for fashion brands and retailers aiming to innovate within virtual spaces. Overall, this study delineates the conceptual framework linking the metaverse and fashion, fostering the advancement of scholarly research and strategic implementation in the industry.

Categories: Marketing and Market Issues in Business, Marketing Communication
Keywords: metaverse, fashion industry, bibliometric analysis, biblioshiny, immersive experiences

Introduction And Background

The convergence of digital technologies and creative industries in recent years has led to significant changes across various fields; the metaverse is emerging as a central concept that inspires innovation (Mystakidis, 2022), (Cheng, 2023), and (Dwivedi et al., 2023). Often described as a collective virtual space that blends physical and digital reality, the metaverse transforms personal interactions, communication, and consumption (Rodriguez Sanchez and Garcia-Badell, 2022) (Wang et al., 2023). Embracing this virtual shift through immersive shopping experiences, digital fashion shows, avatar-based clothing, and blockchain-backed digital assets like NFTs (Non-Fungible Tokens), the fashion industry is among the most profoundly impacted sectors (Joy et al., 2022), (Kim, 2023), and (Park and Lim, 2023).

Traditionally rooted in tangible consumer interactions and noticeable aesthetics, the fashion industry is shifting its paradigm. Major global brands such as Gucci, Nike, and Balenciaga are venturing into the metaverse by launching virtual clothing lines, participating in digital fashion events, and collaborating with gaming platforms like Roblox and Fortnite (Pozzo, 2024), (SanMiguel et al., 2024), and (Tam and Lung, 2024). This trend is particularly evident among Gen Z and digitally savvy consumers, highlighting an increasing recognition of the financial and branding opportunities within virtual spaces. Consequently, the metaverse transforms perceptions of value, identity, and ownership in fashion while enhancing brand visibility (Sayem et al., 2025) (Schapsis et al., 2025).

Scholarly interest has grown in the link between metaverse technologies and fashion as brands seek new ways to engage customers in virtual spaces (Donvito et al., 2024), (Profumo et al., 2024), and (Bae et al., 2025). Researchers are now delving into the impacts of virtual fashion on consumer behavior, retail models, technology adoption, and digital marketing strategies (Kniazeva et al., 2024) (Ruiz Viñals et al., 2024). However, despite the growing body of work, relevant literature remains dispersed across various domains, including business, psychology, technology, and design. This hinders efforts to understand the field's current status coherently.

This study aims to systematically analyze the scholarly discourse surrounding the integration of the metaverse in the fashion industry. Specifically, it seeks to:

1. Perform a bibliometric analysis to pinpoint key trends, influential publications, authors, sources, and global collaborations; and

2. Analyze thematic structures and co-occurrence among keywords to determine dominant research themes and emerging fronts of investigation.

The Scopus database was revealed and examined using the Bibliometrix R package interface, Biblioshiny, and 149 research articles published between 2009 and 2025. This study has included articles using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to improve clarity. This dual perspective encompasses the full spectrum of scholarly progress at the intersection of fashion and the metaverse.

This work also seeks to spot field multidisciplinary trends. Mapping publication trends and conceptual connections will provide insightful analysis for future studies and support academics and business managers in this fast-changing sector.

Methodology

Employing a systematic literature review approach using PRISMA, transparency and repeatability in the choice of documents are promoted (Moher et al., 2010) (Sarkis-Onofre et al., 2021). Two main phases comprise this methodological framework: selecting articles depending on predefined eligibility criteria and applying the bibliometric analysis combining the Biblioshiny package with the Bibliometrix R package (Thangavel and Chandra, 2023).

Article Identification and Selection (PRISMA Framework)

We started our search on April 15, 2025, using the Scopus database, and followed the PRISMA guidelines to guarantee a systematic and objective selection of papers. The article identification and selection criteria is shown in Figure *1*. Concentrating on English-language publications and employing TIT-ABS-KEY for titles, abstracts, and keywords, we included specific keywords such as “metaverse,” “fashion,” “retail,” “cloth,” and “apparel.” We restricted our search to particular subject areas, including business, management and accounting, economics, psychology, social sciences, and decision sciences, thereby increasing the relevance to our field of study. This approach yielded 366 records.

The number of studies was reduced to 195 during the screening phase by manually eliminating duplicate and explicitly irrelevant entries by analyzing article titles, abstracts, and keywords. Full-text documents were carefully examined to ensure their applicability to the research topic during the ensuing eligibility phase. Articles that addressed one or more of the following criteria were kept: the role of the metaverse in fashion management and marketing; consumer behavior in fashion contexts about the metaverse; or the technological connections, opportunities, and risks that bridge the virtual and physical fashion domains. A total of 184 studies were found to be eligible after a thorough filtering process.

During the final choice process, another 35 papers were deleted because of insufficient relevance, especially a lack of significant attention on either fashion or the metaverse. Consequently, a final set of 149 papers was created for bibliometric investigation. This methodical approach guaranteed the inclusion of top-notch, thematically related research for the next projects.

Bibliometric Analysis with Biblioshiny

Biblioshiny, the web-based interface for the Bibliometrix R package that facilitates a thorough quantitative investigation of scientific literature, was used, and bibliometric analysis was conducted (Ghorbani, 2024). Comprising 149 documents, the study provided important new insights into the evolving research landscape at the intersection of the metaverse and fashion. The dataset spans from 2009 to 2025 and includes papers from 73 sources. Reflecting a significant thematic variety in the selected literature, 311 Keywords Plus and 516 Author’s Keywords were identified. The field exhibited an annual publication growth rate of 25.93%, indicating rapidly increasing scholarly interest; the papers averaged 15.56 citations per publication.

The presence of 422 contributing authors, an average of 3.38 co-authors per document, and a remarkable 41.61% rate of international co-authorship illustrate a high level of collaboration within the authorship pattern. Biblioshiny facilitated a variety of analytical outputs, including collaboration network patterns, conceptual structure maps, thematic maps, performance metrics, and keyword co-occurrence networks (Büyükkıdık, 2022). Notably, the keyword co-occurrence network garnered particular attention, emphasizing key thematic clusters such as retailing, virtual environments, consumer behavior, and digital platforms within the metaverse. In this multidisciplinary field, network visualization improved the interpretation of conceptual linkages and emerging trends by displaying dominant keywords and the strength of their associations. It also offered valuable insights into how themes converge and evolve.

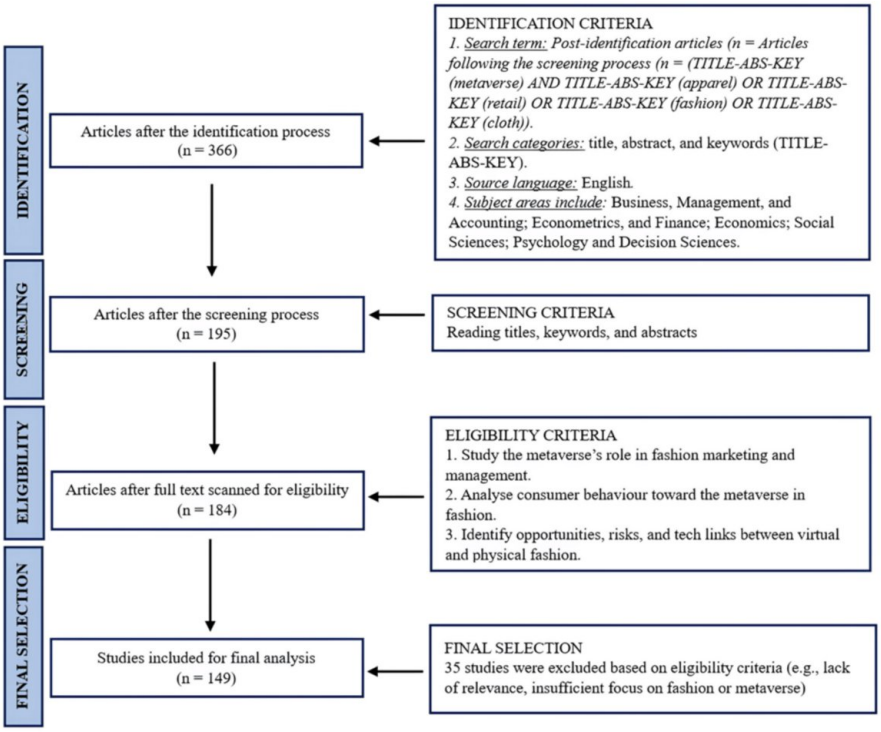

FIGURE 1: Research protocol using PRSIMA

PRSIMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Review

Results and findings

Annual Research Report on Metaverse and Fashion

Particularly in recent years, the annual scientific output on the metaverse and fashion has demonstrated an impressive upward trend, as shown in Figure *2* (Periyasamy and Periyasami, 2023). Publication activity remained low between 2009 and 2020; there was almost no notable scholarly output during this period. However, beginning in 2021, research activity surged alongside the growing academic interest in the intersection of virtual environments and fashion. From 2021 to 2023, the volume of publications fell sharply; in 2024, it peaked at nearly 60 papers. With close to 40 publications, a slight decline is expected in 2025, but generally, the trend indicates significant and increasing scholarly engagement with the subject. The rising number of publications from 2021 to 2024 can be linked to heightened interest in both academia and industry following the global shift to virtual platforms due to COVID-19. This period also saw increased investment in and development of metaverse technologies, alongside the blending of digital fashion trends, as reflected in emerging scholarly and industry literature. This trend highlights a dynamic and rapidly expanding field of study emerging from the metaverse's influence on retail innovation, consumer behavior, and fashion marketing (Chrimes and Boardman, 2023).

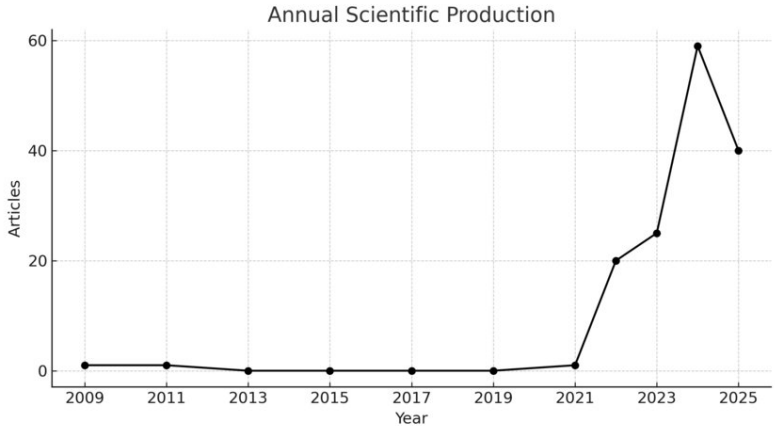

FIGURE 2: Annual scientific production

Most Relevant Sources

Examining the most pertinent materials in the field of metaverse and fashion reveals a multidisciplinary interaction involving digital technologies, consumer behavior, marketing, and fashion studies as shown Figure *3*. With 13 published papers, "Linguistic and Philosophical Investigation" is the primary source demonstrating a clear theoretical and conceptual contribution to the conversation. The "Journal of Global Fashion Marketing" and the "Journal of Retailing and Consumer Services" highlight commercial and consumer-focused perspectives, featuring 12 and 11 publications, respectively. Additional significant sources demonstrate regional and behavioral research approaches, such as the "Journal of the Korean Society of Clothing and Textiles" (7 papers), "Asia Pacific Journal of Marketing and Logistics," and "Computers in Human Behavior" (4 publications). Journals like "Internet Research," "International Journal of Fashion Design," "Technology and Education," and "International Journal of Human-Computer Interaction" show increasing interest in digital interfaces and the technological implications for the fashion industry (Russo et al., 2024). This distribution emphasizes the multidisciplinary character of research, bridging fashion and the metaverse.

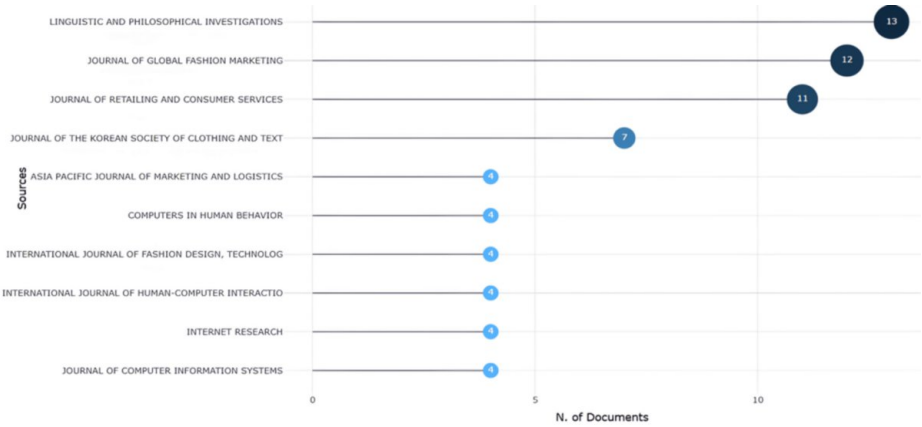

FIGURE 3: Top sources by number of publications

Most Relevant Affiliations

The institutional affiliation study indicates that research on the relationship between the metaverse and fashion is conducted worldwide as shown in Table *1*, with significant contributions from institutions in Asia, Europe, and the Middle East. With 18 articles, "Yonsei University" emerged as the most active affiliation, underscoring South Korea's strong intellectual presence in this emerging field. Exhibiting a growing interest in digital fashion in Central and Southeast Asia were the "University of Žilina" (Slovakia) and "UCSI University" (Malaysia), with 14 and 11 publications, respectively. Highlighting European interaction with media, fashion, and digital culture, "Università IULM" produced nine pieces. The academic base is geographically varied, as evidenced by the additional noteworthy contributions from "Qatar University" (eight articles), "Tampere University" (Finland), and the "University of Manchester" (UK), each of which produced seven papers. Universities including "Spiru Haret University", "Seoul

National University," and "Pune Institute of Business Management" also demonstrated notable involvement with six papers each. This distribution suggests a vibrant, global academic debate on fashion industry metaverse applications.

Affiliation	Articles
Yonsei University	18
University of Zilina	14
Ucsi University	11
Università IULM	9
Qatar University	8
Tampere University	7
University of Manchester	7
Pune Institute of Business Management	6
Seoul National University	6
Spiru Haret University	6

TABLE 1: Top contributing affiliations by number of articles

Wordcloud

The word cloud derived from the bibliometric data illustrates metaverse and fashion literature's most commonly used keywords (Michelle and Sabrina, 2022) (Park et al., 2023). Highlighting the primary thematic focus of this research area, the term "metaverses" emerges as the most prevalent, followed closely by "retailing," "virtual reality," and "marketing." It is being shown in Figure *4*. Additionally, some significant terms that frequently align with consumer behavior, digital marketing practices, and experiential retailing include: "consumption behavior," "sales," "virtual worlds," and "electronic commerce." Other notable keywords are "technology adoption," "immersive," "social media," and "artificial intelligence," suggesting a technology-oriented and behavioral perspective in current academic discussions. The interplay among information systems, behavioral science, marketing, and human-computer interaction illustrates that this field is multidisciplinary, as depicted in the infographic.

FIGURE 4: Word cloud of frequently occurring keywords

Keyword Co-occurrence Network

The keyword co-occurrence network provides an intellectual framework encompassing thematic associations within metaverse and fashion studies as shown in Figure 5. Several clusters arise from this co-occurrence network, representing concentrations of interconnected keywords. At the center of this domain, the terms “virtual reality” and “metaverses” are the most frequently used and connected keywords.

This core cluster is made up of several thematic clusters. Leading key concepts comprising “electronic commerce,” “consumer behavior,” “behavioral reasoning,” and “virtual environments,” the blue cluster addresses how users make choices in virtual environments and the technology they adopt. Marketing, retail strategies, and the digital transformation of fashion are underscored in the red cluster through keywords such as “retail,” “consumption behavior,” and “technology adoption.” Personal identity and engagement within virtual environments are linked by the green cluster, utilizing keywords such as consumer, avatar, and human. The purple cluster, with terms like online shopping, emotional response, conjoint analysis, is centered on online consumer experiences from a psychological and behavioral point of view.

This network joins marketing, technology, consumer psychology, and e-commerce highlighting cross-field study where the Metaverse meets Fashion (Um et al., 2024) (Venturini and Columbano, 2024). It also shows the increasing academic focus on how virtual technologies affect buyer actions and buying places.

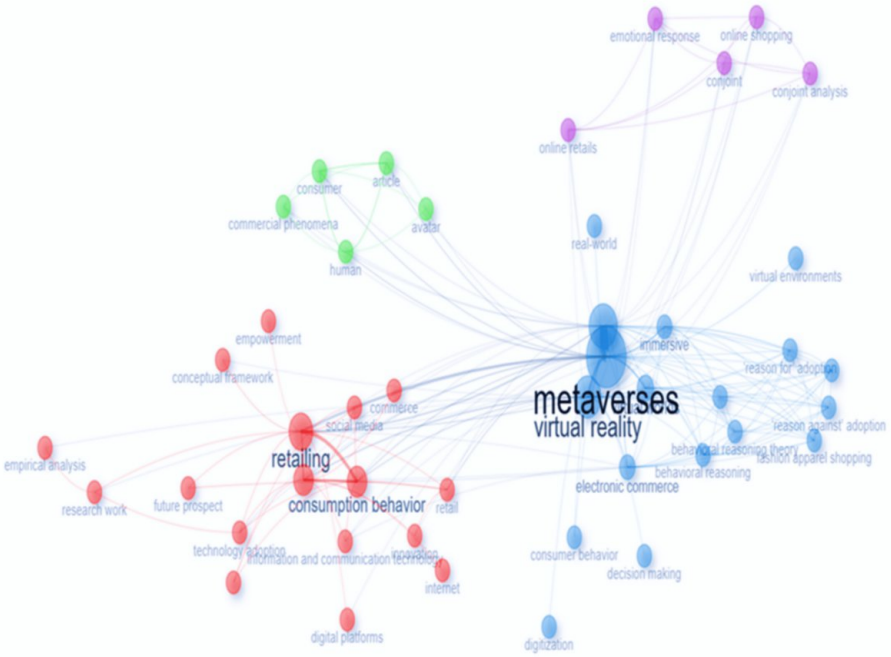

FIGURE 5: Keyword co-occurrence network

Country’s Scientific Production

Analyzing scientific work by country reveals that both affluent and developing nations are actively engaging in metaverse and fashion studies on a global scale as shown in Table 2. With 78 papers, India ranks first, indicating a strong interest in digital tools and online purchasing. South Korea closely follows in second place with 60 papers, contributing to research on online shopping behaviors and new technologies. This underscores the growing focus on virtual fashion setups and marketing strategies in North America and Europe, with Italy and the United States trailing behind with 52 and 51 papers, respectively.

The United Kingdom ranks second with 36 publications, followed by China with 30, reflecting the growing interest emerging from the Asia-Pacific region. Other top 10 researchers-aside from Romania (19), Malaysia (16), and Slovakia (14)-include Australia with 13. Significant contributions from Asia, Europe, and Oceania demonstrate a global intellectual interest in the metaverse and fashion. Strong government policies on digital transformation in India and Korea, along with a rapidly expanding tech-savvy consumer base, help explain the local innovations that underpin their substantial contributions (Chatterjee et al., 2024) (Kshetri et al., 2024).

Country	Frequency
India	78
South Korea	60
Italy	52
USA	51
UK	36
China	30
Romania	19
Malaysia	16
Slovakia	14
Australia	13

TABLE 2: Top 10 contributing countries in Metaverse and Fashion research

Discussion

It reflects broad and deep thinking that contemporary research on the link between fashion and the metaverse reveals. As the digital world evolves rapidly, this connection changes significantly, coinciding with the substantial increase in academic papers after 2021. More scholarly work indicates that more scholars recognize how these virtual spaces influence business, consumer behavior, selling methods, and purchasing habits in fashion (Mogaji et al., 2024) (Agarwal et al., 2025). Acting as an interdisciplinary domain, it garners considerable interest from various fields that contribute to studying the metaverse about fashion. Numerous works in marketing, human-computer interaction, fashion design, and social studies likely fuel this discussion! This link underscores a pressing need for integrated studies that combine consumer-focused fashion applications with emerging technology.

Contributors from India and South Korea position themselves at the forefront, underscoring Asia's influence on global research output. This is evidenced by high digital adoption rates and robust technological infrastructure, along with the emergence of virtual commerce in both countries. Furthermore, significant contributions from Italy, the USA, and the UK highlight the global significance of this issue-particularly in creative, fashion-oriented nations. Keyword analysis uncovers key concepts shaping research, such as virtual reality, marketing, consumer behavior, and online shopping. Clusters within the keyword co-occurrence network reveal specific sub-fields, including identity formation in virtual environments, emotional responses to virtual shopping, and acceptance of immersive retail platforms. This underscores the need for sophisticated theoretical and empirical models, as consumer behavior in digital fashion environments becomes increasingly intricate (Pillai et al., 2024). Although the rapid growth of research is encouraging, the literature also reveals fragmentation, where studies are sometimes isolated by discipline. More integrated models and cross-disciplinary approaches are essential to fully understand the consequences of the metaverse in fashion, from psychological effects and ethical questions to business models and technological feasibility.

While this bibliometric analysis provides a descriptive overview of the evolution of publication trends and thematic clusters, further interpretive insight is necessary. The significant upward trajectory of publications after 2021 represents more than a mere numerical upsurge-it exemplifies a substantive shift in scholarly attention-from traditional retail and marketing to enhancing the digital consumer experience, to name but one. This shift in focus reflects a broader metamorphosis in the entire paradigm of how fashion is conceived, produced, and consumed in a virtual environment. The stronger association of keywords such as virtual identity, NFTs, avatar, and emotional response indicates the emergence of research paradigms that consider psychological, experiential, and ethical questions related to fashion in the metaverse.

The shifts, therefore, indicate a domain necessitating investigation into how digital fashion defines identity, emotional engagement, and notions of ownership. With further application of technological themes such as gamification and blockchain, consumer empowerment and engagement in virtual retail platforms come into focus. This opportunity calls for the dissolution of certain existing disciplinary silos to build integrated models that interface marketing, consumer psychology, and digital fashion innovations. Investigating these dimensions contributes to further theorizing while simultaneously

guiding the fashion industry's strategy as it navigates the immersive digital economy.

Implications

Theoretical Implications

This research examines the intellectual tree and emerging thematic areas in the Metaverse for fashion, thus providing substantial theoretical input. Scholars can construct more layered interdisciplinary frameworks once crucial terminology, journal patterns, and thematic clusters are identified. The studies remain dispersed despite the fragmented literature exhibiting symptoms of marketing, consumer psychology, technology adoption, and fashion studies. This indicates that future research methods should develop theoretical models that unify the diverse aspects of consumer interaction, identity-making, and retail innovation within digital canvases (Kim et al., 2022) (Zhao et al., 2024). Additionally, bibliometric data could prove useful for conceptualizing digital experience design, brand experiences in virtual spaces, and reactions to immersive environments.

Practical Implications

Fashion brands, marketers, and technology developers can utilize this research to navigate the digital retail revolution. This growing academic interest highlights the metaverse's increasing significance as a commercial platform. The study’s findings may assist a company in determining whether to incorporate digital collections or branded stores in the virtual realm or virtual try-ons, thereby influencing their metaverse strategy. From the consumers' perspective, it is crucial to understand behavior in immersive platforms to enhance personalization, emotional engagement, and customer loyalty (Wanick and Bazaki, 2023), (Blazquez, 2024), and (Zhou et al., 2025). Certain bibliometric trends provide insights into various trajectories for fashion retailers, such as gamified shopping, social commerce, and NFT integration, thereby enabling them to create differentiated experiences to engage customers in today’s digital marketplaces.

Limitations and directions for future research

This study presents several insights; however, certain limitations must be considered. First, the bibliometric analysis is confined to Scopus-indexed publications in the English language; thus, relevant studies in other languages or databases such as Web of Science or Google Scholar may have been overlooked. Second, while the bibliometric methodology identifies trends and thematic clusters, it does not explore detailed qualitative interpretations of content or the theoretical depth of individual studies. Relying on keyword co-occurrences limits the study's ability to examine more nuanced relationships between concepts beyond the surface level of association. For instance, one concept might represent a viewpoint shared by another, yet that dimension falls outside the scope of co-occurrence; therefore, future studies should employ complementary bibliometric analyses alongside qualitative content analysis or systematic reviews to provide a deeper understanding of the discourse as it evolves. In light of the present findings, further research could explore how digital fashion experiences within the metaverse influence consumers' feelings, identity, and loyalty; the ethics of data privacy and virtual ownership; the potential for sustainable fashion in virtual spaces; and the comparison of levels of consumer engagement with native metaverse brands and traditional fashion houses entering virtual spaces. These opportunities present fertile ground for advancing knowledge and practical applications in this rapidly evolving field.

Conclusions

This study provides an extensive bibliometric and PRISMA analysis of research integrating the metaverse into the fashion industry, examining publications from 2009 to 2025. Using Biblioshiny, the analysis identifies key themes, prominent countries, institutions, leading journals, and publication growth trends. The findings reveal a rapidly growing and globally diverse interest in research, particularly on digital consumer behavior, virtual retail, and immersive branding strategies. Driven by evolving consumer preferences and technological advancements, this convergence of the metaverse and fashion creates a vibrant and complex landscape, particularly noticeable in Asia, where scholarly contributions are increasing significantly. Intellectual advancements in this field arise from a blend of innovative ideas generated through collaboration. Ultimately, this research contributes to enriching academic discussions regarding the metaverse's applications in fashion and serves as a vital resource for scholars, practitioners, and policymakers eager to explore or facilitate the digitization of the fashion industry. Future studies must address unexplored aspects, such as sustainability, ethics, and inclusivity within virtual fashion, and should promote such cross-domain collaborations.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Eshita Gupta, Ruchi Garg

Acquisition, analysis, or interpretation of data: Eshita Gupta

Drafting of the manuscript: Eshita Gupta, Ruchi Garg

Critical review of the manuscript for important intellectual content: Eshita Gupta

Supervision: Ruchi Garg

Disclosures

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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