AI Avatars, the Metaverse and Customer Experience: A Bibliometric Analysis

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Abstract
Purpose:
With the rise of AI avatars as the human interface to the metaverse, research on avatars, metaverse, and customer experience continues to be scattered. This paper investigates how the three areas developed, their intellectual links, and where there is scope for further research.
Design/methodology/approach:
As per PRISMA 2020, 508 Scopus indexed articles from journals were reviewed in Bibliometrix/Biblioshiny using the method of performance and science mapping along with the use of a robustness test and TCCM content analysis for 17 core studies.
Findings:
Output increased from 2 articles (2019) to 223 (2025), with the Journal of Retailing and Consumer Services being the leader; the most cited paper is Dwivedi et al. (2022), and collaboration is driven by the USA, India, and China, while Africa and Latin America trail; avatar marketing theory integrates three intellectual bases (betweenness 184.64). Metaverse orientation characterizes the field as avatar studies' proportion decreased from 23.4% to 13.9%, only 3.3% cover all three streams, while loyalty, ethics, and cross-cultural aspects are marginal. Analysis of TCCM shows fragmented theories (with none applying avatar marketing theory), retail-fashion settings, self-avatar emphasis, short-term results, and cross-sectional methods.
Implications:
Researchers need to conduct longitudinal, experimental and cross-cultural research on AI-supported avatars, while managers are required to develop emotionally intelligent and transparent avatars that help form loyalty.
Originality/value:
In contrast with previous reviews, the present study explicitly focuses on the convergence of three constructs: avatar-metaverse-customer experience. Using science mapping and TCCM content analysis methods, this study explores the connection between the intellectual structure and practice within this field, and uses these connections to translate integration, theory, and outcomes gap into a five-proposition integrative research agenda.

Keywords: AI avatars; Metaverse; Customer experience; Customer engagement; Bibliometric analysis; TCCM

1. Introduction

Customer engagement now involves an increasing use of digital agents, including rule-based chatbots, animations, and realistic digital humans. Miao et al. (2022) describe such entities as avatars digital depictions that vary in form realism (the human-likeness of looks) and behavioral realism (human-likeness of behavior) and state that both dimensions influence customer reactions towards them. In the context of services, virtual service agents may help mitigate adverse impacts of service failures (Sands et al., 2022a), whereas virtual influencers driven by AI become new brand ambassadors whose authority and authenticity are questioned (Thomas and Fowler, 2021; Arsenyan and Mirowska, 2021; Sands et al., 2022b).

Simultaneously, the metaverse and other extended reality (XR) technologies have enabled the creation of persistent immersive spaces where consumers engage with brands and each other via avatars (Rauschnabel et al., 2022; Dwivedi et al., 2022). Marketing academics have characterized the metaverse as a new domain in consumer behaviour and brand experience (Barrera and Shah, 2023; Dwivedi et al., 2023a; Hadi et al., 2024). Research has considered virtual stores in the metaverse (Chakraborty et al., 2024a), metaverse tourism and the associated phenomenon of presence (Jin et al., 2025), and information search via metaverse platforms (Gursoy et al., 2025). However, researchers have also issued warnings about issues such as privacy and manipulation (Dwivedi et al., 2023b).

Despite all this interest, however, the literature is still disconnected. Research on the topic of avatars and design, research on immersive technologies such as augmented reality, virtual reality and

metaverse, and research on customer experience and engagement has grown separately without much cross-fertilization (Dwivedi et al., 2023a; Hadi et al., 2024). Various reviews have covered specific segments of this research landscape so far. Reviews of avatar marketing have covered avatars from the perspective of being a marketing tool independently (Kusumawati et al., 2024; Qu et al., 2025), whereas reviews of the metaverse have covered metaverse research using customer engagement, customer experience or metaverse marketing as the starting point (Wasiq et al., 2024; Ozturk and Kizilkan, 2025; Bashar et al., 2025; Nyagadza et al., 2025). It is thus unclear how research on avatars is placed in the overall landscape of metaverse and customer experience literature and what are the underlying intellectual connections between the streams.

In order to bridge this gap, this paper will conduct a bibliometric study of Scopus indexed journal publications from 2019 to 2025 (database accessed on 18th July 2025). The following research questions will be considered:

RQ1: What are the publication patterns, main publications and authors, sources of knowledge, and international collaboration patterns in the study of artificial intelligence avatars, metaverse and consumer experience and engagement?

RQ2: What is the intellectual structure of this scientific area?

RQ3: What is the conceptual structure of this scientific area, and what are its under-studied areas?

This study offers four major contributions. First, this study stands out from previous reviews based solely on avatars or on metaverse engagement and experience by adopting the combination of AI avatars, metaverse environment and consumer experience and engagement as the anchor of this study and examining the extent to which these literatures are combined. Second, it offers the bridge of knowledge connecting conceptual metaverse literature with consumer empirical literature, offering the framework that will help guide future research. Dalal (2024) Third, it provides the missing customer outcomes, especially the long-term relational outcomes such as consumer loyalty. Sahani et al. (2025) Fourth, all of these findings are incorporated in a conceptual framework with five propositions and transformed into a research agenda with five directions each corresponding to research questions and theoretical/methodological framework.

The rest of the paper is structured as follows. Section 2 provides a review of the literature on AI avatars, the metaverse and customer experience/engagement. Section 3 outlines the methodology and data sources used. Section 4 reports the results of the performance analysis and science mapping, along with robustness checks. Jasani (2024) Section 5 examines the results against the research questions raised earlier and highlights the novelty of the paper relative to existing reviews and suggests an integrated framework. Section 6 presents the implications. Section 7 puts forward a research agenda for future studies, and Section 8 discusses the limitations of this study.

2. Literature Review

2.1 AI avatars in customer interactions

An avatar is a digital representation of either a human user or an AI-powered agent in interactions with clients. According to Miao et al. (2022), avatars can be classified by using the typology of form realism and behavioural realism, and the success of an avatar is dependent on its compatibility of its form and intelligence with the task. In customer service, the use of virtual service agents has been found to mitigate the impact of service failures (Sands et al., 2022a), while service robots have been changing the in-store shopping experience (Shankar et al., 2025). In marketing communication, AI-generated virtual influencers serve as endorsers for brands (Thomas and Fowler, 2021); however, their lifelike appearance on social media platforms makes one wonder whether it is authentic or fake (Arsenyan and Mirowska, 2021; Sands et al., 2022b). AI-powered technologies are also used to increase consumer engagement within certain product categories like beauty and cosmetics (Chakraborty et al., 2024b).

2.2 The metaverse and immersive consumer experiences

Metaverses are defined as persistent and multi-users environments, integrating physical and digital realities via immersive technologies (Mystakidis, 2022; Park & Kim, 2022). Rauschnabel et al. (2022) differentiate augmented and virtual realities in the context of extended reality (XR), whereas Dincelli & Yayla (2022) present literature on immersive virtual reality in the context of technology affordances. Jasani (2023) Marketing scholars see the metaverse as an emerging frontier for consumer behavior and brand building (Barrera & Shah, 2023; Dwivedi et al., 2023a; Hadi et al., 2024). Empirical research has been conducted on the continuance intention towards metaverse based virtual stores (Chakraborty et al., 2024a; Boccia & Palmieri, 2025), the determinants of metaverse adoption (Bauerová & Halaška, 2025; Rana & Banerjee, 2024), and personality and organizational factors influencing metaverse adoption by enterprises (Kumar et al., 2024a, 2024b; Kumar & Shankar, 2024). There are other

papers which explore metaverse in the context of tourism, education, supply chain management (Correia, 2025; Buragohain et al., 2023; Chen et al., 2023), and show that augmented reality changes post-purchase product evaluation by consumers (Dong et al., 2025).

2.3 Customer experience and engagement in avatar-mediated environments

Customer experience in immersive settings is affected by presence, embodiment, and interactivity. Embodiment and the self-image portrayed by users through avatars facilitate continuance intention in the metaverse (Dwivedi et al., 2024), while embodiment and ergonomic factors are considered important elements of an immersive VR tour that helps to make tourist experiences memorable (Balakrishnan et al., 2024b). Informative and peripheral factors of the metaverse affect customer experience through the self-concept of users (Balakrishnan et al., 2024a), while presence was defined as a measurable construct in metaverse tourism (Jin et al., 2025). Metaverse experiences may inspire actual trips (Deng et al., 2024), information searches (Gursoy et al., 2025), synthetic tourism experiences (Miao et al., 2025), and contactless interactive marketing campaigns (Ku, 2025). Gamification, which could have a negative effect (Flavián et al., 2024), and social activities, including metaverse dating (Chakraborty et al., 2023), are some other ways of engaging customers. However, researchers raise concerns about privacy and manipulation risks (Dwivedi et al., 2023b).

2.4 Prior reviews and research gap

A number of bibliometric reviews have investigated some aspects of this field. For instance, Kusumawati et al. (2024) performed mapping on 185 Scopus publications on avatar marketing for the period from 2004 to 2024. Wasiq et al. (2024) used bibliometric methods together with topic modelling to investigate customer engagement in the metaverse on the base of 409 Scopus publications. Ozturk and Kizilkan (2025) conducted analysis on 289 Web of Science and Scopus publications on metaverse marketing. Very recently, Bashar et al. (2025) and Nyagadza et al. (2025) applied topic modelling and theories-contexts-characteristics-methodologies (TCCM) framework correspondingly to analyze 1,460 Scopus publications (2000-2025) on customer experience in the metaverse and other virtual worlds and reported that there is a need for developing metaverse-specific customer experience models. In these reviews, customer engagement, customer experience or marketing is an anchoring concept and avatars are one of many themes addressed in the studies. Rahila et al. (2025) It should be mentioned that avatar research has mostly been carried out in the context of service and advertising (Miao et al., 2022; Dwivedi et al., 2023a).

3. Methodology

This research employs the bibliometric methodology suggested by Donthu et al. (2021), which was carried out using the Bibliometrix R package via the Biblioshiny interface (Aria and Cuccurullo, 2017). The three stages in the process are shown in Figure 1, while Figure 2 depicts the process of data gathering and selection following the PRISMA 2020 guidelines (Page et al., 2021).

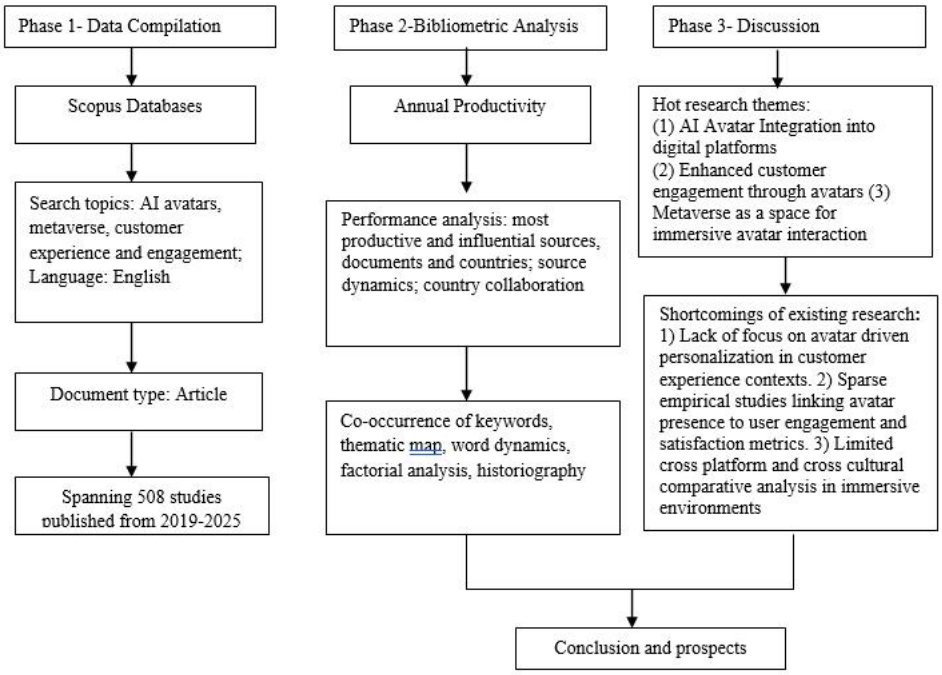


Fig. 1: Methodological framework of the study

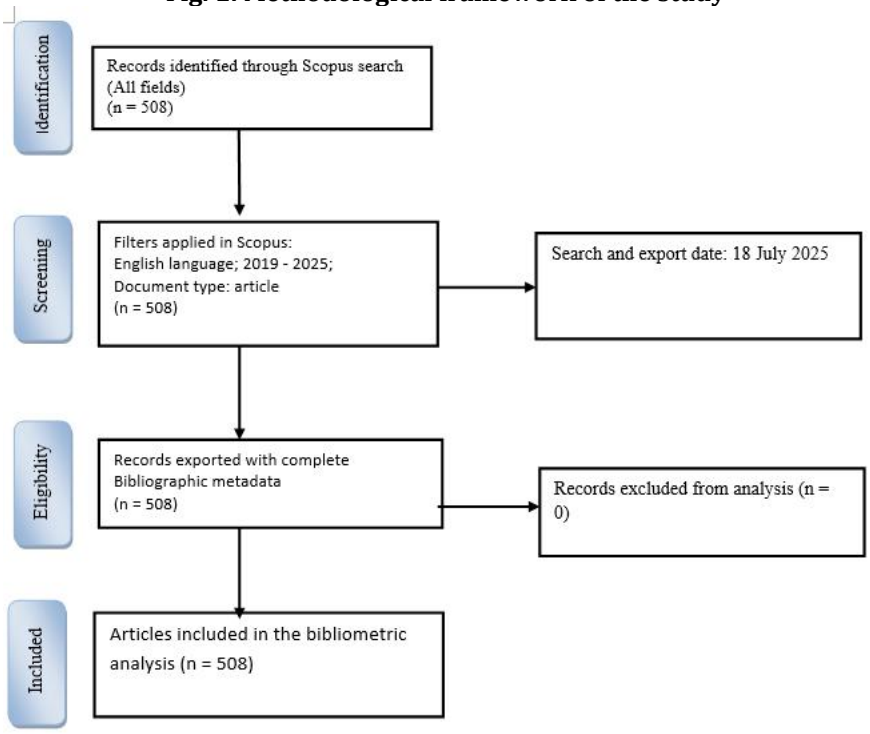


Fig. 2: Data retrieval and selection process (PRISMA 2020 flow)

The database used in this research is Scopus due to its wide range of peer-reviewed literature from the domains of business, management and information systems as well as the standardized metadata for bibliometric analysis. Harjai et al. (2025) The search was performed across all Scopus fields (ALL) covering titles, abstracts, keywords and references, and the results were downloaded on 18th July 2025. In the end, only articles published in journals written in English language during the period from 2019 till 2025 were taken into account, totaling 508 articles analyzed using Biblioshiny.

3.1 Search strategy and analysis

The search used the terms "metaverse" and "AI avatar" with "customer satisfaction" and "customer engagement". The search included the following terms and filters: ALL ((metaverse OR AI avatar) AND (customer satisfaction OR customer engagement)) AND PUBYEAR > 2018 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE ,

"ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (PUBSTAGE , "final")). Since the ALL field includes also the search of references, the search returned some articles in which the searched terms appear mostly in cited references; this is recognized as a limitation (Section 8.1). Keywords were chosen based on previous literature on avatars, metaverse and customer experience. Only articles in English were included since English is the main language in which publication is carried out in this field; this is recognized as a limitation. Conceptual Keyword sets that define the subject area of the research and guided the interpretation of the results. Performance analysis was used for productivity and impact analysis (publications, citations, sources and countries), and science mapping was used for historiographical analysis and co-citation analysis and also for conceptual analysis (keywords co-occurrence, thematic map, word dynamics, multiple correspondence analysis).

In order to find out if it made a difference, a robustness test was performed on the sample of 306 articles that use the search terms in their title, abstract or keywords (Section 4.7). Also, 17 articles about avatars, the metaverse and customers' experience, engagement or satisfaction were coded through the theory-context-characteristics-methodology (TCCM) framework (Paul and Rosado-Serrano, 2019) based on the title, abstract and keywords of these articles (Section 4.8).

Table 1: Conceptual keyword sets defining the scope of the study

Set 1: AI Avatar	Set 2: Metaverse	Set 3: Customer Engagement	Set 4: Customer Experience
AI avatar	Metaverse	Customer engagement	Customer experience
Virtual agent	Virtual reality	Brand engagement	User satisfaction
Conversational agent	3D immersive environment	Interactive experience	Service experience
Intelligent assistant	Digital world	Consumer interaction	Experience quality
Digital persona	Virtual space	Participation behavior	Emotional satisfaction
Embodied AI	XR environment	Touchpoint engagement	Post-purchase experience

4. Results

4.1. Main Information about the Data

The dataset consists of 508 research papers that have been published between the years 2019 and 2025 in 195 different sources (Table 2, Fig. 3). The mean document age of 0.78 indicates how young the field is. The annual number of publications has been growing from 2 in 2019 to 223 in 2025, with an annual growth rate of 119.39%; the growth rate should be viewed with reservation as it is calculated based on a very small base and partial data for 2025. Each paper had 19.69 citations. 1,479 authors who authored 508 papers on average had 3.72 co-authors per paper; there were 41 papers with a sole author, and 42.13% were papers with international co-authorship. There are 1,761 author keywords and 1,387 Keywords Plus in the dataset.

Table 2: Main Information Data

MAIN INFORMATION ABOUT DATA	
Timespan	2019:2025
Sources (Journals, Books, etc)	195
Documents	508
Annual Growth Rate %	119.39
Document Average Age	0.781
Average citations per doc	19.69
References	42456
DOCUMENT CONTENTS	
Keywords Plus (ID)	1387
Author's Keywords (DE)	1761
AUTHORS	
Authors	1479
Authors of single-authored docs	40
AUTHORS COLLABORATION	

Single-authored docs	41
Co-Authors per Doc	3.72
International co-authorships %	42.13
DOCUMENT TYPES	
article	508

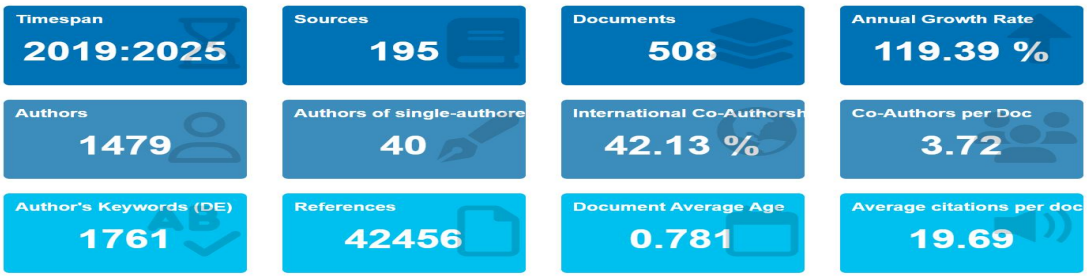


Fig 3: Main information

4.2. Annual Scientific Production trend

The output growth was quite slow until 2023, but it sped up after 2024; cumulative output up to 2023 constitutes 56.10% of the total. Years 2024 and 2025 comprise 82% of all articles. Citations showed considerable variations during the years (Table 3, Fig. 4). The high number of citations for 2019 (ACP 120.50; ACY 17.21) is due to only two papers, one of them being highly cited, and there were no publications in 2020. The spike in citations in 2022 (ACP 256.91; ACY 64.23) resulted from a few pioneering works like Dwivedi et al. (2022), and Rauschnabel et al. (2022). The citation rate decreased for 2023 (ACP 40.04) and 2024 (ACP 17.28), and the low numbers in 2025 (ACP 2.23) can be explained by the short period during which these papers had time to gather citations.

Table 3: Average Citation per Publication (ACP) and Annual Citations per year (ACY) over time

Year	ACP	NP	ACY
2019	120.50	2	17.21
2021	4.00	1	0.80
2022	256.91	11	64.23
2023	40.04	77	13.35
2024	17.28	194	8.64
2025	2.23	223	2.23

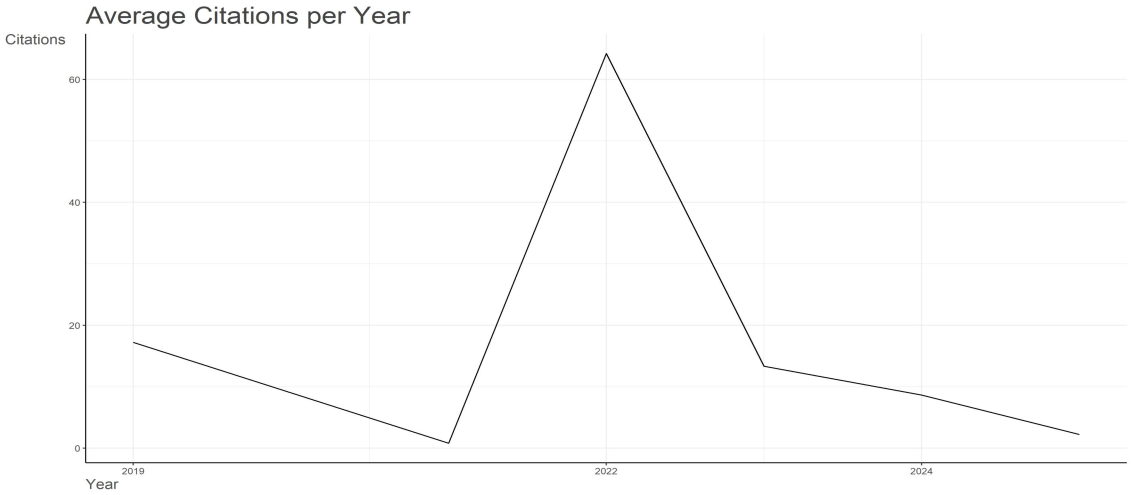


Fig. 4: Average Citations per year; NP = number of Papers; ACP = Average Citations per Publication; ACY = Average Citations per Year.

4.3. Most Productive Sources

Table 4 and Figure 5 below illustrate some of the leading academic journals that have contributed most to the study of AI avatars, immersive technology, and digital customer experience. The ranking of these journals is done

based on their number of publications (NP) and is defined by their 2024 Journal Impact Factor (IF), SJR quartile (Qrt), and publisher.

Table 4: Most Productive Sources (2019 – 2025)

Source	NP	Qrt	IF	Publisher
JOURNAL OF RETAILING AND CONSUMER SERVICES	45	Q1	6.4	Elsevier
TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	22	Q1	12.5	Elsevier
INTERNATIONAL JOURNAL OF CONTEMPORARY HOSPITALITY MANAGEMENT	15	Q1	9.2	Emerald Group Publishing Ltd.
JOURNAL OF CONSUMER BEHAVIOUR	15	Q1	5.2	Wiley-Blackwell
COMPUTERS IN HUMAN BEHAVIOR	14	Q1	9.8	Elsevier
JOURNAL OF THEORETICAL AND APPLIED ELECTRONIC COMMERCE RESEARCH	14	Q1	5.1	MDPI AG
JOURNAL OF BUSINESS RESEARCH	12	Q1	11.3	Elsevier
PSYCHOLOGY AND MARKETING	11	Q1	9.1	Wiley-Liss Inc.
INTERNATIONAL JOURNAL OF HUMAN-COMPUTER INTERACTION	10	Q1	5.5	Taylor & Francis Ltd.
LINGUISTIC AND PHILOSOPHICAL INVESTIGATIONS	-	-	-	Addleton Academic Publishers (discontinued from Scopus, 2023)

NP = Number of Papers; Qrt = Quartile Ranking; IF = Impact Factor, 2024

The journal Linguistic and Philosophical Investigations ceased to be included in Scopus in 2023 and is without a Journal Impact Factor; its papers were kept because they were indexed during the search process (Section 8.1).

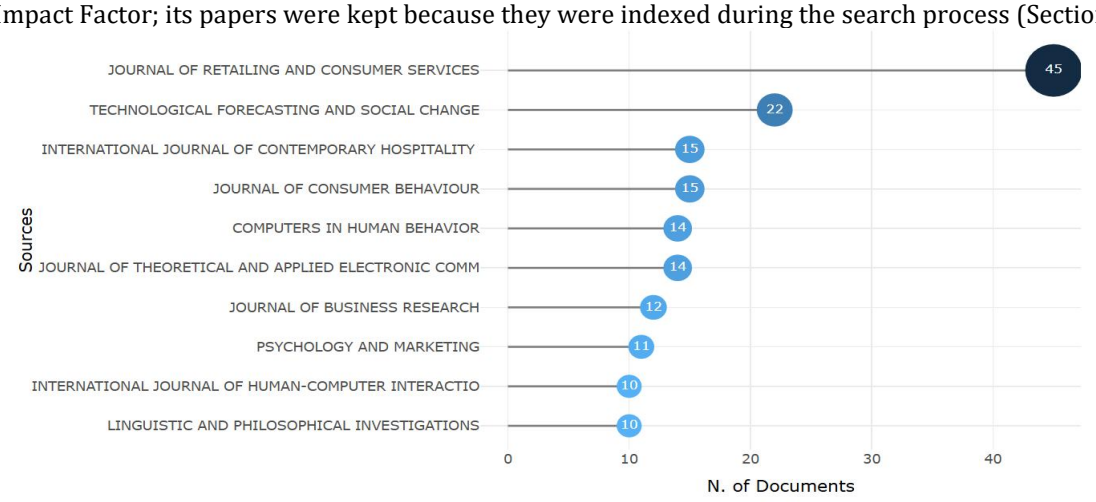


Fig 5: Most relevant sources

The Journal of Retailing and Consumer Services is the most productive source in which 45 papers have been published related to this topic between 2019 and 2025. This is followed by Technological Forecasting and Social Change with 22 papers, and both the International Journal of Contemporary Hospitality Management and the Journal of Consumer Behaviour with 15 papers. Computers in Human Behavior and the Journal of Theoretical and Applied Electronic Commerce Research have each published 14 papers. Q1 journals like the Journal of Business Research (12 papers; IF 11.3) and Psychology and Marketing (11 papers; IF 9.1) have also been found to be publishing papers on this topic.

From Table 5 and Figure 6, we can see that there was almost no output up to 2021, but the output increased from 2022 (11 outputs), and then increased sharply in 2023 (77 outputs) and in 2024 (194 outputs), to reach 223 outputs by 2025 despite the fact that 2025 output only considers up to 18 July 2025.

Table 5: Annual Production per Year

Year	Articles
2019	2
2020	0
2021	1
2022	11
2023	77
2024	194
2025	223

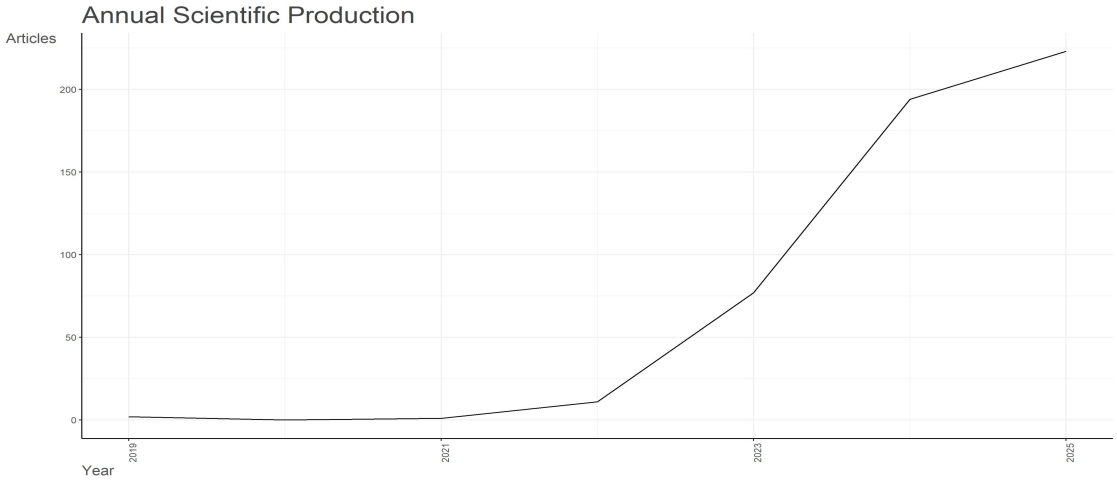


Fig 6: Annual Production 2019 to 2025

Table 6 and Figure 7 represent the total number of publications by top publications over time. Publication was extremely rare until 2022 when two papers were published by Computers in Human Behavior. After 2023, rapid growth was seen within the industry where the Journal of Retailing and Consumer Services expanded from a cumulative 5 in 2023 to 26 in 2024 and 45 in 2025, while Technological Forecasting and Social Change expanded from 11 in 2024 to 22 in 2025. In 2025, the International Journal of Contemporary Hospitality Management and the Journal of Consumer Behaviour both published 15 papers each, while Computers in Human Behavior and the Journal of Theoretical and Applied Electronic Commerce Research published 14 each.

Table 6: Cumulative publications of top journals over time

Year	Journal of retailing and consumer services	Technological forecasting and social change	International journal of contemporary hospitality management	Journal of consumer behaviour	Computers in human behavior	Journal of theoretical and applied electronic commerce research
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	2	0
2023	5	0	0	0	3	0
2024	26	11	5	9	10	2
2025	45	22	15	15	14	14

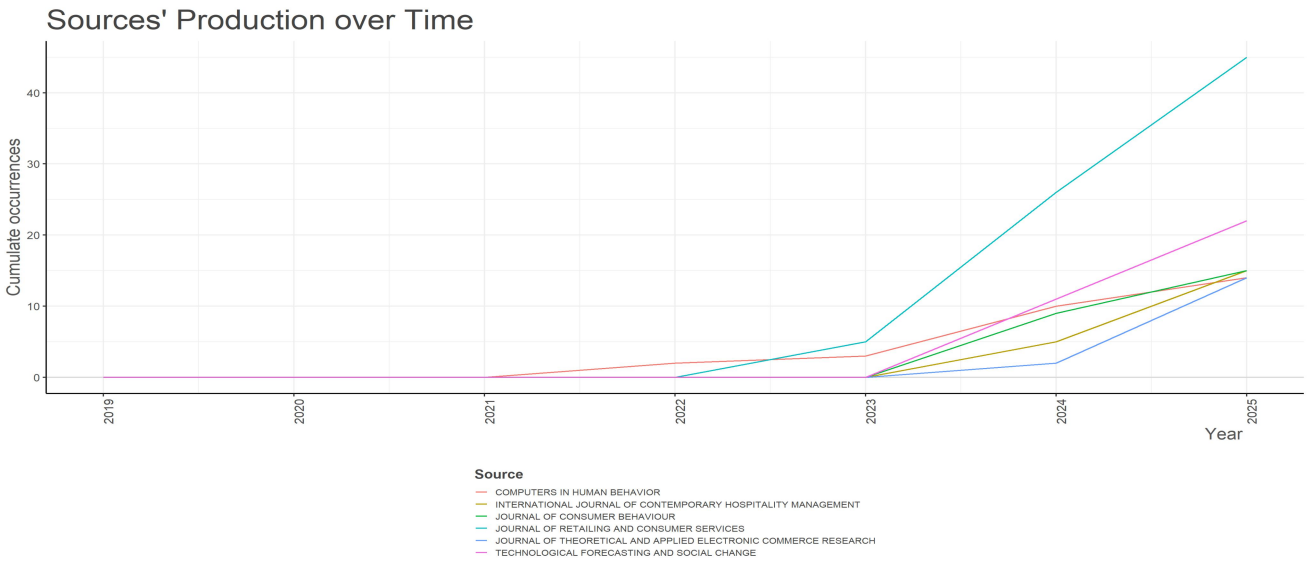


Fig. 7: Source dynamics of top journals (cumulative)

4.4. Distribution of Country Collaboration

Table 7 and Figure 8 illustrate international collaborations of the countries in the dataset using affiliations of all authors. The country with the highest number of internationally co-authored articles is the USA (61), followed by India (55), China (53), the UK (52), and South Korea (44). India and the UK have the largest networks in terms of the number of collaborative partners (45) followed by the USA (44) and Australia (41). The involvement of Asia and Middle East countries in the international scientific research is illustrated by Malaysia, Saudi Arabia, Hong Kong, Qatar, and UAE, and the most collaboratively active country in Africa is South Africa (12 collaborative articles). Latin America countries and most of African countries have almost no international co-authorship articles (such as Brazil – 2, Egypt – 2, Nigeria – 3, Morocco – 4).

Table 7: Top 20 countries by internationally co-authored articles

Rank	Country	Articles	Internationally co-authored articles	Partner countries
1	USA	98	61	44
2	India	89	55	45
3	China	111	53	40
4	United Kingdom	61	52	45
5	South Korea	76	44	38
6	Malaysia	26	25	35
7	Australia	30	23	41
8	Saudi Arabia	22	22	35
9	Hong Kong	26	22	28
10	Italy	39	19	36
11	France	22	17	39
12	Taiwan	23	17	33
13	Qatar	16	16	28
14	United Arab Emirates	15	15	24
15	Canada	16	15	23
16	Spain	26	13	34
17	South Africa	12	12	25
18	Macao	12	11	8

19	Romania	13	10	4
20	Pakistan	9	9	17

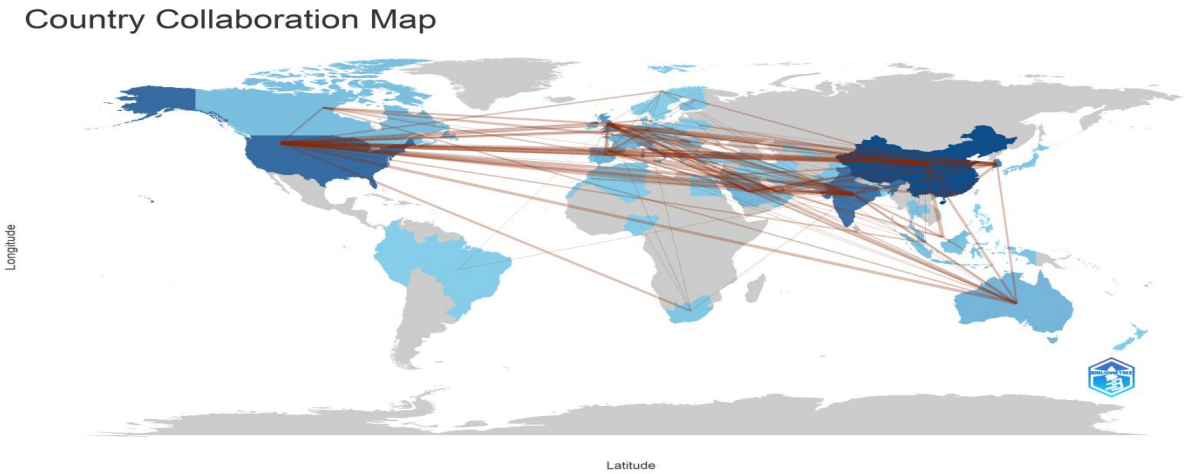


Fig 8: Country collaboration map

4.5. Intellectual structure

Intellectual structure analysis is done based on the most cited papers, historiography and co-citation network of cited references.

4.5.1. Most influential works

Among the studies related to AI avatars, the metaverse, and digital customer experience, Table 8 contains the ten most impactful scholarly works. It is essential to emphasize that there are many recently published papers in 2022 and 2023 years that have a very high average citations per year (ACY) rate, which often exceeds those of previously published papers. The paper with the maximum TC rate and highest ACY value in this sample belongs to Dwivedi et al. (2022) entitled "Metaverse Beyond the Hype: Multidisciplinary Perspectives on Emerging Challenges, Opportunities, and Agenda for Research, Practice and Policy" (International Journal of Information Management) with TC = 1,725 and ACY = 431.25.

It is followed by Dwivedi et al. (2023a) "Metaverse Marketing: How the Metaverse Will Shape the Future of Consumer Research and Practice" (Psychology & Marketing) with TC = 556 (ACY = 185.33) and Rauschnabel et al. (2022) "What is XR? Towards a Framework for Augmented and Virtual Reality" (Computers in Human Behavior) with TC = 540 (ACY = 135). Among other highly cited papers, it is possible to mention Barrera and Shah (2023) and Hadi et al. (2024) with their high ACY rates (149.0 and 117.5, respectively).

Table 8: Most Influential Publications

Author	Source	Document Title	DOI	TC	TC Rank	ACY	Publisher
DWIVEDI YK, 2022,	International journal of information management	Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy	10.1016/j.ijinfomgt.2022.102542	1725	1	431.25	Elsevier
DWIVEDI YK, 2023,	Psychology & Marketing	Metaverse marketing: How the metaverse will shape the future of consumer research and practice	10.1002/mar.21767	556	2	185.33	Wiley Online Library
RAUSCHNABEL PA, 2022,	Computers in human behavior	What is XR? Towards a framework for augmented and virtual reality	10.1016/j.chb.2022.107289	540	3	135	Elsevier

BARRERA K, G, 2023,	Journal of Business Research	Marketing in the Metaverse: Conceptual understanding, framework, and research agenda	10.1016/j.jbusres.2022.113420	447	4	149	Elsevier
HADI R, 2024,	Journal of Consumer Psychology	The Metaverse: A new digital frontier for consumer behavior	10.1002/jcpy.1356	235	5	117.5	Wiley Online Library
SANDS S, 2022,	Business Horizons	False idols: Unpacking the opportunities and challenges of falsity in the context of virtual influencers	10.1016/j.bushor.2022.08.002	166	6	41.5	Elsevier
HUANG Y-C, 2019,	Education and Information Technologies	An investigation of motivation and experience in virtual learning environments: a self-determination theory	10.1007/s10639-018-9784-5	156	7	22.28	Springer
DWIVEDI YK, 2023,	Information systems frontiers	Exploring the darkverse: A multi-perspective analysis of the negative societal impacts of the metaverse	10.1007/s10796-023-10400-x	122	8	40.66	Springer
JAFAR RMS, 2023,	Technology in Society	Unfolding the impacts of metaverse aspects on telepresence, product knowledge, and purchase intentions in the metaverse stores	10.1016/j.techsoc.2023.102265	118	9	39.33	Elsevier
SUNG E, 2023,	Psychology & Marketing	NFT luxury brand marketing in the metaverse: Leveraging blockchain-certified NFTs to drive consumer behavior	10.1002/mar.21854	117	10	39	Wiley Online Library

4.5.2. Historiograph

As shown in the historiograph (Fig. 9), direct citations of the most locally cited papers from the dataset are presented in chronological order. There are two major citation paths.

Red cluster (metaverse marketing and consumer behavior): The two papers by Dwivedi et al. (2023a, 2023b) devoted to metaverse marketing and negative societal effects of the metaverse are the core of the citation path. The early framework of advertising presented in the paper by Ahn et al. (2022) is used as the basis for this core, which is extended by papers by Sung et al. (2023), Arya et al. (2024), Kaur et al. (2024), and Murtas et al. (2024) to NFT luxury marketing, gamification of brand equity, consumer behavior in the metaverse, and early metaverse experience of luxury fashion brands.

Blue cluster (virtual agents and service context): The paper by Sands et al. (2022b) on virtual influencers cited by Gursoy et al. (2023) offering the framework of the metaverse in the field of services marketing and by Tlili et al. (2023) analyzing the metaverse as the path to Industry 5.0 and Society 5.0 in service sectors are connected in this smaller path.



Fig 9: Historiography graph

4.5.3 Co-Citation Analysis

Co-citation analysis reveals the intellectual roots of a field by looking at how frequently two references are cited jointly in subsequent documents. Figure 10 and Table 9 show the co-citation network of the cited references in the 508 articles and reveal three clusters.

Green cluster: This largest cluster comprises conceptual and review studies about the metaverse, namely Barrera and Shah (2023), Kim (2021), Mystakidis (2022), Park and Kim (2022), Dincelli and Yayla (2022) and Dwivedi et al. (2022). Such studies explain the metaverse, its technological structure and its impact on marketing, tourism and hospitality.

Blue cluster: This cluster combines the technology acceptance model (Davis, 1989), the environmental psychology viewpoint, forming the basis of the stimulus-organism-response approach (Mehrabian and Russell, 1974), avatar marketing theory (Miao et al., 2022) and structural equation modeling recommendations (Fornell and Larcker, 1981; Henseler et al., 2015; Hair et al., 2019). The betweenness centrality of Miao et al. (2022) is significantly higher (184.64) than those of other articles and it indicates that Miao et al. (2022) serve as the key link between metaverse literature and empirical consumer research.

Red cluster: This small cluster is formed by Thomas and Fowler (2021) and Arsenyan and Mirowska (2021) whose research concerns AI and virtual influencers in relation to being brand endorsers. Its rather high closeness centrality (0.018–0.019) demonstrates its good connections with other nodes, even though it is small in size.

These three clusters altogether confirm that the field is based on conceptual metaverse studies, existing theories and methodologies in consumer behaviour, as well as a separate line of research on AI influencers.

Table 9: Centrality measures of selected co-cited references

Node	Cluster	Betweenness	Closeness
Mehrabian a. 1974	Blue	2.086	0.014
hair j.f. (Multivariate Data Analysis)	Blue	0.311	0.013
Dincelli e. 2022	Green	0.140	0.015
Davis f.d. 1989	Blue	20.279	0.017
Thomas v.l. 2021	Red	1.412	0.018
Henseler j. 2015	Blue	4.012	0.016
Arsenyan j. 2021	Red	7.989	0.019
Miao f. 2022	Blue	184.635	0.026
Hair j.f. 2019	Blue	30.404	0.021
Park s.m. 2022	Green	8.620	0.015

Note: The node "hair j.f." is reported by Bibliometrix without a year; in the cited references it corresponds to the various editions of Multivariate Data Analysis (Hair et al., 2010).

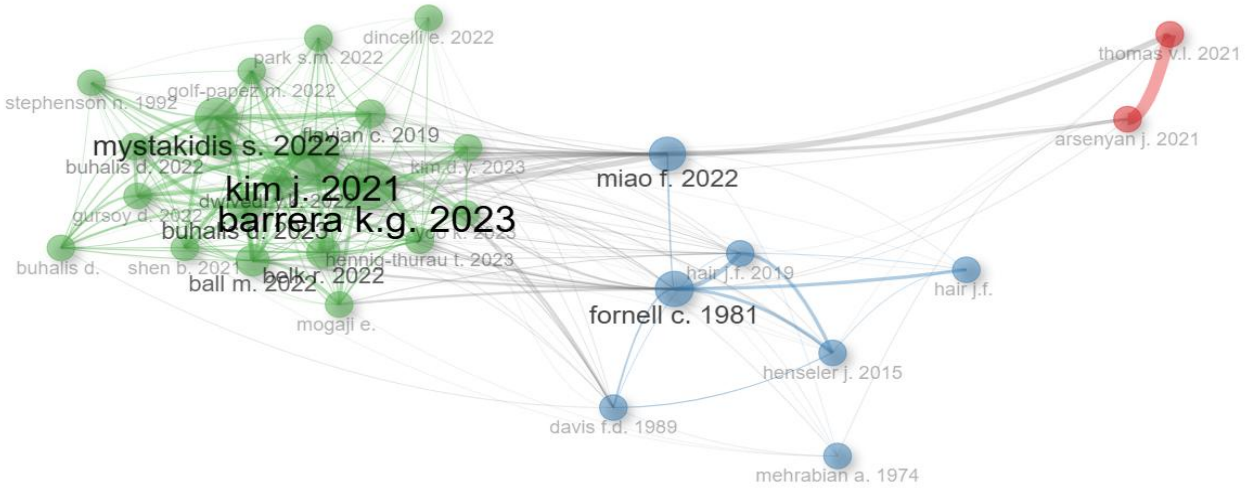


Fig 10: Co-Citation Analysis Network

4.6. Conceptual structure

The conceptual structure analysis identifies the important topics in the research field and their interrelationships. This is illustrated in this paper using keywords frequency analysis (treemap and word dynamics), a three-field plot, a keyword co-occurrence network, a thematic map, and MCA.

4.6.1. Keyword Frequencies:

The treemap (Figure 11) and Table 10 provide information on the keywords occurring in the highest frequency in the 508 articles. "Metaverse" (206 times; 18%) occurs as the most frequent keyword, followed by "virtual reality" (96 times; 8%) and "metaverses" (79 times; 7%), where "metaverses" represents the plural form of the same keyword. The remaining keywords are "artificial intelligence" (45; 4%), "consumption behaviour" (38; 3%), "marketing" (31; 3%), and "augmented reality" (30; 3%). "Avatar" does not feature in the top ten keywords list.

Table 10: Cumulative keyword occurrences over time

Keywords	2019	2020	2021	2022	2023	2024	2025
Metaverse	0	0	0	4	45	129	206
Virtuall Reality	1	1	1	4	21	65	96
Metaverses	0	0	0	3	15	47	79
Artificial Intelligence	0	0	0	1	4	20	45
Consumption Behaviour	0	0	0	0	3	18	38
Marketing	0	0	0	0	5	20	31
Augmented Reality	0	0	0	2	6	16	29
Social Media	0	0	0	0	2	16	29
Virtual Environment	0	0	0	0	1	7	25
Purchase Intention	0	0	0	1	3	13	23

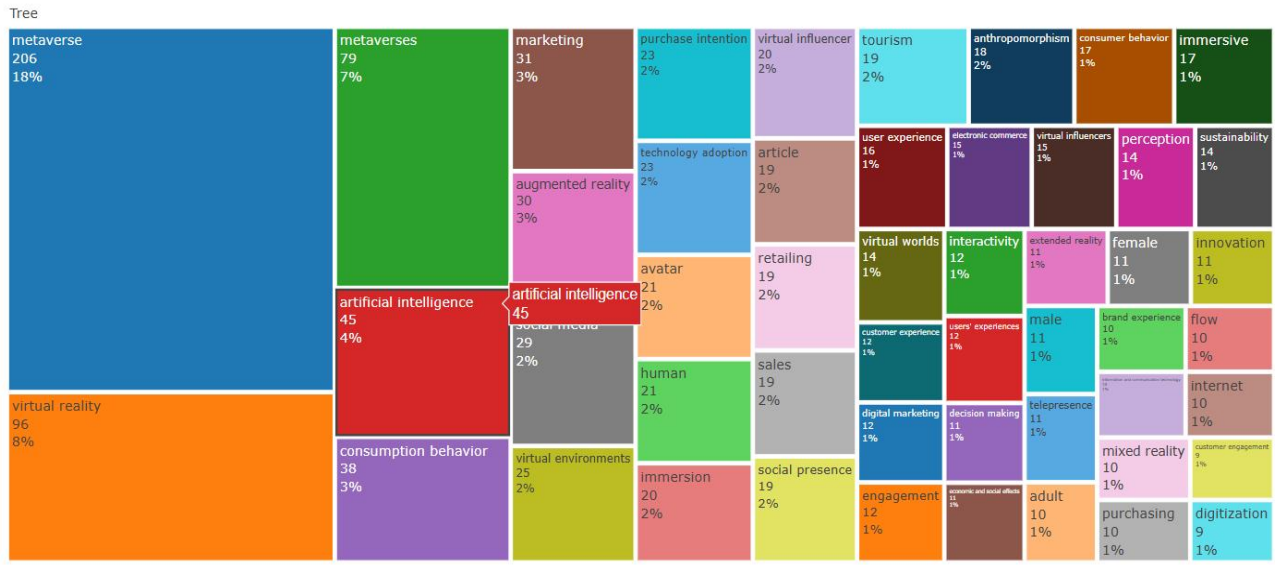


Fig 11: Treemap

4.6.2 Word Dynamics

In Figures 12 and Table 10, the growth in cumulative frequency for the keywords that occur most often is observed. The keyword "metaverse" emerges in 2022 (4 occurrences), increases to 45 in 2023, 129 in 2024, and 206 in 2025. "Virtual reality" is the sole keyword among the most frequently used ones that emerges since 2019; however, it was still insignificant until 2022 and rose to 96 in 2025.

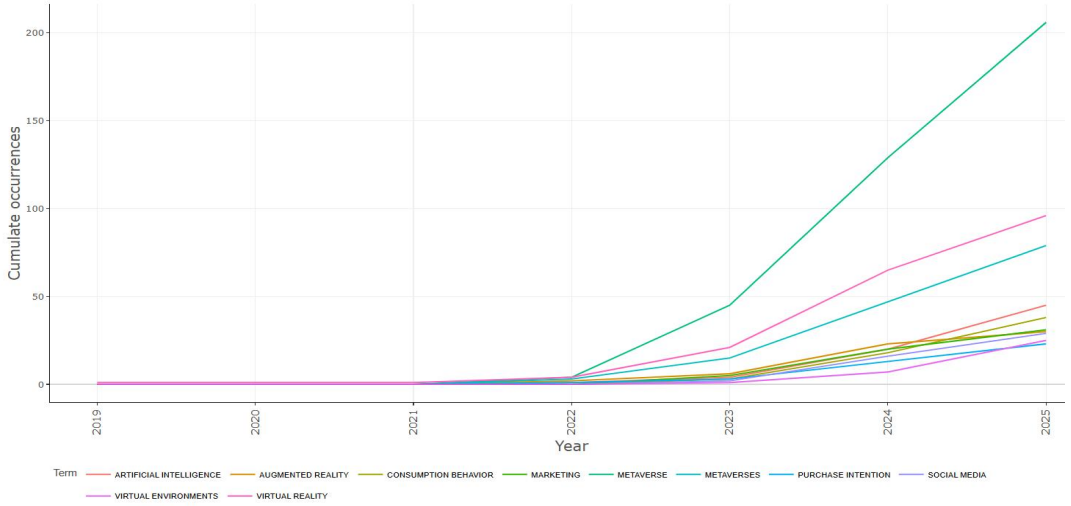
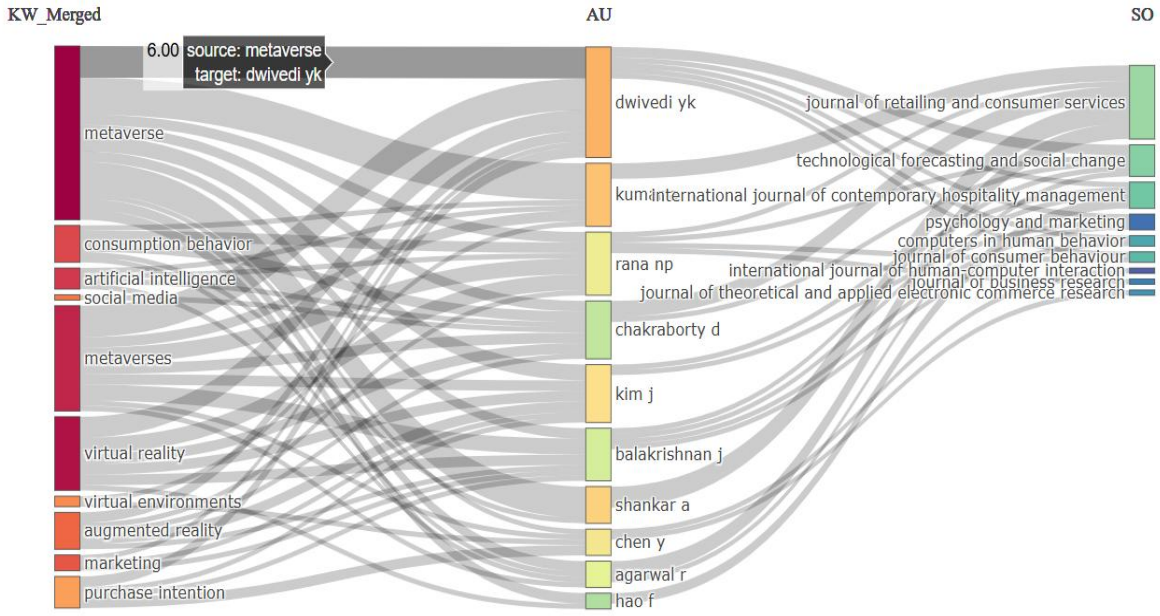


Fig 12: Word Dynamic

4.6.3. Three-field plot: Keywords, Authors, and Sources

Figure 13, which is a Sankey diagram, presents the three-dimensional relation of the merged keywords (left-hand side), authors (middle), and source of publications (right-hand side). It has been observed that "Metaverse" is the key keyword associated most with Dwivedi Y.K., making him the leader of the author nodes and highly correlated with publications in the "Journal of Retailing and Consumer Services" and "Technological Forecasting and Social Change". The next set of authors consists of Kumar A., Rana N.P., and Chakraborty D., which are highly connected with metaverse and behavioral terms, and have their research published in "International Journal of Contemporary Hospitality Management" and "Psychology & Marketing". Similarly, the authors such as Kim J., Balakrishnan J., and Shankar A. have connections with virtual reality, marketing, and purchase intention terms and have their research articles published in Computers in Human Behavior and Journal of Consumer Behavior.



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eft field: keywords Middle field: authors Right fields: sources

Fig 13: Three-field plot of keywords, authors and sources

4.6.4 Co-occurrence Network

A network of co-occurrence of keywords was created using Biblioshiny to determine the major research topics of 508 articles (Fig. 14; Table 11). As can be seen from Fig. 14 and Table 11, there are six clusters in the network.

The red cluster is the biggest and can be titled as "Immersive technologies and the experience of the metaverse". It includes metaverse, metaverses, and virtual reality in addition to augmented reality, mixed reality, extended reality, user experience, brand experience, flow and social presence (Rauschnabel et al., 2022; Dwivedi et al., 2022). The orange cluster, "Avatars, immersion, and customer experience", connects avatar with customer experience, engagement, immersion, virtual environment, virtual worlds, and tourism, indicating that the topic of avatars is researched mostly as an integral part of customer experiences (Miao et al., 2022; Jin et al., 2025). The blue cluster, "Virtual commerce and consumer behavior", includes marketing, social media, digital marketing, sales, purchase intention, purchasing, telepresence, and interactivity (Hadi et al., 2024; Jafar et al., 2023). In the brown cluster "AI-driven innovation and digital retail", there are indexing terms related to artificial intelligence, innovation, sustainability, digitization, e-commerce, retailing, and consumer behavior (Chakraborty et al., 2024b; Shankar et al., 2025). In the green cluster "Virtual influencers and anthropomorphism", there are indexing terms related to virtual influencers, customer engagement, and anthropomorphism (Thomas and Fowler, 2021; Sands et al., 2022b). Finally, the purple cluster includes only indexing terms like human, male, female, adult, article, and decision making, which reflect the way database indexes articles using human participants.

Table 11: Cluster Component, co-occurred network

Node	Cluster
Metaverse, metaverses, virtual reality, augmented reality, mixed reality, extended reality, user experience, users' experiences, brand experience, flow, social presence, economic and social effects	Red
Marketing, social media, digital marketing, sales, purchase intention, purchasing, consumer behavior, telepresence, interactivity	Blue

Artificial intelligence, innovation, perception, sustainability, digitization, information and communication technology, electronic commerce, consumption behavior, retailing	Brown
Virtual influencer, virtual influencers, customer engagement, anthropomorphism	Green
Human, male, female, adult, article, decision making	Purple
Avatar, customer experience, engagement, immersion, immersive, virtual environments, virtual worlds, tourism	Orange

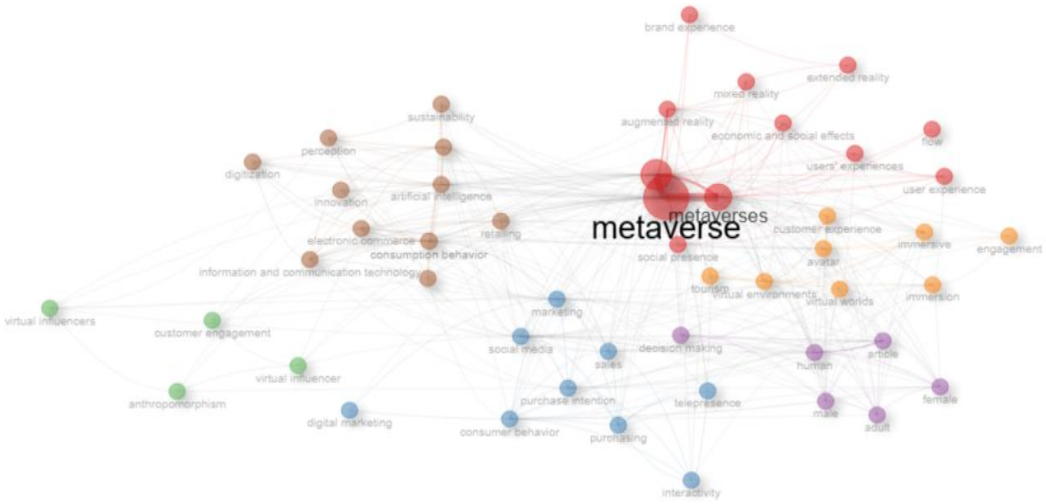

Fig 14. Co-occurrence network

4.6.5 Thematic map

The thematic map (Figure 15; Table 12) divides the keyword clusters into four quadrants according to centrality (field-relatedness) and density (development within the field) (Cobo et al., 2011). **Motor themes**, being central and developed, are presented in the form of augmented reality, mixed reality and economic and social impacts. **Basic themes**, being central but not so much developed, can be found in metaverse and virtual reality; marketing, social media and purchase intention; and consumption behaviour, technology adoption and virtual influencers. They constitute the basis of the field. **Niche themes**, being developed but peripheral, are flow, human-computer interaction and presence, as well as avatar identification, continuance intention and satisfaction, located on the border between niche and emerging themes. The human, article and female cluster is comprised of indexing keywords. Customer loyalty is an emerging or declining theme with very low centrality and density, demonstrating that the loyalty consequences of avatar and metaverse experience have not been examined yet.

Table 12: Thematic map indexes

Cluster	Callon Centrality	Callon Density	Rank Centrality	Rank Density	Cluster Frequency
avatar identification	2.309	41.240	3	5	72
augmented reality	5.144	46.531	5	6	152
marketing	16.482	24.840	8	1	429
consumption behavior	7.163	37.899	6	4	448
flow	2.286	69.502	2	8	58
human	4.582	65.935	4	7	174
metaverse	12.752	35.066	7	3	761
customer loyalty	0.000	33.333	1	2	3

Note: Rank columns are reported as produced by Bibliometrix, in ascending order (1 = lowest value).

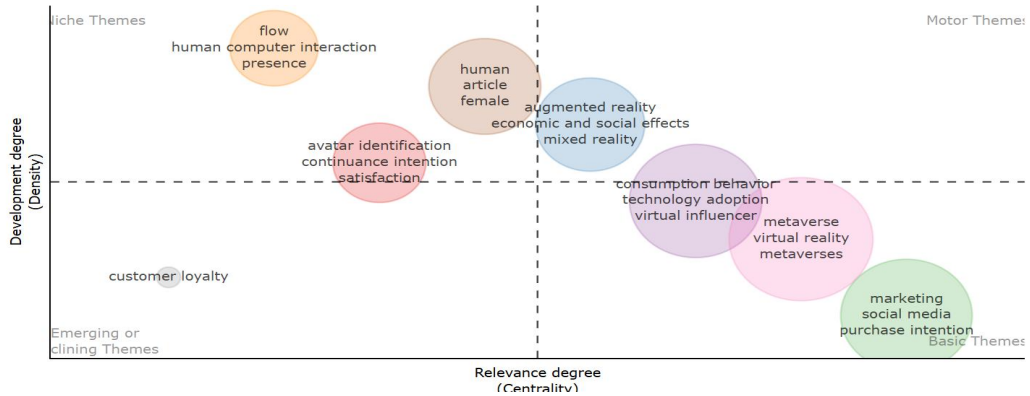

Fig. 15: Thematic map

The high-density values obtained for augmented reality and avatars (46.53 and 41.24, respectively) suggest internally coherent research communities, whereas marketing (centrality 16.48) and metaverse (12.75) demonstrate the highest values for centrality, which proves their structural core position in the field.

4.6.6 Factorial analysis (MCA)

Figure 16 represents multiple correspondence analysis that identifies high frequency keywords mapped to two dimensions accounting for 74.95% of total variation (Dimension 1: 61.94%; Dimension 2: 13.01%). Dimension 1 distinguishes a small cluster of blue colored words related to indexing (human, humans, male, adult) from a large red-colored cluster of all substantive keywords. The second dimension within the red cluster differentiates keywords representing immersive-experience (virtual environments, augmented reality and brand experience in upper cluster) from commerce related keywords (electronic commerce, purchasing, internet and consumption behavior in lower cluster), while the avatar, interactivity, telepresence and decision making keywords fall in the middle. This indicates that avatars can be the bridge between immersive experience and commercial results.

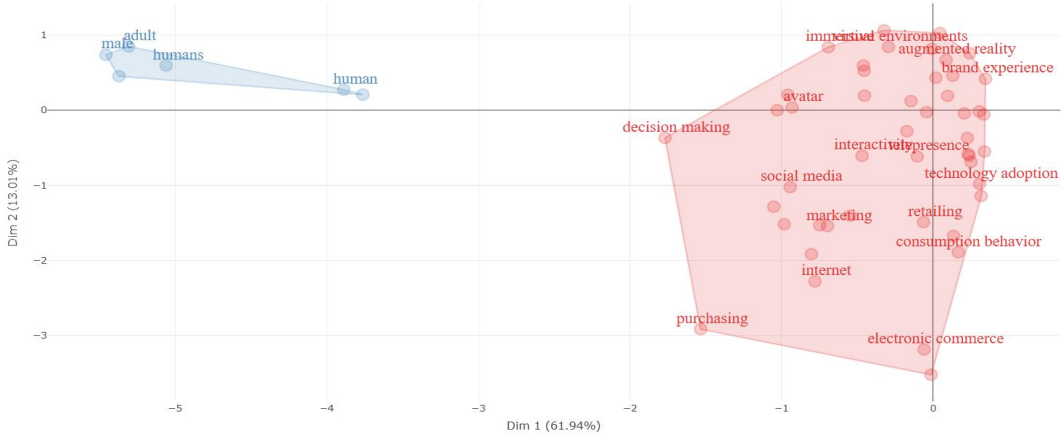

Fig. 16: MCA conceptual structure map for high-frequency keywords

4.7 Robustness check

As the search was conducted for all fields in Scopus, it is possible that certain articles were included in the database due to the fact that the search terms occur only in the references of the articles. In order to check if this influenced the results, all the main analyses were conducted on the sub-set of 306 articles containing the search terms in their titles, abstracts or keywords. This is equivalent to a standard TITLE-ABS-KEY search. As Table 15 shows, the results of the analysis are the same for both databases. The two main sources of publications are the Journal of Retailing and Consumer Services and Technological Forecasting and Social Change; the most frequent keyword is metaverse, with virtual reality, consumption behaviour, artificial intelligence and augmented reality following it; and the five top cited documents are the same in both orders. Avatars are still a marginal theme (22.5% of the core documents); the 17 articles mentioning avatars, metaverse and customer experience, engagement or satisfaction all belong to the core set of documents, and only one document associates

avatars and loyalty.

Table 15: Robustness check (full dataset versus core subset)

Indicator	Full dataset (n = 508)	Core subset (n = 306)
Leading sources	JRCS (45), TFSC (22)	JRCS (25), TFSC (16)
Most frequent keyword	Metaverse	Metaverse
Other top keywords	Virtual reality, consumption behaviour, artificial intelligence, augmented reality	Virtual reality, consumption behaviour, artificial intelligence, augmented reality
Five most cited documents	Dwivedi et al. (2022); Dwivedi et al. (2023a); Rauschnabel et al. (2022); Barrera and Shah (2023); Hadi et al. (2024)	Identical, same order
Articles addressing avatars	96 (18.9%)	69 (22.5%)
Avatars, metaverse, customer experience/engagement/satisfaction	17	17
Avatars + loyalty	1	1

Note: Core subset articles containing "metaverse", "AI avatar", "customer satisfaction" or "customer engagement" in their titles, abstracts or keywords.

4.8 Content analysis of the core intersection studies (TCCM)

To supplement the findings from the bibliometric analysis, the 17 papers that link avatars, metaverse and customer experience, engagement or satisfaction have been analyzed using TCCM framework (Table 16). Fourteen papers belong to empirical research and three papers belong to reviews/editorials/technical surveys (Tella et al., 2025; Bae et al., 2025; Donvito et al., 2024; Sami et al., 2024).

Theory: The theoretical base of the literature is fragmented. Seven empirical papers use seven different theories in their research. Those are narrative identity and social constructionism (Chakraborty et al., 2025), flow theory and SERVQUAL (Cadet et al., 2024), diffusion of innovation (Chakraborty and Biswal, 2024), cognitive appraisal theory (Suh, 2024), self-determination theory (Liu and Hao, 2024), media richness theory (Yoon and Lee, 2024) and gamification affordance theory (Wee et al., 2023). However, six empirical papers do not use any theory explicitly in their abstracts. More specifically, none of the abstracts mentions avatar marketing theory (Miao et al., 2022), despite the co-citation analysis showing it as the main intellectual link of the field (Section 4.5.3).

Context: The research focuses primarily on retail and fashion (eight papers), covering metaverse shops, fashion items, clothing and brands in the virtual space like Nikeland from Roblox (Payal et al., 2024). Tourism and cultural heritage represent three papers (Baker et al., 2023; Liu and Hao, 2024; Mestiri et al., 2025). After tourism, the next field is that of social virtual reality platforms (Chakraborty et al., 2025; Suh, 2024), then gaming (Hashem et al., 2023) and libraries (Tella et al., 2025). Service industries like banks, health care or hotels are virtually not covered.

Characteristics: Almost all previous research studies have been done on user-created self-avatars, and this includes issues such as the design of avatars (Cadet et al., 2024; Yoon and Lee, 2024), the self-expression and identity through avatar (Chakraborty et al., 2025; Wee et al., 2023), and attitudes towards avatars (Liu and Hao, 2024). The only research that makes comparisons between self-avatars and brand-managed shopping avatars is by Kautish et al. (2025). And, the only study that talks about AI avatars is Tella et al. (2025). Consequences are mostly in the short run, like intentions to buy or use and enjoyments.

Methodology: The primary methodology used in cross-sectional survey analyses employing structural equation modeling prevails (Cadet et al., 2024; Hashem et al., 2023; Liu and Hao, 2024; Payal et al., 2024; Wee et al., 2023). Only two articles conduct experiments (Kautish et al., 2025; Yoon and Lee, 2024), one article employs longitudinal panel data (Suh, 2024), while four employ qualitative and mixed research (Baker et al., 2023; Chakraborty and Biswal, 2024; Chakraborty et al., 2025; Mestiri et al., 2025). None of the articles use physiological and behavioral tracking data.

Overall, the content analysis reinforces the bibliometric results and expands them: core research is fragmented from the theoretical point of view, limited to retail and fashion industries, concerned with self-avatars not artificial intelligence (AI) avatars, aimed at short-term effects, and based on cross-sectional surveys.

Study	Theory	Context	Key constructs / focus	Method
Kautish et al. (2025)	Not specified	Metaverse retail	Self vs brand-managed avatars, interactivity → awe-inspired experience	Three experiments
Mestiri et al. (2025)	Not specified	Virtual museum (heritage)	Customisable avatars, social interaction, engagement	Mixed methods case study
Tella et al. (2025)	–	Distance-learning libraries	AI-driven avatars for user assistance, engagement	Exploratory literature review
Bae et al. (2025)	–	Digital virtual fashion	Avatar 738 ersonalization, consumer behaviour	Systematic review (TCCM)
Chakraborty et al. (2025)	Social constructionism; narrative identity	Metaverse platforms	Avatar selves, co-creation → engagement/disengagement	Netnography and interviews
Cadet et al. (2024)	Flow theory; SERVQUAL	Metaverse stores	Avatar design, vividness → quality, value → purchase intention	Survey (n= 322), PLS-SEM
Chakraborty and Biswal (2024)	Diffusion of innovation	Lifestyle brands (D2A)	CX, engagement, co-creation → citizenship → satisfaction, loyalty	Mixed (tweets, interviews, survey)
Suh (2024)	Cognitive appraisal theory	Social VR platforms	Appraisals → emotions → continuance intention	Two-wave panel survey (n = 216)
Donvito et al. (2024)	–	Fashion	Avatar resemblance, NFTs, privacy	Editorial
Liu and Hao (2024)	Self-determination theory	Regenerative tourism	Attitudes to avatars → learning → sustainable practices	Survey (n = 483), PLS-SEM
Sami et al. (2024)	–	Technology (multi-domain)	Metaverse pipeline, avatars, privacy, security	Technical survey
Payal et al. (2024)	Not specified	Nikeland on Roblox (Gen Z)	Interactivity → brand trust, attachment → engagement → purchase intention	Survey
Kumar and Sharma (2024)	Not specified	Business environments	Enablers of immersive environments	TISM-MICMAC (expert-based)
Yoon and Lee (2024)	Media richness theory	Metaverse shopping	Rendering quality × avatar realism → presence → enjoyment → use intention	Experiment (n = 205)
Hashem et al. (2023)	Not specified	Online gaming	Avatar, presence, interfaces → customer experience	Survey (n = 450), regression
Wee et al. (2023)	Gamification affordance theory	Avatar fashion styling (ZEPETO)	Self-expression, competition → enjoyment → engagement intention	Survey (n = 198), SEM
Baker et al. (2023)	Not specified (UX)	Heritage tourism VR	13 UX factors, design dilemmas	Interviews, content analysis

Note: Coding based on titles, abstracts and keywords. "–" indicates reviews, editorials or surveys without an empirical theory.

5. Discussion

This section discusses the findings in relation to the three research questions.

RQ1: What are the publication patterns, main publications and authors, sources of knowledge, and international collaboration patterns in the study of artificial intelligence avatars, metaverse and consumer experience and engagement?

Research about AI avatars, the metaverse, and customer experience increased from 2 studies in

2019 to 223 in 2025 (growth per year 119.39%), where 2024 represents the peak. Literature is represented by studies published in prestigious marketing and management journals like Journal of Retailing and Consumer Services, Technological Forecasting and Social Change, and the International Journal of Contemporary Hospitality Management. The studies by Dwivedi, Rauschnabel, Barrera, and Hadi are highly cited. Three field plot analysis reveals that the most prominent authors of this literature are Dwivedi, Kumar, Rana, Chakraborty, Kim, and Balakrishnan. Most international collaboration is conducted by the USA, India, China, and the UK. Latin America and most of the African nations have low connectivity. Consistent with Ozturk and Kizilkan (2025), findings revealed that research in this field shifted from conceptual foundation to consumer behaviour. Bashar et al. (2025) have shown that consumer experience models in metaverse are still underdeveloped. This paper extends their findings, adding that the literature of avatar-specific topics in the metaverse literature is rather limited even though avatars represent the main interaction tool in the metaverse environment.

RQ2: What is the intellectual structure of this scientific area?

The most cited and influential studies are Dwivedi et al. (2022, 2023a), Rauschnabel et al. (2022), and Barrera and Shah (2023), as indicated by the citation analysis and historiograph. From the co-citation analysis, there emerge three intellectual bases: metaverse concept research (in green), theories and measurements of consumer behavior (in blue), and artificial intelligence influencer research (in red). The theory of avatar marketing (Miao et al., 2022) emerges as the connecting link between these bases.

RQ3: What is the conceptual structure of this scientific area, and what are its under-studied areas?

The keyword analysis revealed that the core themes in the field are metaverse, virtual reality, consumer behavior and marketing, whereas augmented and mixed reality are considered to be the most elaborated motor themes. The themes related to avatars, namely avatar identification, presence and flow, are also niche themes. Customer loyalty theme is an emerging one and has virtually no elaboration. Ethical governance, privacy and cross-cultural differences are not even identified as distinct clusters, which means that they are poorly researched compared to their importance.

5.1 Novelty and contribution of the study

Several reviews have been conducted in parts of this area, but each one is based on a different anchor (Table 14). Reviews of avatar marketing include studies where avatars have been mapped as a standalone marketing strategy. For instance, Kusumawati et al. (2024) reviewed 185 Scopus sources (2004-2024), while Qu et al. (2025) synthesised 203 publications from Web of Science (2009-2023) with anthropomorphism being the prominent theme. Reviews of the metaverse are based on anchors of engagement or experience. For example, Wasiq et al. (2024) have investigated customer engagement in the metaverse using 409 articles, while Bashar et al. (2025) and Nyagadza et al. (2025) reviewed customer experience in virtual environments with 1,460 articles each. Ozturk and Kizilkan (2025) have also done metaverse marketing mapping using 289 documents.

First, explicitly focuses on the convergence of AI avatars, metaverse and customer experience and engagement. It measures how under-integrated these threads are in terms of their interconnections. As it can be seen from the analysis of the 508 articles, the metaverse was present in 57.1% of the publications while the avatars were mentioned in only 18.9% of the articles. There are only 17 articles that deal with avatars, metaverse and customer experience, engagement or satisfaction at all. Also, the percentage of the articles that deal with avatars has declined from 23.4% in 2023 to 13.9% in 2025. Thus, it becomes clear that the domain develops around metaverse as the platform while avatars (interface for experiencing metaverse) get less coverage proportionately.

The second one is to discover an academic connection among these streams. According to co-citation analysis, the avatar marketing theory (Miao et al., 2022) has the highest betweenness centrality (184.64) among others, connecting the conceptual metaverse research with consumer behaviour theories and approaches. In addition, the concept of anthropomorphism, which is considered to be the leading topic of avatar marketing research by Qu et al. (2025), is grouped with virtual influencers, but not with metaverse experience. Thus, it is possible to conclude that the two types of research are being conducted simultaneously, while the avatar marketing theory can be the best connecting point between them.

Third, it brings about an outcome gap. Previous studies focus more on engagement and experience, while this study indicates that few studies focus on relational outcomes over time. Loyalty can be noted to be one of the emerging topics that have low centrality and density, and just one study in the corpus talks about avatars and loyalty. Ethical and governance topics are similarly poor in number – only 13 studies (2.6% of total number of studies) talk about avatars with reference to ethics, privacy and transparency issues. Moreover, the TCCM analysis of the 17 core intersection studies

has indicated that the studies in question have theoretical fragmentation with seven theories being applied in seven studies with no application of avatar marketing theory. The studies also concentrate more on user controlled self-avatars instead of artificial intelligence avatars.

Lastly, it captures the latest development stage of the discipline and transforms such gaps into an agenda based on the theory. Articles published in 2024 and 2025 represent 82% of the articles collected and seven points of the research agenda are associated with the research question and appropriate theories/methods (Table 13).

Table 14: Comparison with prior reviews

Review	Anchor	Database and period	Corpus	Main focus
Kusumawati et al. (2024)	Avatar marketing	Scopus, 2004–2024	185	Trends, contributors, thematic evolution
Wasiq et al. (2024)	Customer engagement in the metaverse	Scopus	409	Bibliometrics and topic modelling
Qu et al. (2025)	Avatar marketing	Web of Science, 2009–2023	203	Seven research domains; anthropomorphism
Ozturk and Kizilkan (2025)	Metaverse marketing	WoS and Scopus	289	Evolution of metaverse marketing
Bashar et al. (2025)	Customer experience in the metaverse	Scopus, 2000–2025	1,460	Topic modelling of immersive CX
Nyagadza et al. (2025)	Customer experience in virtual realms	Scopus, 2000–2025	1,460	TCCM framework
This study	AI avatars × metaverse × customer experience and engagement	Scopus, 2019–July 2025	508	Integration gap, intellectual bridge, outcome gap, theory-linked agenda

5.2 An integrative framework and research propositions

Based on the above findings, it can be deduced that research on avatars, metaverse experiences, and customer outcomes is highly fragmented. Extending the avatar marketing paradigm as defined in Miao et al. (2022), Fig. 17 outlines an overarching theoretical model of these research strands as driven by avatar properties, experiential mechanisms, and customer outcomes, mediated by moderators and boundary conditions.

The avatar properties and realism lead to presence and perceived value (Cadet et al., 2024; Yoon & Lee, 2024), but the technological capabilities enabling behavioral realism have been virtually ignored in literature.

P1: Combination of avatars having high form and behavior realism, including AI-based emotional responses, increases presence and interactivity. Self-avatars give better experiences compared to brand-controlled avatars (Kautish et al., 2025), and avatar-based self-expression boosts user engagement (Wee et al., 2023; Chakraborty et al., 2025).

P2: Customizable and relatable avatars increase the customer experience better than brand-controlled avatars. The influences of avatar usage are mainly achieved through presence, immersion, interactivity, and flow (Kautish et al., 2025; Payal et al., 2024; Cadet et al., 2024).

P3: Presence, immersion, interactivity, and flow influence how avatar characteristics affect short-term measures of enjoyment, engagement, and purchase intentions. One paper connects avatars and loyalty (Chakraborty and Biswal, 2024), but loyalty is still an emergent area of research.

P4: Satisfaction and loyalty through avatar-mediated experience come about due to repeat encounters which create trust and identification with the avatar. Lastly, metaverse familiarity acts as a moderator for avatar impact (Wee et al., 2023), while most research on evidence revolves around retail and fashion, and privacy and manipulation are persistent issues (Dwivedi et al., 2023b).

P5: Culture and familiarity with the metaverse environment affect these results, whereas privacy issues and the opacity of whether an avatar is an AI reduce them.

The above propositions may be empirically examined using experiments (P1, P2), mediation analyses (P3), longitudinal study (P4), and cross-cultural studies (P5), as formulated in the research agenda (Table 13).

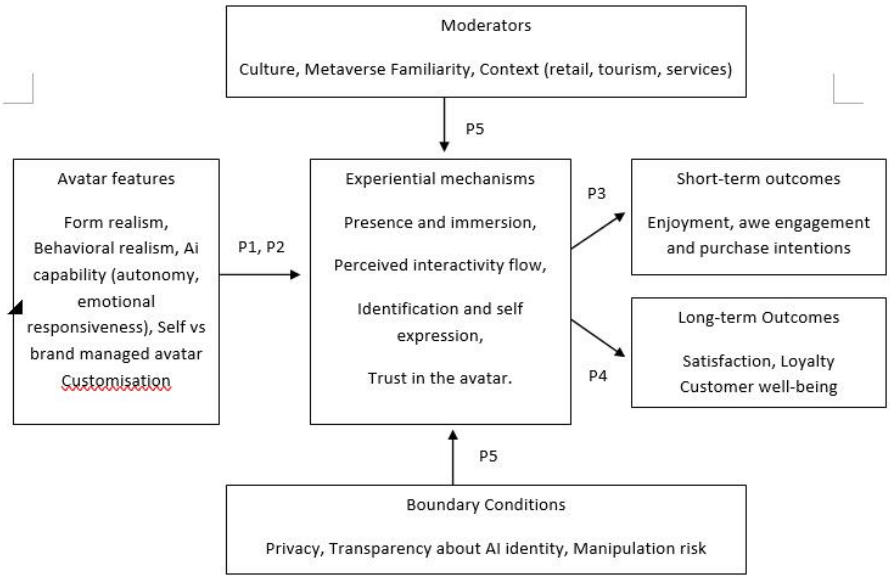

Fig: Integrative framework of AI avatar-mediated customer experience in the metaverse

6. Implications of the study

6.1 Implications for Research and Policy

The framework introduced in Section 5.2 provides researchers with an initial point of reference to test the relationship between the characteristics of the avatar and their impact on customers. The findings demonstrate how research related to AI avatars and the metaverse is structured and where the gaps exist. The underdeveloped themes identified from this literature review are avatar identification, presence, flow, and customer loyalty, for which empirical research needs to be conducted. From the policy makers' perspective, the lack of clusters related to ethics, privacy, and governance indicates that responsible use of avatars is behind the curve in terms of both research and regulation.

6.2 Managerial Implications:

This bibliometric study provides managers with evidence-based insights that can be used directly to develop strategies to enhance the customer experience through AI avatars and metaverse technologies. The study suggests three strategic considerations.

First, the research has shifted from the general use of virtual reality to consumer experiences in the metaverse through avatars. Consequently, managers need to recognize that avatars are both a tool for efficiency and a component of consumer experience. Organizations need to allocate resources to developing adaptive avatar systems that create personalized communication for users. Emotionally responsive interactions create stronger connections between users, leading to increased customer satisfaction and more immersive experiences.

Second, the research results show that metaverse environments create strong connections between user experience and their level of participation and complete immersion in virtual worlds. Managers must develop the metaverse as an experiential ecosystem, as it provides greater value than creating virtual extensions of real-world operations. Managers can use this knowledge to develop interactive experiences that use avatars and virtual brand spaces. The team needs to build storytelling environments that motivate users to engage with the experience. Companies can use telepresence and psychological ownership to establish a strong emotional connection with consumers, thereby improving the consumer experience and strengthening brand loyalty.

Lastly, the combination of artificial intelligence with retailing, consumer behavior, and trust-related research demonstrates that businesses need to create personalized services alongside their governing systems. Managers can use these findings to embed AI avatars within customer relationship management and analytics systems to deliver real-time personalized recommendations and optimize digital customer journeys. The company should establish AI communication standards, implement effective security systems, and define clear policies for avatars' interaction with users. Trust is the fundamental element that governs immersive environments. Businesses that use responsible AI governance alongside personalized services will achieve greater success in building customer loyalty than their competitors.

6.3 Societal and ethical implications

The fast expansion of this field indicates the potential benefits that could be delivered by metaverse services based on avatars in sectors like retail, tourism, education, and healthcare. However, research capabilities are still mostly available in a

few countries only, whereas Latin America and Africa are poorly connected. This indicates a lack of digital preparedness and calls for further international collaboration. The results also highlight ethical issues that should be addressed. AI-driven avatars produce large amounts of behavioral and biometric data. However, there is no apparent cluster that covers topics like privacy, consent, and governance. As avatars start resembling real people and are able to simulate emotions and empathy, it becomes important to address such issues as authenticity, manipulation, and users' wellbeing. Therefore, users should be notified about the presence of an artificial identity in front of them. Given that most evidence comes from specific cultural backgrounds, future avatars should also be designed taking into account cultural differences.

7. Future research directions

On the basis of the results and the framework presented in Section 5.2, this paper presents seven research directions that can be categorized as theoretical, thematic and methodological (Table 13).

7.1 Theoretical agenda

Emotionally intelligent AI avatars. Most previous papers consider user-controlled self-avatars, and just one paper considers AI avatars. Future research must explore how emotional intelligence of avatars influences trust, satisfaction and loyalty (P1, P4).

Integrated frameworks. Previous research considers numerous unrelated theories and does not consider avatar marketing theory at all. Future research must use theoretical models based on integration of avatar features, experiential mechanism and customer value.

7.2 Thematic agenda

Cross-cultural and inclusive experiences. Evidence is restricted to studies done in the retail and fashion industry, while Latin American and most of the African regions add very little to this research area. Studies must investigate the impact of culture, language, and digital literacy on the perception of AI avatars (P5).

Responsible AI and governance. The ethical, privacy, and governance issues do not constitute separate research domains. Research must investigate the role of disclosure of identity and explainability on perceived manipulation.

Societal impact. Present research centers on engagement and adoption. Future research should address the impact of avatar-based services on the employees, reskilling, digital inclusion and sustainability.

7.3 Methodological agenda

Longitudinal and experimental research. Cross-sectional surveys are prevalent, with one longitudinal survey and two experimental studies. Longitudinal panels and field experiments are necessary in order to understand how trust and attachment to avatars form over time (P4).

Advanced and multidisciplinary methods. None of the articles from the core set use any physiological or behavioral tracking data. Combination of self-reports with eye-tracking, EEG, facial coding and machine learning may allow uncovering emotional reaction to avatars which are not possible to uncover through surveys.

Table 13: Future research agenda

Agenda point	Example research questions	Suggested theories / methods
1. Emotionally intelligent avatars	What is the influence of the emotional intelligence and empathy of the avatar on trust, satisfaction and loyalty?	Avatar marketing theory (Miao et al., 2022); S-O-R; social presence theory
2. Integrated frameworks	How does avatar intelligence combine with immersion and engagement to generate customer value?	S-O-R; service-dominant logic; configurational models (fsQCA)
3. Cross-cultural experiences	How do people react to avatars from different cultures, languages, and levels of computer literacy, especially in Africa and Latin America?	Cultural dimensions theory; multi-group SEM
4. Responsible AI and governance	What is the impact of AI identity disclosure, transparency, and explainability on trust and manipulation?	Persuasion knowledge model; experiments
5. Societal impact	What impact do avatar services have on the job functions, reskilling, and digitalization of employees?	Socio-technical systems; TOE framework; case studies
6. Longitudinal research	How does trust and attachment towards avatars develop through use?	Longitudinal panels; field experiments
7. Advanced methods	Do physiological methods (eye tracking, EEG,	Neuromarketing;

	facial coding) provide a better understanding of emotions elicited by avatars than self-reports?	multimodal machine learning

8. Conclusion

The present paper offers a bibliometric review of scientific literature on the topic of artificial intelligence avatars, metaverse technologies, and customer experience. Based on the study of 508 Scopus-indexed articles released from 2019 to 2025, it is concluded that the area experienced a rapid increase in publication numbers starting in 2022, with an annual growth rate of 119.39%, and the papers are usually found in top-rated marketing and management journals. The most cited papers are Dwivedi et al. (2022, 2023a) and Rauschnabel et al. (2022), which address marketing strategy and human psychology along with the issues related to human-computer interaction. India, China, the United States of America, and the United Kingdom possess the largest international cooperation networks. In turn, Latin America and majority of African states still lack connections, thus limiting the cultural diversity of knowledge. In terms of concept, the field is centered on the metaverse, rather than avatars, which leaves a number of relevant topics understudied, including avatar-specific matters, customer loyalty, ethics, and cross-cultural aspects. Seven research agenda points suggested in the current paper will help to fill this gap.

8.1 Limitations

There are several weaknesses of this research. First, it is focused on only one database, Scopus. Adding Web of Science would be useful. Second, only English articles published in journals were examined; thus, conference papers, books, and non-English publications are not included in the research. Third, the articles' retrieval was performed on 18 July 2025, hence, 2025's numbers are incomplete, and recent articles do not have enough citations yet. Fourth, the search was conducted in all Scopus fields, which means that some articles dealing with AI avatars and the metaverse only tangentially were retrieved; however, the robustness check of the 306 articles containing the search terms in titles, abstracts or keywords was conducted, and it supports main results (Section 4.7). Fifth, the keyword analysis was based on the Scopus keywords without processing; therefore, synonyms like metaverse and metaverses or generic indexing keywords like human and article are present in some maps.

Sixth, the database contains 20 papers from 2023 in two journals dedicated to philosophy from Addleton Academic Publishers (Linguistic and Philosophical Investigations and Review of Contemporary Philosophy); the first journal has already been discontinued from Scopus and these papers discuss technical issues of immersive technology rather than marketing of it. These papers were kept as they were indexed at the moment of the search but they might affect slightly the results of the search regarding technology-related keywords. Seventh, two closely related reviews (Bashar et al., 2025; Nyagadza et al., 2025) have appeared after the date of data retrieval and were not able to influence the search design. The coding of the 17 core papers within the TCCM has been conducted using titles, abstracts, and keywords of the papers so some theories and methods mentioned only in full texts could be omitted. Eighth, the keyword-based search might have omitted the papers which used other terminology. Future reviews may solve these issues by combining databases, searching in titles, abstracts and keywords, cleaning keywords with the thesaurus file and updating the analysis.

Reference:

1. Ahn, S.J., Kim, J. and Kim, J. (2022) 'The bifold triadic relationships framework: A theoretical primer for advertising research in the metaverse', Journal of Advertising, 51(5), pp. 592–607. https://doi.org/10.1080/00913367.2022.2111729
2. Aria, M. and Cuccurullo, C. (2017) 'bibliometrix: An R-tool for comprehensive science mapping analysis', Journal of Informetrics, 11(4), pp. 959–975. https://doi.org/10.1016/j.joi.2017.08.007
3. Arsenyan, J. and Mirowska, A. (2021) 'Almost human? A comparative case study on the social media presence of virtual influencers', International Journal of Human-Computer Studies, 155, 102694. https://doi.org/10.1016/j.ijhcs.2021.102694
4. Arya, V., Sambyal, R., Sharma, A. and Dwivedi, Y.K. (2024) 'Brands are calling your AVATAR in Metaverse – A study to explore XR-based gamification marketing activities & consumer-based brand equity in virtual world', Journal of Consumer Behaviour, 23(2), pp. 556–585. https://doi.org/10.1002/cb.2214
5. Bae, S.H., Kim, K.H. and Cho, E. (2025) 'Consumption of digital virtual fashion goods in metaverse', Journal of Global Fashion Marketing, 16(2), pp. 196–211. https://doi.org/10.1080/20932685.2025.

2451844
6. Baker, J., Nam, K. and Dutt, C.S. (2023) 'A user experience perspective on heritage tourism in the metaverse: Empirical evidence and design dilemmas for VR', Information Technology and Tourism, 25(3), pp. 265–306. https://doi.org/10.1007/s40558-023-00256-x
7. Balakrishnan, J., Das, R., Alalwan, A.A., Raman, R. and Dwivedi, Y.K. (2024a) 'Informative and peripheral metaverse: Which leads to experience? An investigation from the viewpoint of self-concept', Computers in Human Behavior, 156, 108223. https://doi.org/10.1016/j.chb.2024.108223
8. Balakrishnan, J., Dwivedi, Y.K., Mishra, A., Malik, F.T. and Giannakis, M. (2024b) 'The role of embodiment and ergonomics in immersive VR tours in creating memorable tourism experiences', International Journal of Contemporary Hospitality Management, 36(11), pp. 3794–3822. https://doi.org/10.1108/IJCHM-09-2023-1425
9. Barrera, K.G. and Shah, D. (2023) 'Marketing in the Metaverse: Conceptual understanding, framework, and research agenda', Journal of Business Research, 155, 113420. https://doi.org/10.1016/j.jbusres.2022.113420
10. Bashar, A., Nyagadza, B., Khan, I. and Alkadash, T. (2025) 'Mapping evolving immersive customer experiences (CX) and virtual engagement in the metaverse: Insights from bibliometrics-topic modelling synthesis', International Journal of Information Technology. https://doi.org/10.1007/s41870-025-02954-7
11. Bauerová, R. and Halaška, M. (2025) 'Unlocking the metaverse: Determinants of voluntary adoption in e-commerce', Sustainable Futures, 9, 100436. https://doi.org/10.1016/j.sftr.2025.100436
12. Boccia, F. and Palmieri, N. (2025) 'Towards an Aporia? Empirical evidence on the relationship between consumer behaviour and metaverse-based virtual stores', Sustainable Horizons, 14, 100140. https://doi.org/10.1016/j.horiz.2025.100140
13. Buragohain, D., Chaudhary, S., Punpeng, G., Sharma, A., Am-in, N. and Wuttisittikulkij, L. (2023) 'Analyzing the impact and prospects of metaverse in learning environments through systematic and case study research', IEEE Access, 11, pp. 141261–141276. https://doi.org/10.1109/ACCESS.2023.3340734
14. Cadet, F., Gironda, J.T., O'Leary, B. and Petrescu, M. (2024) 'MV-QUAL: A tool for understanding decisions to purchase virtual products in the metaverse', Journal of Consumer Behaviour, 23(6), pp. 3112–3131. https://doi.org/10.1002/cb.2380
15. Chakraborty, A., Jain, V. and Belk, R. (2025) 'Exploring avatar selves in the metaverse: Consumer co-creation of experiences', Journal of Consumer Behaviour, 24(2), pp. 694–716. https://doi.org/10.1002/cb.2440
16. Chakraborty, D., Patre, S. and Tiwari, D. (2023) 'Metaverse mingle: discovering dating intentions in metaverse', Journal of Retailing and Consumer Services, 75, 103509. https://doi.org/10.1016/j.jretconser.2023.103509
17. Chakraborty, D., Polisetty, A. and Rana, N.P. (2024a) 'Consumers' continuance intention towards metaverse-based virtual stores: A multi-study perspective', Technological Forecasting and Social Change, 203, 123405. https://doi.org/10.1016/j.techfore.2024.123405
18. Chakraborty, D., Polisetty, A., Rana, N.P. and Khorana, S. (2024b) 'Unlocking the potential of AI: Enhancing consumer engagement in the beauty and cosmetic product purchases', Journal of Retailing and Consumer Services, 79, 103842. https://doi.org/10.1016/j.jretconser.2024.103842
19. Chakraborty, U. and Biswal, S.K. (2024) 'Diffusion of innovation in direct-to-avatar (D2A): A study of immersive communication and branding in the metaverse', Computers in Human Behavior, 158, 108318. https://doi.org/10.1016/j.chb.2024.108318
20. Chen, P.K., Ye, Y. and Huang, X. (2023) 'The metaverse in supply chain knowledge sharing and resilience: an empirical investigation of factors affecting adoption and acceptance', Journal of Innovation & Knowledge, 8(4), 100446. https://doi.org/10.1016/j.jik.2023.100446
21. Cobo, M.J., López-Herrera, A.G., Herrera-

Viedma, E. and Herrera, F. (2011) 'An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field', Journal of Informetrics, 5(1), pp. 146–166. https://doi.org/10.1016/j.joi.2010.10.002
22. Correia, P.Á.P. (2025) 'Metaverse in tourism: A pathway to sustainability and regeneration', International Journal of Technology Management & Sustainable Development, 24(2), pp. 125–149. https://doi.org/10.1386/tmsd_00104_1
23. Darshit Jasani. (2024). Digital Workforce Augmentation in Construction: Intelligent Tools, AI Assistants, and Next-Gen Operations. International Journal of Intelligent Systems and Applications in Engineering, 12(23s), 4109 – 4115
24. Davis, F.D. (1989) 'Perceived usefulness, perceived ease of use, and user acceptance of information technology', MIS Quarterly, 13(3), pp. 319–340. https://doi.org/10.2307/249008
25. Deng, B., Wong, I.A. and Lian, Q.L. (2024) 'From metaverse experience to physical travel: the role of the digital twin in metaverse design', Tourism Review, 79(5), pp. 1076–1087. https://doi.org/10.1108/TR-05-2023-0315
26. Dincelli, E. and Yayla, A. (2022) 'Immersive virtual reality in the age of the Metaverse: A hybrid-narrative review based on the technology affordance perspective', The Journal of Strategic Information Systems, 31(2), 101717. https://doi.org/10.1016/j.jsis.2022.101717
27. Dong, X., Hu, C., Heller, J. and Deng, N. (2025) 'Does using augmented reality in online shopping affect post-purchase product perceptions? A mixed design using machine-learning based sentiment analysis, lab experiments, and focus groups', International Journal of Information Management, 82, 102872. https://doi.org/10.1016/j.ijinfomgt.2025.102872
28. Donthu, N., Kumar, S., Mukherjee, D., Pandey, N. and Lim, W.M. (2021) 'How to conduct a bibliometric analysis: An overview and guidelines', Journal of Business Research, 133, pp. 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070
29. Donvito, R., Acuti, D. and Song, S. (2024) 'Fashion and the metaverse: Implications for consumers and firms', Journal of Global Fashion Marketing, 15(1), pp. 1–5. https://doi.org/10.1080/20932685.2023.2293290
30. Dwivedi, Y.K., Balakrishnan, J., Mishra, A., De Bock, K.W. and Al-Busaidi, A.S. (2024) 'The role of embodiment, experience, and self-image expression in creating continuance intention in the metaverse', Technological Forecasting and Social Change, 203, 123402. https://doi.org/10.1016/j.techfore.2024.123402
31. Dwivedi, Y.K., Hughes, L., Baabdullah, A.M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M.M. and Wamba, S.F. (2022) 'Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy', International Journal of Information Management, 66, 102542. https://doi.org/10.1016/j.ijinfomgt.2022.102542
32. Dwivedi, Y.K., Hughes, L., Wang, Y., Alalwan, A.A., Ahn, S.J., Balakrishnan, J. and Wirtz, J. (2023a) 'Metaverse marketing: How the metaverse will shape the future of consumer research and practice', Psychology & Marketing, 40(4), pp. 750–776. https://doi.org/10.1002/mar.21767
33. Dwivedi, Y.K., Kshetri, N., Hughes, L., Rana, N.P., Baabdullah, A.M., Kar, A.K. and Yan, M. (2023b) 'Exploring the darkverse: A multi-perspective analysis of the negative societal impacts of the metaverse', Information Systems Frontiers, 25(5), pp. 2071–2114. https://doi.org/10.1007/s10796-023-10400-x
34. Flavián, C., Ibáñez-Sánchez, S., Orús, C. and Barta, S. (2024) 'The dark side of the metaverse: The role of gamification in event virtualization', International Journal of Information Management, 75, 102726. https://doi.org/10.1016/j.ijinfomgt.2023.102726
35. Fornell, C. and Larcker, D.F. (1981) 'Evaluating structural equation models with unobservable variables and measurement error', Journal of Marketing Research, 18(1), pp. 39–50. https://doi.org/10.1177/002224378101800104
36. Gursoy, D., Lu, L., Nunkoo, R. and Deng, D. (2023) 'Metaverse in services marketing: An overview and future research directions', The Service Industries Journal,

43(15–16), pp. 1140–1172. https://doi.org/10.1080/02642069.2023.2252750
37. Gursoy, D., Sfodera, F., Piccioni, N., Nosi, C., Chi, C.G. and Chi, O.H. (2025) 'Consumers' willingness to use the metaverse for information search: an investigation of the underlying mechanism and critical determinants', International Journal of Hospitality Management, 124, 103957. https://doi.org/10.1016/j.ijhm.2024.103957
38. Hadi, R., Melumad, S. and Park, E.S. (2024) 'The Metaverse: A new digital frontier for consumer behavior', Journal of Consumer Psychology, 34(1), pp. 142–166. https://doi.org/10.1002/jcpy.1356
39. Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010) Multivariate Data Analysis. 7th edn. Upper Saddle River, NJ: Pearson.
40. Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019) 'When to use and how to report the results of PLS-SEM', European Business Review, 31(1), pp. 2–24. https://doi.org/10.1108/EBR-11-2018-0203
41. Hashem, T., Alotoum, F.J., Allan, M. and Ali, N. (2023) 'Employing metaverse marketing through gaming and its impact on customer experience: Evidence from multiple online gaming platforms', Quality – Access to Success, 24(196), pp. 193–206. https://doi.org/10.47750/QAS/24.196.25
42. Harjai, V., Nair, R., & Sharma, B. (2025). Is digital marketing simply communication evolved? A study on how digital platforms reshape brand–customer interaction. ShodhVichar: Journal of Media and Mass Communication, 1(2), 160–165. https://doi.org/10.29121/ShodhVichar.v1.i2.2025.54
43. Henseler, J., Ringle, C.M. and Sarstedt, M. (2015) 'A new criterion for assessing discriminant validity in variance-based structural equation modeling', Journal of the Academy of Marketing Science, 43(1), pp. 115–135. https://doi.org/10.1007/s11747-014-0403-8
44. Huang, Y.C., Backman, S.J., Backman, K.F., McGuire, F.A. and Moore, D. (2019) 'An investigation of motivation and experience in virtual learning environments: a self-determination theory', Education and Information Technologies, 24(1), pp. 591–611. https://doi.org/10.1007/s10639-018-9784-5
45. Jafar, R.M.S., Ahmad, W. and Sun, Y. (2023) 'Unfolding the impacts of metaverse aspects on telepresence, product knowledge, and purchase intentions in the metaverse stores', Technology in Society, 74, 102265. https://doi.org/10.1016/j.techsoc.2023.102265
46. Jasani, D. (2023). Human-Centered Design in Construction Software: Designing Interfaces for Non-Technical Field Personnel. International Journal of Computational and Experimental Science and Engineering, 9(4). 475-482
47. Jay Dalal (2024). Cloud Based Structural Design Software with Bilt-In Ai Copilot: A Concept. International Development Planning Review, 23(2), 2437-2445.
48. Jin, X.L., Wang, B., Yang, L., Wang, Y. and Zhou, Z. (2025) 'Sense of presence in metaverse tourism experiences: scale development and validation', Industrial Management & Data Systems, 125(5), pp. 1732–1766. https://doi.org/10.1108/IMDS-10-2024-0993
49. Kaur, J., Mogaji, E., Paliwal, M., Jha, S., Agarwal, S. and Mogaji, S.A. (2024) 'Consumer behavior in the metaverse', Journal of Consumer Behaviour, 23(4), pp. 1720–1738. https://doi.org/10.1002/cb.2298
50. Kautish, P., Lim, W.M. and Joshi, N. (2025) 'Awe-inspired experience in the metaverse: A multi-study investigation', Journal of Retailing and Consumer Services, 87, 104390. https://doi.org/10.1016/j.jretconser.2025.104390
51. Kim, J. (2021) 'Advertising in the metaverse: Research agenda', Journal of Interactive Advertising, 21(3), pp. 141–144. https://doi.org/10.1080/15252019.2021.2001273
52. Ku, E.C. (2025) 'Embracing the future of interactive marketing with contactless technology: evidence from tourism businesses', Journal of Research in Interactive Marketing, 19(4), pp. 630–650. https://doi.org/10.1108/JRIM-04-2024-0183
53. Kumar, A., Shankar, A., Agarwal, R., Agarwal, V. and Alzeiby, E.A. (2024a) 'With enterprise metaverse comes great possibilities! Understanding metaverse usage intention from an employee perspective', Journal of Retailing and Consumer Services, 78, 103767.

https://doi.org/10.1016/j.jretconser.2024.103767
54. Kumar, A. and Shankar, A. (2024) 'Building a sustainable future with enterprise metaverse in a data-driven era: A technology-organization-environment (TOE) perspective', Journal of Retailing and Consumer Services, 81, 103986. https://doi.org/10.1016/j.jretconser.2024.103986
55. Kumar, A., Shankar, A. and Nayal, P. (2024b) 'Metaverse is not my cup of tea! An investigation into how personality traits shape metaverse usage intentions', Journal of Retailing and Consumer Services, 77, 103639. https://doi.org/10.1016/j.jretconser.2023.103639
56. Kumar, H. and Sharma, V.K. (2024) 'Creating an immersive environment of metaverse for businesses', Australasian Journal of Information Systems, 28, pp. 1–27. https://doi.org/10.3127/ajis.v28.4529
57. Kusumawati, A., Sartika, Rahimah, A. and Abdillah, Y. (2024) 'Mapping the landscape of avatar marketing: A bibliometric analysis of trends and future directions', Cogent Business & Management, 11(1), 2427428. https://doi.org/10.1080/23311975.2024.2427428
58. Liu, S. and Hao, F. (2024) 'Metaverse and regenerative tourism: The role of avatars in promoting sustainable practices', Asia Pacific Journal of Tourism Research, 29(7), pp. 869–884. https://doi.org/10.1080/10941665.2024.2350401
59. Mehrabian, A. and Russell, J.A. (1974) An Approach to Environmental Psychology. Cambridge, MA: MIT Press.
60. Mestiri, M., Khadhar, M., Huftier, A. and Fergombe, A. (2025) 'Fostering social interaction variability in the metaverse: A case study of the Museum of L'Avesnois in Fourmies', Heritage, 8(5), 171. https://doi.org/10.3390/heritage8050171
61. Miao, F., Kozlenkova, I.V., Wang, H., Xie, T. and Palmatier, R.W. (2022) 'An emerging theory of avatar marketing', Journal of Marketing, 86(1), pp. 67–90. https://doi.org/10.1177/0022242921996646
62. Miao, L., Yang, F.X., Zhang, Q. and Wang, K.Y. (2025) 'Synthetic tourist experience', Annals of Tourism Research, 113, 103977. https://doi.org/10.1016/j.annals.2025.103977
63. Murtas, G., Pedeliento, G. and Mangiò, F. (2024) 'Luxury fashion brands at the gates of the Web 3.0: An analysis of early experimentations with NFTs and the metaverse', Journal of Global Fashion Marketing, 15(1), pp. 90–114. https://doi.org/10.1080/20932685.2023.2249476
64. Mystakidis, S. (2022) 'Metaverse', Encyclopedia, 2(1), pp. 486–497. https://doi.org/10.3390/encyclopedia2010031
65. Nyagadza, B., Bashar, A., Khan, I., Wasiq, M. and Chuchu, T. (2025) 'Customer experience (CX) in virtual realms: A theories-contexts-characteristics-methodologies (TCCM) guided bibliometric study', Journal of Global Marketing. https://doi.org/10.1080/08911762.2025.2549706
66. Ozturk, R. and Kizilkan, Z. (2025) 'Revisiting metaverse marketing: A bibliometric analysis', Marketing and Management of Innovations, 16(2), pp. 56–74. https://doi.org/10.21272/mmi.2025.2-05
67. Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D. et al. (2021) 'The PRISMA 2020 statement: An updated guideline for reporting systematic reviews', BMJ, 372, n71. https://doi.org/10.1136/bmj.n71
68. Park, S.M. and Kim, Y.G. (2022) 'A metaverse: Taxonomy, components, applications, and open challenges', IEEE Access, 10, pp. 4209–4251. https://doi.org/10.1109/ACCESS.2021.3140175.
69. Paul, J. and Rosado-Serrano, A. (2019) 'Gradual internationalization vs born-global/international new venture models: A review and research agenda', International Marketing Review, 36(6), pp. 830–858. https://doi.org/10.1108/IMR-10-2018-0280
70. Payal, R., Sharma, N. and Dwivedi, Y.K. (2024) 'Unlocking the impact of brand engagement in the metaverse on real-world purchase intentions: Analyzing pre-adoption behavior in a futuristic technology platform', Electronic Commerce Research and Applications, 65, 101381. https://doi.org/10.1016/j.elerap.2024.101381
71. Qu, Y., Lo, C.K.Y. and Baek, E. (2025) 'From humanoid to virtual humans: A systematic literature review of avatar marketing', International Journal of Human-Computer

Interaction, 41(20), pp. 12602–12621. https://doi.org/10.1080/10447318.2025.2464889

72. Rana, N.P. and Banerjee, S. (2024) 'The future of metaverse adoption: A behavioral reasoning perspective with a text-mining approach', Journal of Consumer Behaviour, 23(5), pp. 2217–2233. https://doi.org/10.1002/cb.2336
73. Rahila, J. M., Lizzy, A., & Prasanna, P. (2025). Branding cinemas through understanding the effects of immersive technology and servicescape on customer cinematic experience. International Journal of Engineering Technologies and Management Research, 12(4SE), 96–111. https://doi.org/10.29121/ijetmr.v12.i4SE.2025
74. Rauschnabel, P.A., Felix, R., Hinsch, C., Shahab, H. and Alt, F. (2022) 'What is XR? Towards a framework for augmented and virtual reality', Computers in Human Behavior, 133, 107289. https://doi.org/10.1016/j.chb.2022.107289
75. Sami, H., Hammoud, A., Arafeh, M., Wazzeh, M., Arisdakessian, S., Chahoud, M., Wehbi, O., Ajaj, M., Mourad, A., Otrok, H., Abdel Wahab, O., Mizouni, R., Bentahar, J., Talhi, C., Dziong, Z., Damiani, E. and Guizani, M. (2024) 'The metaverse: Survey, trends, novel pipeline ecosystem & future directions', IEEE Communications Surveys and Tutorials, 26(4), pp. 2914–2960. https://doi.org/10.1109/COMST.2024.3392642
76. Sahani, K. K., Khan, M. S., Khatwani, S., Gupta, S., & Dubey, A. (2025). A smart interview simulator using AI avatars and real-time feedback mechanisms. International Journal of Engineering Technologies and Management Research, 12(5), 66–75. https://doi.org/10.29121/ijetmr.v12.i5.2025
77. Sands, S., Campbell, C., Plangger, K. and Pitt, L. (2022a) 'Buffer bots: The role of virtual service agents in mitigating negative effects when service fails', Psychology & Marketing, 39(11), pp. 2039–2054. https://doi.org/10.1002/mar.21723
78. Sands, S., Ferraro, C., Demsar, V. and Chandler, G. (2022b) 'False idols: Unpacking the opportunities and challenges of falsity in the context of virtual influencers', Business Horizons, 65(6), pp. 777–788. https://doi.org/10.1016/j.bushor.2022.08.002
79. Shankar, A., Agarwal, R. and Alghafes, R. (2025) 'Revolutionizing retail: the transformative power of service robots on shopping dynamics', Journal of Retailing and Consumer Services, 82, 104085. https://doi.org/10.1016/j.jretconser.2024.104085
80. Suh, A. (2024) 'How users cognitively appraise and emotionally experience the metaverse: Focusing on social virtual reality', Information Technology and People, 37(4), pp. 1613–1641. https://doi.org/10.1108/ITP-06-2022-0461
81. Sung, E., Kwon, O. and Sohn, K. (2023) 'NFT luxury brand marketing in the metaverse: Leveraging blockchain-certified NFTs to drive consumer behavior', Psychology & Marketing, 40(11), pp. 2306–2325. https://doi.org/10.1002/mar.21854
82. Tella, A., Oso, O. O., & Famuyiwa, S. T. (2025). Enhancing information delivery in distance learning libraries through Metaverse technologies. Journal of library & information ServiceS in DiStance learning, 19(1-2), 1-27. 10.1080/1533290X.2025.2480549
83. Thomas, V.L. and Fowler, K. (2021) 'Close encounters of the AI kind: Use of AI influencers as brand endorsers', Journal of Advertising, 50(1), pp. 11–25. 10.1080/00913367.2020.1810595
84. Tlili, A., Huang, R. and Kinshuk (2023) 'Metaverse for climbing the ladder toward "Industry 5.0" and "Society 5.0"?', The Service Industries Journal, 43(3–4), pp. 260–287. 10.1080/02642069.2023.2178644
85. Wasiq, M., Bashar, A., Khan, I., & Nyagadza, B. (2024). Unveiling customer engagement dynamics in the metaverse: A retrospective bibliometric and topic modelling investigation. Computers in Human Behavior Reports, 16, 100483. 10.1016/j.chbr.2024.100483
86. Wee, J., Yoon, N., & Lee, Y. J. (2023). The effect of perceived affordances of gamified avatar fashion styling on metaverse engagement behavior intention. Journal of the Korean Society of Clothing and Textiles, 47(3), 560-576.10.5850/JKSCT.2023.47.3.560
87. Yoon, N. and Lee, H.K. (2024) 'Exploring media richness in the metaverse shopping platform: The role of rendering quality and avatar realism', Journal of the Korean Society of Clothing and Textiles, 48(5), pp.

1024–1038.
10.5850/JKSCT.2024.48.5.1024