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Evaluating the Effects of Artificial Intelligence and Digital Marketing on Consumer Behaviour: A Bibliometric Approach

Saransh Kumar Srivastav[1], Mahima Habil[2], Pooja Thakur[3]

[1,2,3] Department of Commerce, Dr. Harisingh Gour Vishwavidyalaya, (A Central University) Sagar, Madhya Pradesh, India. Email: saranshsrivastav1996@gmail.com[1], mahimahabil18@gmail.com[2], poojathakur7024@gmail.com[3]

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ABSTRACT
This study examines the evolution and emerging trends in consumer behavior by integrating Artificial Intelligence (AI), digital marketing, and consumer buying behavior through bibliometric analysis. Using data from the Web of Science (2014–2023), 645 articles were analyzed to identify publication trends, key themes, and leading contributors. Bibliometric indicators, including citation counts and keyword analysis, were visualized using VOSviewer. The analysis revealed six keyword clusters, highlighting key areas such as AI-driven data analytics, customer experience, and conversational AI. The findings provide valuable insights into how AI and digital marketing influence consumer behavior, offering directions for future research. The conclusion synthesizes the key findings and outlines potential research avenues at the intersection of AI, digital marketing, and consumer behavior. This study contributes to the field by providing a comprehensive bibliometric analysis, identifying major trends, influential authors, contributing countries, and dominant themes while suggesting areas for further exploration.

Keywords: Artificial Intelligence (AI), Chatbots, Consumer Behaviour, Bibliometric Analysis, Digital Marketing.
JEL Code: M31, O33, C80, D91.

I. Introduction

Consumer behavior has long been a subject of fascination and critical importance for marketers and researchers (Malter et al., 2020). Emerging as a formal field of study in the mid-20th century, scholars began exploring the underlying factors driving purchasing decisions (Kernan, 1995; Wilkie & Moore, 2003; MacInnis & Folkes, 2010). Early research primarily relied on observations and surveys, providing foundational insights into buyer motivations and preferences (Howard & Sheth, 1969). The traditional marketing mix—product, price, place, and promotion—served as a guiding framework for developing strategies that aligned with consumer needs and desires. The 1950s marked a significant expansion in academic research on consumer behavior, leading to a more structured and systematic exploration of the field (MacInnis & Folkes, 2010; Malter et al., 2020; Peighambari et al., 2016). Researchers examined various aspects, including consumer choice, attitudes, satisfaction judgments, and the meanings attached to consumption (Battalio et al., 1974; Arndt, 1986). The literature from this period laid the foundation for understanding consumer-brand relationships and the broader implications of consumer behavior on market dynamics (MacInnis & Folkes, 2010).

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As society, economics, and technology have evolved, so too has the complexity of consumer behavior studies. The advent of digital marketing has transformed traditional approaches, providing new ways to reach and influence consumers (Dwivedi et al., 2021; Efendioğlu, 2024). The integration of artificial intelligence (AI) into marketing strategies has further revolutionized the field, enabling businesses to analyze vast amounts of data and personalize consumer interactions with unprecedented precision (Davenport et al., 2020; Motadi, 2024; Yazdani & Darbani, 2023; Zlatanova-Pazheva, 2024). AI-driven tools such as recommendation systems, chatbots, and predictive analytics have significantly influenced purchasing decisions, enhancing the relevance and effectiveness of marketing efforts (V. Kumar et al., 2019; Oke Tolulope Timothy et al., 2024; Ziakis & Vlachopoulou, 2023). The extensive body of literature on consumer behavior reflects these ongoing transformations. Previous research has explored a wide range of topics, expanding the discipline into fields such as psychology, sociology, anthropology, economics, management, and statistics (Billore & Anisimova, 2021; Cioppi et al., 2023; Jia et al., 2018; Mariani et al., 2022; Piñeiro-Chousa et al., 2024). Studies have examined consumer decision-making processes (Roy et al., 2023; Rozenkowska, 2023; Schmitt, 2024), attitudes, perceptions, and satisfaction (Roy, 2022), as well as interactions with brands and online-offline behaviors (Datta, 2022; Roy & Datta, 2023). Additionally, research has addressed consumer well-being and sustainable consumption (Korkmaz & Altan, 2024; Vergura et al., 2023), green consumerism (Sharma et al., 2023), and impulse buying behavior (Kennedy, 2017; Kennedy & Kennedy, 2018; Yi & Jai, 2020). Other areas of study include the role of social media and e-commerce (Bhardwaj et al., 2024; Chauhan et al., 2021; Dwivedi et al., 2021), the effects of digitalization and digital marketing (Calderon-Monge & Ribeiro-Soriano, 2024; Dr. Anita Kumari & Pooja Thakur, 2024; Mukhtar et al., 2023), influencer marketing (Kanaveedu & Kalapurackal, 2022), and neuromarketing (Maris Lima Cruz et al., 2016). Furthermore, the role of AI in shaping consumer behavior has been extensively analyzed (Alfina et al., 2023; Farooq & Yee Yen, 2024; Floren et al., 2020; Mogaji & Jain, 2024; Oke Tolulope Timothy et al., 2024; Saputra et al., 2023; Spais et al., 2024; Sundareswaran et al., 2022; Taufik et al., 2021).

This extensive body of research has deepened our understanding of how consumers make decisions, form preferences, and interact with brands, as well as how their behavior and well-being are shaped by the digital age. The ever-evolving consumer landscape requires continuous updates to research methodologies and theoretical frameworks to keep pace with shifting consumer dynamics. Thus, bibliometric research (Donthu et al., 2021; Öztürk et al., 2024) is essential for clarifying the current state of the field and providing valuable insights to stakeholders interested in understanding the various disciplines involved. Prior studies have emphasized the importance of this approach in exploring topics such as sustainability (Hael et al., 2024), consumer buying behavior (Roy et al., 2023), artificial intelligence (Bawack et al., 2022; Kavitha et al., 2024), and interrelated journals (Donthu et al., 2020a; Donthu et al., 2020b; Baker et al., 2021; Khan et al., 2021). However, despite these advancements, there remains a need for a holistic analysis that synthesizes existing findings and provides a broader perspective on the interplay between digital marketing, AI, and consumer behavior. By examining scholarly articles and identifying key themes, influential works, and emerging trends, we can develop a comprehensive understanding of how these technologies shape consumer buying behavior. In line with this, we conduct a bibliometric analysis to provide relevant insights guided by the following research questions (RQs):

- RQ1. What are the publication trends in digital marketing and AI in consumer behavior? This research question examines the number and percentage growth of scholarly publications in the field.
- RQ2. Which are the most cited articles on consumer behavior related to digital marketing and AI? Identifying the most cited articles provides a valuable resource for researchers seeking to understand both foundational and cutting-edge contributions to the discipline.
- RQ3. Who are the key authors in this field? Citation analysis is used to identify influential authors and their contributions, helping scholars and professionals recognize key figures in the discipline.

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- RQ4. Which countries lead in the number of publications and citations, indicating their influence in the field? This question is explored through citation analysis to determine the geographical distribution of research impact.
- RQ5. What are the major themes explored by researchers in this field? The thematic analysis highlights key topics, demonstrating the interdisciplinary significance of the research and identifying potential areas for future study.
- RQ6. Which journals publish the most articles on digital marketing, AI, and consumer behavior? This analysis identifies the leading journals that serve as key sources of knowledge on emerging trends in digital marketing and AI's impact on consumer behavior.

The remaining sections are structured as follows: **Section 2: Materials & Methods** outlines the research methodology, data extraction process, and data sources. **Section 3: Science Mapping** presents the results and findings of the bibliometric analysis. Finally, **Section 4: Conclusion** summarizes the key findings and emerging trends, providing recommendations for future research.

II. Research Method

Bibliometric analysis is a widely used and rigorous method for investigating and analyzing large volumes of scientific data (Donthu et al., 2021). It examines the literature repository using quantitative metrics such as citations, authorships, and the institutional and geographic patterns of bibliographic materials over time (Ellegaard & Wallin, 2015). One of its primary advantages is its ability to manage vast amounts of bibliographic data efficiently (Ramos-Rodrígue & Ruíz-Navarro, 2004). In bibliometric analysis, citation and co-citation analyses are effective methods for uncovering trends, patterns, and the intellectual framework within a particular academic field (Diodato, 1994; Ferreira et al., 2014; Faruk et al., 2021). By examining citation frequencies and their interconnections, these analyses help organize and synthesize scholarly work, providing valuable insights into the evolution of knowledge within a discipline. Both analyses serve as powerful tools for mapping the intellectual landscape of various research fields and identifying emerging trends (Nerur et al., 2008). They also enable researchers to trace the development of academic disciplines, identify influential publications, and uncover dominant schools of thought through citation networks (Lewis & Alpi, 2017). This method is widely applied across multiple disciplines to identify trends and map the intellectual landscape of research. It has been effectively used in fields such as finance (Kashi & Shah, 2023; Jain & Goyal, 2024), economics (Alqudah et al., 2024), healthcare (Er-Rays & Lemqeddem, 2024; Ray et al., 2021; Yaqoob et al., 2022), blockchain and technology (Camilleri, 2017; Habil et al., 2024; S. Kumar et al., 2023; Kuzior & Sira, 2022; Salah et al., 2019; Yuan & Wang, 2018), and marketing management (Bashar et al., 2024; Valencia-García et al., 2023). By analyzing citation networks, these studies provide valuable insights into the evolution of knowledge and highlight influential works, offering a comprehensive understanding of academic development within these fields.

2.1. Content Curation & Search

Web of Science (www.webofscience.com) is a leading database for scientific research and citation data, encompassing all disciplines and sources, including journals, books, patents, and conference proceedings. We selected Web of Science (WoS), a leading database, for this study due to its robust indexing and citation analysis tools, which effectively track publication trends, identify influential authors, and analyze research networks. Recognized for its reliability, WoS is widely used for systematic literature reviews, meta-analyses, and bibliometric research (Martínez-López et al., 2020; Rialp et al., 2019; Sarin et al., 2020; Khan et al., 2021; Labib, 2024), offering high-quality, peer-reviewed scholarly content. While previous studies on related topics have primarily used Scopus for systematic literature reviews (SLRs) and bibliometric studies (Verma et al., 2021; Ziakis & Vlachopoulou, 2023; Ghorbani et al., 2022; Sangeeta Rajput & Samrat Ray, 2024), this study

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utilizes WoS to provide a fresh perspective and build on existing research. As suggested by Faruk et al. (2021), using WoS enhances the reliability and comprehensiveness of the topic. For the data extraction process (Figure 1), we used the search string "Consumer behaviour AND Digital marketing OR Artificial Intelligence", ensuring that these terms appeared in the topic fields (title, abstract, keyword plus, and author keywords) of the documents. The study period was limited to 10 years (2014–2023), resulting in 2,268 documents. This timeframe was chosen to focus on recent and relevant developments in AI, digital marketing, and consumer behavior (LeCun et al., 2015; Chaffey & Smith, 2017; Shankar, 2018). By capturing significant advancements in technology and research trends, this approach ensures a comprehensive analysis of contemporary patterns and practices. The search was further refined to include only specific document types (articles, review articles, or book chapters), English-language sources, and Web of Science categories (Business or Management), excluding other disciplines. To maintain research quality and reliability, we excluded conference proceedings, preprints, and retracted papers, ensuring that only peer-reviewed, validated research contributing significantly to the field was considered. By focusing on English-language documents within the Business and Management categories, this study aligns with its objective of examining the intersection of AI, digital marketing, and consumer behavior in a business context while maintaining the credibility of sources. However, relevant studies from psychology and other disciplines related to business and management—such as consumer behavior and decision-making—were included to provide a more comprehensive perspective on the topic. After these refinements, 1,838 articles remained. Subsequently, two researchers independently analyzed the titles, abstracts, keywords, and content of these papers, retaining only those that addressed the research topic in a meaningful and non-trivial manner. This process further reduced the number of eligible papers to 645 (Table 1), which were then used for the bibliometric analysis.

Table 1. Number of Yearly Published Articles

Final Publication Year	No. of Articles Selected	% of Total Count
2023	156	24.186
2022	177	27.442
2021	142	22.016
2020	75	11.628
2019	40	6.202
2018	19	2.946
2017	17	2.636
2016	10	1.550
2015	4	0.620
2014	5	0.775

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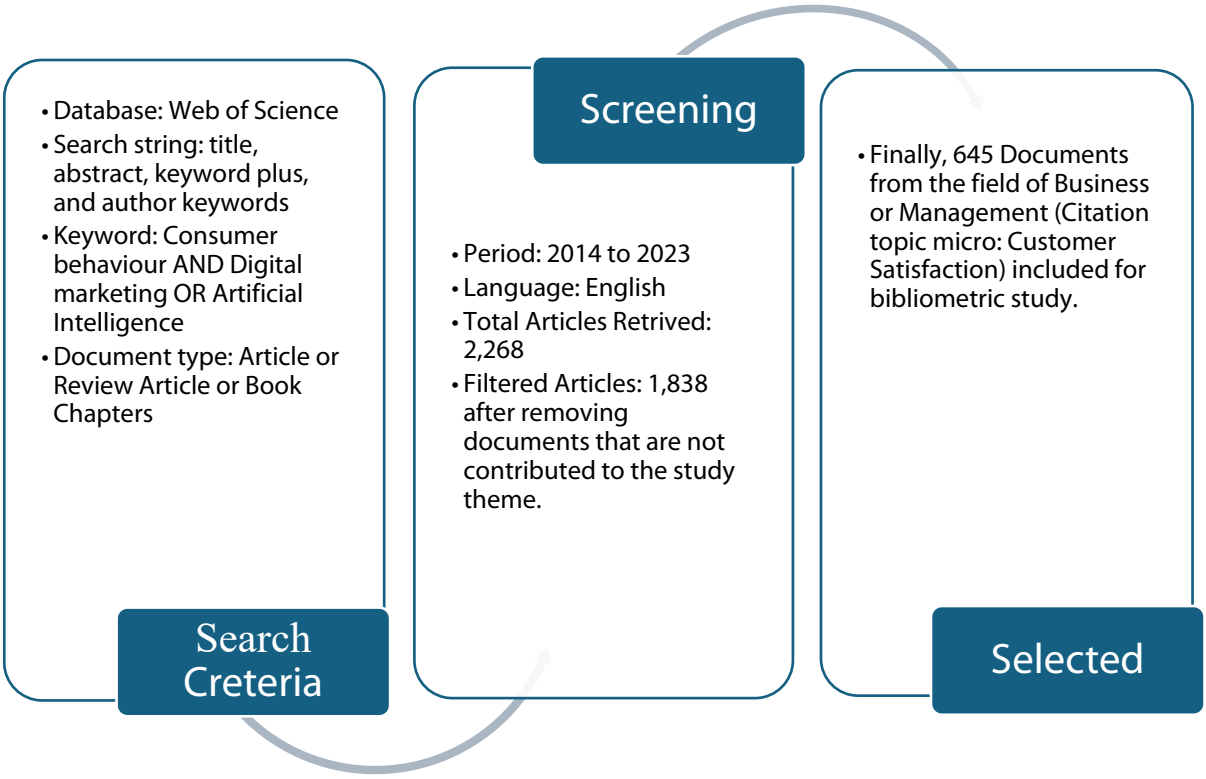

Figure 1. Data Extraction Process

III. Results and Discussions

3.1. Annual Publication & Citation count

The trend of annual publications from 2014 to 2023 indicates a significant increase in scholarly output in the fields of digital marketing, AI, and consumer behavior. This is evident from the data presented in Figure 2, which highlights both annual publication counts and citation trends. Between 2014 and 2018, research output was minimal, with only 55 articles published, accounting for just 9% of the total publications. This period can be considered the early stage of research at the intersection of digital marketing, AI, and consumer behavior. However, research output expanded significantly from 2019 onward, with over 90% of total publications occurring during this time. The most substantial growth was observed in the last three years (2021–2023), during which more than 50% of the total literature was produced. In 2022 alone, 177 articles were published, marking the highest annual output to date and representing 27.44% of the total publications. (As of June 2024, this data was extracted from WoS. From 2014 to 2017, citation counts grew modestly, reflecting a gradual increase in academic interest. However, from 2018 onward, citations rose sharply, indicating a surge in scholarly research output. The spike in citations in 2023, reaching 9,999, highlights a heightened focus on the topic. Despite this increase in citations, 2023 saw a decline in overall research output. This shift suggests that the focus of research in digital marketing and AI has transitioned from consumer behavior to areas such as customer experiences, services through chatbots, big data, machine learning (ML), and business process optimization. This trend aligns with the growing emphasis on operational efficiency and innovation within the business sector. However, despite this shift, there remain significant opportunities and gaps for researchers, particularly in understanding the evolving consumer behavior within the context of these innovations. This remains a crucial area of study in today's market landscape. The overall average annual growth rate in publications from 2014 to 2023 is approximately 32.93%. Additionally, the rise in citations may

indicate a deeper integration of digital marketing and AI research into practical applications in contemporary consumer behavior and market strategies.

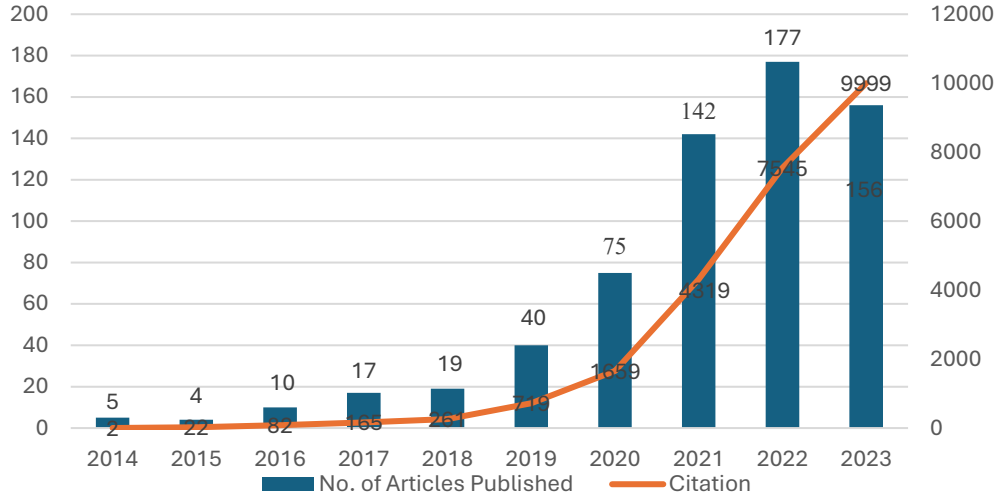

Figure 2. Annual Publication & Citation Trend

3.2. Manuscript Checklist

The citation count serves as an indicator of research impact (Aksnes et al., 2019; Svensson, 2010). To assess this impact, we ranked documents based on Total Citations (TC) and categorized them into two groups: those that directly incorporate at least two of the study's search terms and those covering a broader, diversified area aligned with the study theme. This classification provides deeper insights into the most popular and influential articles. Table 2 presents the ten most cited articles published between 2014 and 2023 that align with the study theme. The most cited article, Kumar et al. (2016), has received 474 TC with an Average Citations per Year (ACY) of 59.25, highlighting its strong influence within the research community. Their findings suggest that firm-generated content enhances the effectiveness of TV and email marketing, particularly among tech-savvy and social media-active consumers. Although more recent, Luo et al. (2019) has garnered 317 TC and holds the highest ACY of 79.25, indicating its rapidly growing impact in consumer behavior and AI. Their research reveals that chatbots perform as effectively as skilled human workers and outperform inexperienced ones in driving customer purchases. However, disclosing a chatbot's identity significantly reduces purchase rates due to consumer perceptions of lower knowledge and empathy. Similarly, Kirk and Rifkin (2020), ranking third in TC but first in ACY, analyzed consumer behaviors during the early COVID-19 pandemic, categorizing them into reacting, coping, and adapting phases. Their study provides theoretical insights for future research and has gained considerable attention due to its timely examination of consumer behavior during the pandemic. Despite having relatively lower total citations of 109 and 108, respectively, due to their recent publication, Mariani et al. (2022) and Dwivedi et al. (2023) reflect emerging areas in AI, marketing, and the metaverse. Mariani et al. (2022) provided an integrated overview of AI research in marketing, consumer behavior, and psychology, identifying eight key topical clusters, such as neural networks and social media analytics, along with 412 theoretical lenses, including the unified theory of technology acceptance, theory of planned behavior, and game theory. Their study also proposes a research agenda to enhance cross-disciplinary insights and address overlooked topics. In contrast, Dwivedi et al. (2023) explored the transformative marketing potential of the metaverse, highlighting both opportunities and challenges for brands and marketers. They proposed a detailed future research agenda and framework to guide further investigation and practical application.

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Table 2. Most Cited Articles in The Field of Study Area

No	Title	Authors	Source Title	TC	ACY
1.	From Social to Sale: The Effects of Firm-Generated Content in Social Media on Customer Behavior	Kumar et al. (2016)	Journal Of Marketing	474	59.25
2.	Frontiers: Machines vs. Humans: The Impact of Artificial Intelligence Chatbot Disclosure on Customer Purchases	Luo et al. (2019)	Marketing Science	317	79.25
3.	I'll trade you diamonds for toilet paper: Consumer reacting, coping and adapting behaviors in the COVID-19 pandemic	Kirk and Rifkin (2020)	Journal Of Business Research	327	81.75
4.	Digital Content Marketing's Role in Fostering Consumer Engagement, Trust, and Value: Framework, Fundamental Propositions, and Implications	Hollebeek and Macky (2019)	Journal Of Interactive Marketing	281	56.2
5.	Consumers and Artificial Intelligence: An Experiential Perspective	Puntoni et al. (2021)	Journal Of Marketing	226	56.5
6.	Transforming the Customer Experience Through New Technologies	Hoyer et al. (2020)	Journal Of Interactive Marketing	228	57
7.	Understanding consumers' acceptance of automated technologies in service encounters: Drivers of digital voice assistants' adoption	Fernandes and Oliveira (2021)	Journal Of Business Research	189	63
8.	Digital Sensory Marketing: Integrating New Technologies into Multisensory Online Experience	Petit et al. (2019)	Journal Of Interactive Marketing	196	39.2
9.	AI in marketing, consumer research and psychology: A systematic literature review and research agenda	Mariani et al. (2022)	Psychology & Marketing	109	36.33
10.	Metaverse marketing: How the metaverse will shape the future of consumer research and practice	Dwivedi et al. (2023)	Psychology & Marketing	108	54

In the second category, Table 3 highlights the broad diversity of topics, including AI in service, marketing, retailing, tourism and hospitality, and service robots, demonstrating its wide impact across multiple subdomains of marketing and management. The most cited article, "Artificial Intelligence in Service" by Huang & Rust (2018), ranks first with 918 TC and an ACY of 153. Following closely, "Brave New World: Service Robots in the Frontline" by Wirtz et al. (2018) has garnered 776 TC and an ACY of 129.33, reflecting its substantial impact on service management literature. Davenport et al.'s (2020) article, "How Artificial Intelligence Will Change the Future of Marketing", stands out with 512 TC and a high ACY of 128. Despite being more recent, it is rapidly becoming a key reference in marketing AI research. The table also includes articles focusing on specific sectors, such as those by Pillai & Sivathanu (2020) and De Kervenoael et al. (2020), both

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emphasizing the emerging role of AI in hospitality services. With 195 and 228 TC and ACYs of 65 and 57, respectively, these studies are becoming important references for understanding AI adoption in the hospitality sector.

Table 3. Most Cited Articles in Broad Category of Marketing Domain

No	Title	Authors	Source Title	TC	ACY
1.	Artificial Intelligence in Service	Huang & Rust (2018)	Journal Of Service Research	918	153
2.	Brave new world: service robots in the frontline	Wirtz et al. (2018)	Journal Of Service Management	776	129.33
3.	How artificial intelligence will change the future of marketing	Davenport et al. (2020)	Journal Of The Academy Of Marketing Science	512	128
4.	The Future of Retailing	Grewal et al. (2017)	Journal Of Retailing	511	73
5.	Engaged to a Robot? The Role of AI in Service	Huang & Rust (2021)	Journal Of Service Research	279	69.75
6.	A strategic framework for artificial intelligence in marketing	Huang & Rust (2021)	Journal Of The Academy Of Marketing Science	226	75.33
7.	Waiting for a sales renaissance in the fourth industrial revolution: Machine learning and artificial intelligence in sales research and practice	Syam & Sharma (2018)	Industrial Marketing Management	261	43.5
8.	Service robot implementation: a theoretical framework and research agenda	Belanche et al. (2020)	Service Industries Journal	246	61.5
9.	Adoption of AI-based chatbots for hospitality and tourism	Pillai & Sivathanu (2020)	International Journal Of Contemporary Hospitality Management	195	65
10.	Leveraging human-robot interaction in hospitality services: Incorporating the role of perceived value, empathy, and information sharing into visitors' intentions to use social robots	De Kervenoael et al. (2020)	Tourism Management	228	57

3.3. Most Prolific Author

Table 4 summarizes the 10 most prolific authors among the 645 documents, based on citation analysis. This analysis provides insights into the influence and connectivity of authors within the research field, highlighting those who have had the most significant impact on the scholarly community and mapping the intellectual structure of the domain. From a dataset comprising 1,724 authors, a citation threshold of at least 100 citations and a minimum of three documents per author was applied. A total of 54 authors met these

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criteria, with the top 10 presented in the table. These authors were analyzed based on their record count, total citations, and total link strength—a key metric for understanding an author's connectivity and influence within the research network.

Huang stands out as the leading author, with 2,138 citations across 7 documents and a total link strength of 217, reflecting his extensive connections and high citation impact. Rust follows closely with 1,956 citations from 6 documents and a total link strength of 204. Wirtz is also noteworthy, with 1,598 citations and a strong total link strength of 210 across 8 documents. Grewal has accumulated 1,417 citations over 8 documents, with a total link strength of 110. While his citation count is substantial, the comparatively lower link strength suggests that his work, though influential, may be more specialized or less integrally connected to other research clusters. Meanwhile, Kunz and Paluch, despite having fewer documents (4 and 3, respectively), have achieved high citation counts (1,289 and 1,250, respectively), demonstrating that their individual papers have made a significant impact on the field.

Table 4. Top 10 Most Prolific Authors

Author	Record Count	Citations	Total link strength
huang, ming-hui	7	2138	217
rust, roland t.	6	1956	204
wirtz, jochen	8	1598	210
grewal, dhruv	8	1417	110
kunz, werner h.	4	1289	147
paluch, stefanie	3	1250	125
belanche, daniel	8	939	199
flavian, carlos	8	891	197
guha, abhijit	5	812	82
kannan, p. k.	4	638	7

The network diagram (Figure 3) is color-coded to represent different clusters, each signifying a group of authors whose work is frequently cited together and closely related. These clusters highlight the presence of distinct research communities or subfields within the broader research domain. Huang and Rust are centrally positioned within the purple cluster, indicating the centrality of their work and its widespread influence within this specific research community. Similarly, Grewal and Guha belong to the red cluster, Belanche and Flavian to the yellow cluster, and Wirtz, J. to the blue cluster. The size of each node, representing an author, correlates with their citation count and total link strength. Larger nodes indicate authors with higher citations and greater influence. The lines (edges) connecting the nodes represent co-citation links between authors, with thicker and more numerous lines indicating stronger relationships, where two authors are frequently cited together in the literature. The dense network surrounding key authors such as Huang, Rust, and Grewal reflects their broad influence and frequent co-citation with other significant works. Additionally, some authors have connections across multiple clusters, indicating their interdisciplinary influence within the field.

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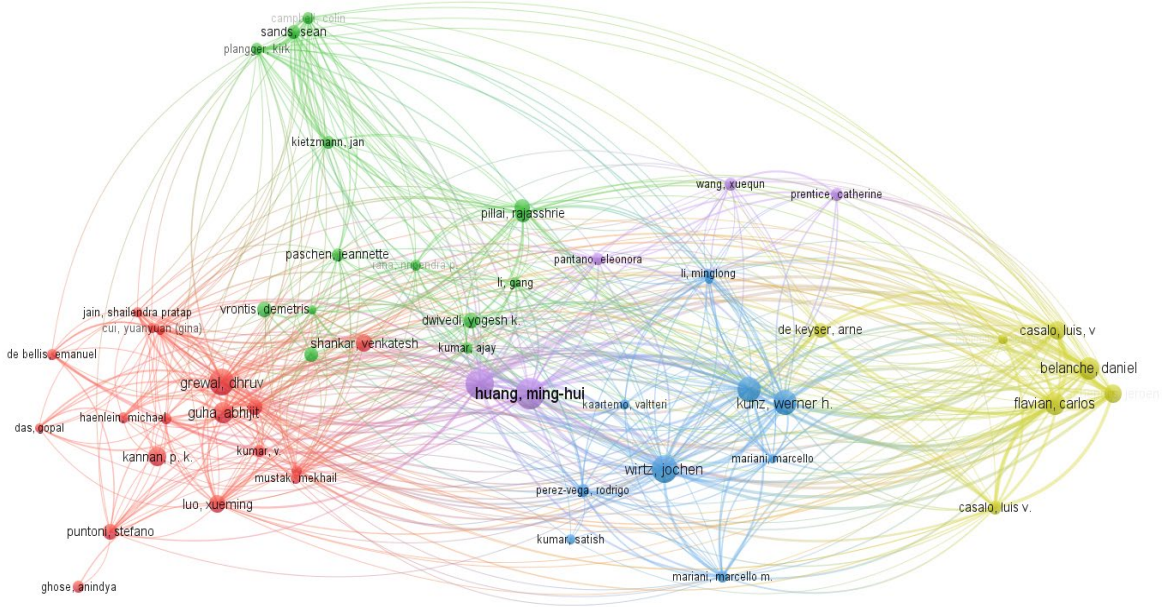

Figure 3. Citation analysis of Authors

3.4. Most Productive Countries

Table 5 presents an analysis of the 10 most productive countries in the consumer behavior research domain, based on citation analysis, with a minimum threshold of 100 citations and at least five documents per country. Among 74 countries, 34 met these criteria, with the top 10 highlighted for their significant contributions. The total link strength represents the combined impact of publications and citations, providing a comprehensive measure of research influence. While the number of publications is an important metric, total link strength and citation count offer deeper insights into the quality and significance of a country's research contributions. Countries with high citation counts and strong link strength produce more impactful research, shaping the scientific community. This analysis highlights countries with notable research contributions and provides insights into the global research landscape.

The USA stands out as the most influential country in digital marketing and AI research, with 16,247 citations across 229 publications and a total link strength of 3,761. This reflects its leadership not only in the volume of research but also in producing high-impact studies that significantly shape global academic discourse. England, with 101 publications and 6,445 citations, ranks second. Despite having fewer publications than the USA, England's high citation count underscores the profound quality and influence of its research, particularly in bridging theoretical frameworks with applied studies on AI's transformative role in marketing practices. China follows closely with 104 publications and 3,880 citations, highlighting its growing academic and practical contributions. The strong citation count reflects the global recognition of Chinese research, driven by the rapid expansion of its e-commerce sector and the application of AI in consumer insights. While China's publication output is similar to England's, its focus on AI-driven solutions for market expansion has positioned it as a rising leader in the field. These trends underscore the dynamic interplay between publication volume, citation impact, and research innovation among leading countries in the global academic landscape.

Australia, with 61 publications and 3,655 citations, and Germany, with 44 publications and 3,342 citations, demonstrate significant influence in the global research ecosystem. Their relatively high citation counts highlight the impactful nature of their contributions, particularly in AI and digital marketing. In contrast, France and India, with 46 and 50 publications, respectively, have slightly lower citation counts of 2,841 and 2,819. This suggests that while their research output is valuable, it may not yet have achieved the same level of international recognition as leading nations like the USA or England. Nevertheless, these

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countries continue to play an important role in advancing discussions on AI's transformative potential in shaping consumer behavior.

Taiwan and Singapore stand out for their citation efficiency. Taiwan, with 29 publications and 2,886 citations, and Singapore, with 19 publications and 2,464 citations, demonstrate a high citation-to-publication ratio, highlighting their focus on niche yet impactful subfields within AI and marketing. Similarly, the Netherlands, with 28 publications and 2,501 citations, reflects its strong academic presence in these disciplines. Notably, among the developed nations in the top 10, developing economies like India and China have emerged as prominent contributors to scientific literature. This reflects their growing emphasis on leveraging AI and digital technologies to address local and global challenges, further solidifying their position in the evolving research landscape.

Table 1. Top 10 Most Productive Countries out of 74 countries

Countries	Record Count	Citations	Total link strength
USA	229	16247	3761
England	101	6445	1913
China	104	3880	1481
Australia	61	3655	1164
Germany	44	3342	943
Taiwan	29	2886	949
France	46	2841	828
India	50	2819	795
Netherlands	28	2501	726
Singapore	19	2464	624

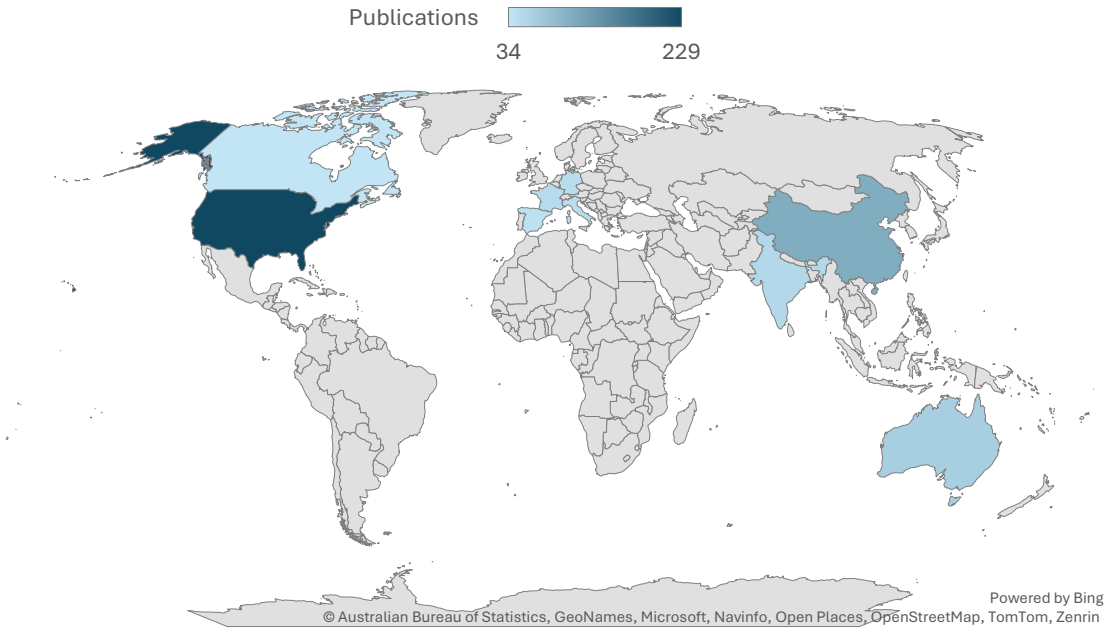

Figure 4. Mapping of top 10 Most Productive Countries

3.5. Major themes

Most previous studies have conducted keyword analyses to identify common themes and topics, providing insights into emerging trends (Comerio & Strozzi, 2019). In this study, we performed keyword co-occurrence analysis to uncover networks of related keywords (Radhakrishnan et al., 2017). Unlike basic keyword analysis, keyword co-occurrence analysis examines how often two or more keywords appear

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together within the same documents. This method helps identify relationships between different concepts or topics and reveals the structural framework of a research field (Su & Lee, 2010). Additionally, it highlights emerging interdisciplinary trends and niche areas of study. In our analysis, keywords within the same co-occurrence networks are conceptually related, while the proximity between different networks indicates the closeness of these concepts. We selected authors' keywords that appeared at least five times, a criterion met by 86 out of 2,173 keywords. The most frequently occurring keywords were extracted using VOSviewer co-occurrence analysis, with the top 20 presented in Table 6. The keyword co-occurrence network from our analysis is depicted in Figure 5. The central and most prominent node in the network is "Artificial Intelligence", indicating that AI is the most frequently occurring term (258 times) and the most interconnected across the analyzed documents. The size of the node represents its high occurrence and significant influence within the visually represented network in Figure 5. The terms AI, social media, machine learning (ML), customer experience, consumer behavior, chatbot, and digital marketing are among the most prominent keywords used by researchers.

Table 2. Top 20 Frequently Occurred Keywords

Keyword	Occurrence
Artificial Intelligence (AI)	258
Social Media	36
Machine Learning	35
Customer Experience	30
Consumer Behavior	30
Chatbot	30
Anthropomorphism	23
Service Robots	23
Trust	23
Digital Marketing	20
Robots	17
Big Data	16
Marketing	16
E-Commerce	15
Customer Engagement	14
Customer Journey	14
Service Quality	14
Purchase Intention	12
Hospitality	11
Value Co-creation	11

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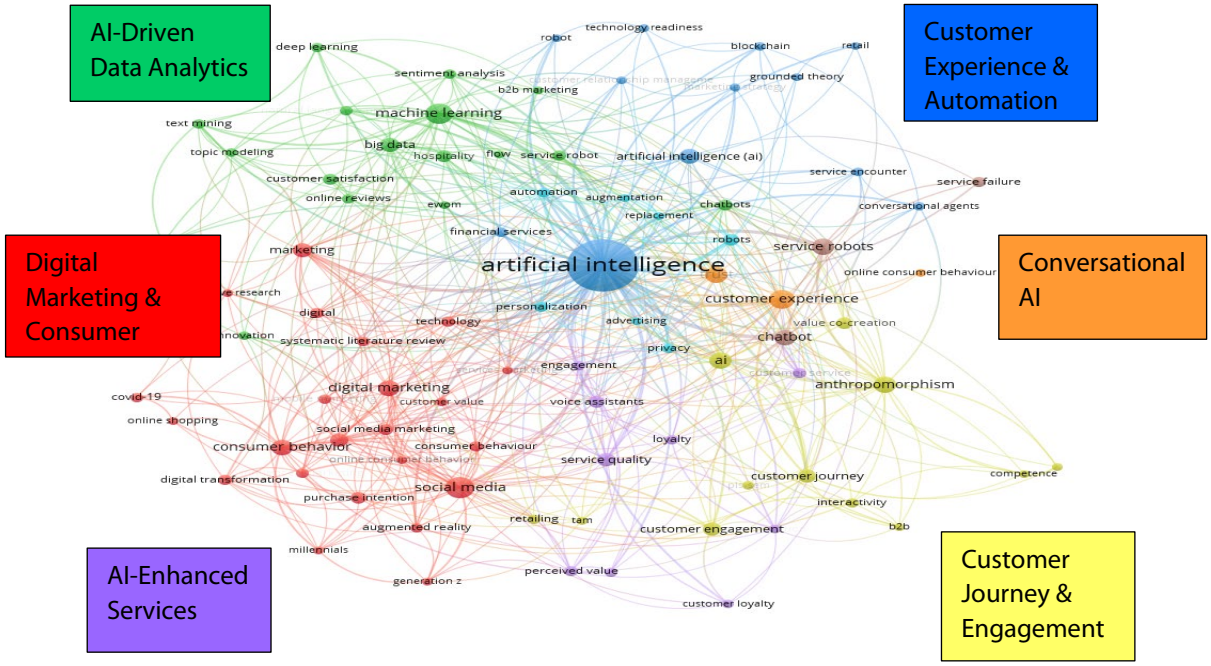

Figure 5. Keyword occurrence network

To gain deeper insights into the relationships between keywords, we grouped these contemporary topics into six clusters based on keyword co-occurrence, allowing us to explore underlying relationships and thematic concentrations within the literature. Figure 5 illustrates these six clusters and their main themes, including AI-Driven Data Analytics (green cluster), Digital Marketing and Consumer Behavior (red cluster), Customer Experience and Automation (blue cluster), Customer Journey and Engagement (yellow cluster), AI-Enhanced Services (purple cluster), and Conversational AI (orange cluster). The following sections provide a more detailed exploration of each cluster.

3.5.1. AI-Driven Data Analytics

Cluster 1 focuses on AI-driven data analytics and its impact on consumer adoption of products and services. Key themes within this cluster include AI, machine learning (ML), big data, data mining, online reviews, text mining, customer satisfaction, and service robots. These topics emphasize the critical role of AI technologies in shaping consumer preferences and decision-making processes. AI has the potential to transform customer relationships by converting data into actionable strategies, enabling businesses to influence and foster more meaningful consumer behavior (Rabby & Hassan, 2021).

A comprehensive analysis of the economic impact of recent advancements in AI, with a particular focus on machine learning (ML) applications, has been conducted by Abrardi et al. (2022). Their study highlights key issues with immediate policy implications, including AI's influence on labor markets, productivity, employment, company structures, and the innovation process. Furthermore, by leveraging data-driven learning and behavioral biases, the study explores how AI influences consumer behavior and market competition. Despite ongoing discussions on AI's impact on employment markets, the analysis extends beyond robotics to examine its broader implications in sectors such as finance, retail, and healthcare. Olan et al. (2021) used the fsQCA approach to develop a meta-framework for consumer behavior, integrating the principles of AI, consumer behavior, and knowledge sharing. Their findings suggest that AI enhances consumer attitudes and behaviors by facilitating information acquisition, while online communities foster engagement by encouraging consumers to share their experiences with specific products or services. Studies by Huang & Rust (2018, 2021) and Davenport et al. (2020) highlight AI's role in analyzing large datasets to generate practical and valuable insights for businesses. These studies examine the potential of ML algorithms,

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big data analytics, and natural language processing to predict consumer preferences, optimize marketing strategies, and improve business performance. Luo et al. (2019) emphasize the importance of data mining techniques in enhancing customer satisfaction, driving product innovation, and analyzing customer interactions. Additionally, research by Rust (2020) underscores the potential of AI-driven technologies to revolutionize traditional business structures by enabling real-time decision-making and delivering personalized customer experiences. The literature demonstrates that businesses are leveraging AI to process customer data, generate personalized recommendations, and improve customer satisfaction (Davenport & Ronanki, 2018). This cluster represents a growing body of research emphasizing AI's critical role in reshaping industries and equipping businesses with tools to better understand and respond to consumer needs. The dense connections within this cluster reflect collaborative efforts across disciplines to integrate AI and data analytics, enhancing consumer engagement and business efficiency.

3.5.2. Digital Marketiing & Consumer Behaviour

Cluster 2 on digital marketing and consumer behavior explores the integration of AI, digital marketing strategies, and consumer behavior studies. The advancement of AI, generative AI, and data analytics has significantly transformed consumer behavior through digital marketing (Dash & Kar, 2024; S. Khan et al., 2022; Khatri, 2021; Ziakis & Vlachopoulou, 2023). The convergence of digital platforms, social media, and AI-powered technologies has provided marketers with innovative tools to understand, engage with, and influence consumer choices (A. Kumar et al., 2015; Singh et al., 2024). Research within this cluster examines topics such as social media, consumer buying behavior, customer value, consumer information processing, purchase intention, digital marketing, Generation Z, and online shopping, demonstrating how digital tools are reshaping marketing strategies to become more consumer-centric. The studies by V. Kumar (2015) and Hollebeek & Macky (2019) analyze the impact of digital marketing strategies, including customized content and AI-driven marketing mechanisms, on consumer behavior and decision-making processes. Additionally, Grewal et al. (2017) highlight the role of automation and personalization in enhancing consumer engagement and loyalty, emphasizing the importance of trust and satisfaction in digital platforms. Chaffey & Ellis-Chadwick (2019) and Huang & Rust (2022) observed that modern digital marketing tactics heavily rely on data-driven insights to create personalized campaigns, improving the relevance and effectiveness of marketing programs. This customization, enabled by ML and AI, allows marketers to predict consumer preferences and optimize interactions across digital platforms, ultimately increasing customer satisfaction (Kietzmann et al., 2018). In the digital era, virtual influencers play a significant role in shaping consumer behavior through social media, product recommendations, reviews, and real-time brand engagement. Consumers are drawn to virtual influencers due to their perceived credibility, trustworthiness, and relevance to their needs, which in turn enhances their purchase intentions (Gerlich, 2023). Kutabish et al. (2023) emphasize that consumers now have unprecedented access to information, enabling them to make well-informed purchasing decisions. Online reviews and peer feedback have significantly transformed the traditional buyer's journey, exerting a strong influence on consumer attitudes and choices (Shi et al., 2022). Furthermore, AI in digital marketing has not only enhanced firms' ability to target their audience more effectively but has also reshaped consumer interactions by providing real-time recommendations and personalized content, thereby influencing consumer behavior in a meaningful way (Huang & Rust, 2022; Khandelwal et al., 2024). However, as noted by Huang & Rust (2018), concerns regarding privacy and trust arise when AI and data analytics are used to track and predict consumer behavior. These technologies can potentially lead to the manipulation and exploitation of personal data, raising ethical considerations in digital marketing. This cluster reflects the growing use of AI and digital marketing in understanding and influencing consumer behavior within the digital marketplace.

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3.5.3. Customer Experience and Automation

Cluster 3 focuses on key themes such as AI-driven personalization, customer service automation, and the integration of service robots to enhance customer satisfaction. Singh & Singh (2024) and Wirtz et al. (2018) conducted studies examining the potential of AI technologies in service environments and their role in improving efficiency, personalization, and customer service engagement. Wirtz & Pitardi (2023) further explored these innovations, highlighting their impact on service delivery. Automation tools such as chatbots and service robots play a crucial role in streamlining customer interactions and improving response times. Companies are increasingly adopting these technologies to reduce operational costs and enhance the consumer journey by providing faster and more accurate responses (Adam et al., 2021; Kietzmann et al., 2018). Automation technologies, as highlighted in this cluster, not only enhance operational efficiency but also improve customer satisfaction by enabling more seamless and personalized services. This aligns with broader trends in digital transformation, where businesses are increasingly adopting AI and automated tools to optimize customer interactions across both digital and physical channels (Rust, 2020).

3.5.4. Customer Journey and Engagement

Cluster 4 focuses on understanding and enhancing the customer experience as they interact with brands across multiple touchpoints, including browsing the web, engaging on social media platforms, reading email newsletters, or visiting physical stores (Kokins et al., 2021; Kolar, 2024). Each interaction presents an opportunity for brands to build trust and foster deeper relationships with customers (Weidig et al., 2024). Studies within this cluster, such as those by Pillai et al. (2020; 2021) and Li (2021), explore the impact of digital technologies on the consumer journey, emphasizing engagement strategies that promote long-term relationships. Brill et al. (2019) examine the increasing integration of AI and data-driven insights into consumer touchpoints, covering the entire customer journey from initial brand awareness to post-purchase interactions. These technologies enable organizations to deliver tailored content and services. Research by Hermann & Puntoni (2024) and Babatunde et al. (2024) highlights the role of AI in enhancing consumer experiences through personalized solutions, predictive analytics, and automation-driven interactions. Additionally, Srivastava et al. (2023) emphasize the importance of customer feedback loops and real-time data in improving service delivery and customizing consumer experiences. The interconnections among these researchers suggest a growing interest in leveraging AI, machine learning, and digital platforms to enhance customer journeys, ensuring businesses engage consumers more effectively at every stage.

3.5.5. AI-Enhanced Services

Cluster 5 focuses on leveraging AI to enhance service delivery and streamline customer interactions. Significant research, including studies by Wirtz et al. (2018; 2023) and Huang and Rust (2020a), highlights the transformative impact of AI on the service sector through task automation, improved customer support, and personalized experiences. These advancements underscore AI's growing role in reshaping service interactions. Belanche et al. (2019; 2021) explore the role of AI-driven systems, such as chatbots and virtual assistants, in enhancing customer experiences by providing instant responses and effective problem analysis. De Kervenoael et al. (2020) examine how AI influences consumer service expectations, particularly in industries like retail and hospitality, where AI technologies are used to predict consumer needs and customize services accordingly. Service robots evoke varied customer responses. While highly realistic robots often generate negative reactions and resistance, less human-like robots tend to be viewed more favorably and are accepted at levels comparable to human employees in hospitality and tourism organizations (Belanche et al., 2020). Furthermore, Prentice and Nguyen (2020) highlight AI's ability to create intelligent systems that not only meet customer needs but also anticipate future trends, enhancing the proactivity and adaptability of service offerings. Collectively, these studies emphasize AI's transformative impact on improving customer satisfaction and service quality across various industries.

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3.5.6. Conversation AI

Cluster 6 focuses on the integration of AI-powered technologies, including chatbots, virtual assistants, and voice-activated systems, which facilitate real-time interactions with customers (Pitardi & Marriott, 2021). Studies such as Prentice and Nguyen (2020a) and Prentice et al. (2020b) explore how conversational AI technologies enhance consumer engagement by providing prompt responses to inquiries and delivering personalized recommendations, ultimately improving overall customer satisfaction. Pillai et al. (2020; 2021) examine the growing use of conversational interfaces in customer service, particularly in the e-commerce and retail industries. These sectors employ AI chatbots to efficiently handle customer inquiries, reduce waiting times, and optimize the purchasing process (Aslam, 2023). Brill et al. (2019) highlight the proactive nature of conversational AI services, which leverage consumer data to anticipate questions and deliver customized responses, enhancing the responsiveness and customer-centric nature of interactions (Li et al., 2001). Despite the vast opportunities presented by AI-enabled technologies, they also raise ethical and privacy concerns (Mariani et al., 2022; Zhang et al., 2021; Acikgoz et al., 2023). Additionally, some consumers still prefer human interaction over AI in certain contexts (Prentice & Nguyen, 2020). This research underscores the growing significance of conversational AI in transforming customer communication, enhancing user experiences, and establishing more efficient, personalized, and accessible service channels.

3.6. Most Productive Publishers & Journals

Table 7 presents the 10 most productive publishing journals in the fields of AI, digital marketing, and consumer behavior, highlighting the leading platforms for scholarly dissemination in these areas. The Journal of Business Research stands out as the most prolific, with 59 records, indicating its central role in publishing cutting-edge research across these intersecting domains. Psychology & Marketing follows with 42 records, emphasizing its focus on the psychological aspects of consumer behavior within the digital landscape. The Journal of Retailing and Consumer Services ranks next, contributing 29 records, reflecting its emphasis on the retail sector and its interactions with digital marketing trends. Additionally, the Journal of Service Management and Technological Forecasting and Social Change are key contributors, with 23 and 22 records, respectively, highlighting their focus on service management and the broader technological implications on marketing and consumer behavior.

Industrial Marketing Management, International Journal of Contemporary Hospitality Management, and Journal of Research in Interactive Marketing each contribute 21 records, highlighting their significant influence in specialized areas such as industrial marketing, hospitality, and interactive marketing strategies. The European Journal of Marketing and the Journal of the Academy of Marketing Science complete the list with 20 and 18 records, respectively. These journals are recognized for their rigorous academic contributions and their role in shaping the discourse on marketing science, particularly in the context of digital advancements and consumer behavior.

Table 7. Top 10 Most Productive Source Journals

Source Journals	Record Count
Journal of Business Research	59
Psychology Marketing	42
Journal of Retailing and Consumer Services	29
Journal of Service Management	23
Technological Forecasting and Social Change	22
Industrial Marketing Management	21
International Journal of Contemporary Hospitality Management	21
Journal of Research in Interactive Marketing	21
European Journal of Marketing	20
Journal of the Academy of Marketing Science	18

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IV. Conclusion

In this study, we utilized various bibliometric tools, including citation analysis, bibliographic coupling, and keyword analysis, to conduct a comprehensive review of the intersection between consumer behavior, digital marketing, and AI from 2014 to 2023. These quantitative techniques were particularly appropriate given the vast scope of the Web of Science database, which comprised 645 documents. By mapping key historical and contemporary research themes, this study not only traces the evolution of existing knowledge but also identifies potential future trends. The increasing interest in AI underscores its growing adoption across various industries, with this study highlighting its potential impact on areas such as customer experience, engagement, virtual influencers, dynamic purchase decision processes, social media and neuromarketing, service robots, chatbots, voice assistants, the Internet of Things (IoT), and ethical considerations surrounding data privacy. As foundational technologies of Industry 4.0, AI and machine learning (ML) continue to revolutionize digital marketing strategies, fundamentally shaping consumer buying behavior.

The citation analysis identified key contributions to the field, with the most frequently cited works authored by Kumar et al. (2016), Luo et al. (2019), Kirk and Rifkin (2020), Hollebeek and Macky (2019), and Puntoni et al. (2021). Prominent scholars such as Huang, Rust, Wirtz, Grewal, Kunz, and Paluch emerged as leading figures in this domain. The analysis also revealed that the USA, China, England, Australia, and India are the top global contributors to research on AI, digital marketing, and consumer behavior. Through bibliographic coupling, six major thematic clusters were identified: **AI-Driven Data Analytics, Digital Marketing and Consumer Behavior, Customer Experience and Automation, Customer Journey and Engagement, AI-Enhanced Services, and Conversational AI. These findings provide a roadmap for researchers to explore emerging topics, identify future research directions, and establish potential collaborations.

Furthermore, leading publishers such as Elsevier, Emerald Group Publishing, Wiley, Sage, Springer Nature, and Taylor & Francis, along with prominent journals including the Journal of Business Research, Psychology & Marketing, Journal of Retailing and Consumer Services, Journal of Service Management, and Technological Forecasting and Social Change, were identified as key outlets for cutting-edge research in this field. As AI and consumer behavior continue to evolve, interdisciplinary studies will play a crucial role in unlocking AI's full potential in marketing. By understanding the past and present landscape of this rapidly developing field, researchers and industry leaders will be better equipped to navigate future trends, fostering innovative applications and AI-driven solutions in consumer behavior. Moreover, marketing leaders who effectively integrate AI into their strategies are likely to gain a competitive edge in the years to come.

However, this study has certain limitations. It relied solely on the keyword "consumer behaviour AND digital marketing OR artificial intelligence" to identify and extract articles from the Web of Science database, which may not capture all relevant research. Additionally, we included only articles, review papers, and book chapters written in English, thereby excluding studies published in other languages. Future research can expand its scope by incorporating multiple databases and additional sources to provide a more comprehensive analysis.

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