



## **Mapping the Evolution of Artificial Intelligence in Digital Marketing: A Bibliometric Analysis Using Biblioshiny**

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### **ABSTRACT**

Artificial intelligence has become an increasingly important topic in digital marketing research, particularly due to the rapid development of machine learning, big data analytics, personalization, chatbots, generative AI, and digital commerce. This study aims to map the scientific development of research on artificial intelligence and digital marketing using bibliometric analysis. Bibliographic data were collected from the Scopus database using the search string TITLE-ABS-KEY (“artificial intelligence” AND “digital marketing”). After applying filters for publication year, document type, language, and publication stage, 148 journal articles published between 2020 and 2024 were included in the final dataset. The data were analyzed using Biblioshiny, the web-based interface of the bibliometrix package in RStudio. The findings show that research on artificial intelligence and digital marketing has grown rapidly, with an annual growth rate of 56.51%. The number of publications increased from 12 articles in 2020 to 72 articles in 2024. The most productive source was the Journal of Digital and Social Media Marketing, while the most globally cited document was Dwivedi et al. (2021), with 1,744 citations. Keyword analysis shows that artificial intelligence, digital marketing, machine learning, commerce, social media, big data, and deep learning are dominant themes. The thematic map and co-occurrence network indicate that artificial intelligence and digital marketing form the core conceptual structure of the field, while ChatGPT, SEO, deep learning, and digital transformation represent specialized or emerging themes. This study contributes to the literature by providing a comprehensive bibliometric overview of AI and digital marketing research and identifying future directions related to generative AI, personalization, consumer trust, privacy, and AI-driven marketing performance.

**Keywords:** Artificial intelligence; digital marketing; bibliometric analysis; Biblioshiny; bibliometrix; machine learning; generative AI; social media marketing

### **INTRODUCTION**

Amidst Artificial intelligence has become one of the most transformative technologies in contemporary marketing (Davenport et al., 2020; Vlačić et al., 2021). The rapid development of machine learning, natural language processing, predictive analytics, recommender systems,

chatbots, and generative AI has changed how firms understand consumers, design marketing strategies, personalize content, automate communication, and optimize customer experiences (De Mauro et al., 2022). In digital marketing, AI enables marketers to process large volumes of consumer data, identify behavioral patterns, deliver personalized recommendations, predict consumer preferences, and improve the efficiency of marketing decision-making (Gupta & Chhabria, 2023; Ziakis & Vlachopoulou, 2023). As a result, AI is no longer viewed merely as a supporting technology, but as a strategic capability that reshapes the way firms interact with consumers in digital environments.

The integration of artificial intelligence into digital marketing has become increasingly important as consumers interact with brands through various digital touchpoints, including search engines, social media, e-commerce platforms, mobile applications, websites, and online communities (Bormane & Blaus, 2024; Ziakis & Vlachopoulou, 2023). These digital interactions generate large amounts of data that can be used to improve targeting accuracy, personalize advertising messages, enhance customer engagement, and support real-time marketing decisions (Sakalauskas & Kriksciuniene, 2024; Theodorakopoulos & Theodoropoulou, 2024). AI-powered tools allow firms to move from general marketing communication toward more individualized and predictive forms of consumer interaction (V. Kumar et al., 2019; Şenyapar, 2024). This development has encouraged scholars to examine the role of AI in areas such as customer relationship management, personalized advertising, digital consumer behavior, marketing automation, service quality, social media marketing, and ethical issues in data-driven marketing (Potwora et al., 2024; Van Esch & Black, 2021).

Despite the growing importance of artificial intelligence in digital marketing, the literature in this field remains fragmented (Mariani et al., 2021; Thakur & Kushwaha, 2023). Existing studies have examined different aspects of AI, such as personalization, consumer trust, privacy concerns, chatbots, recommendation systems, customer engagement, and digital advertising effectiveness (Babadoğan, 2024; Islam et al., 2024). However, because these studies are spread across different journals, disciplines, methods, and theoretical perspectives, it is difficult to obtain a comprehensive understanding of how the field has evolved (Mariani et al., 2021). Furthermore, the rapid development of AI technologies creates new research directions that require systematic mapping, including the emergence of generative AI, algorithmic personalization, consumer privacy, ethical marketing, and AI-driven customer experience (Islam et al., 2024; Thakur & Kushwaha, 2023).

Previous reviews have provided valuable insights into artificial intelligence in marketing and digital business contexts (Mariani et al., 2021). However, there is still a need for a focused bibliometric study that maps the intellectual structure and thematic evolution of research specifically at the intersection of artificial intelligence and digital marketing (Thakur & Kushwaha, 2023; Verma et al., 2021). A bibliometric approach is useful because it allows researchers to identify publication trends, influential authors, leading journals, highly cited articles, productive countries, collaboration patterns, and emerging research themes. Unlike traditional narrative reviews, bibliometric analysis provides a systematic and quantitative overview of the development of a research field based on bibliographic data (S. Kumar et al., 2022; Thakur & Kushwaha, 2023; Verma et al., 2021).

To address this gap, this study conducts a bibliometric analysis of artificial intelligence and digital marketing research indexed in the Scopus database. The study focuses on journal articles published between 2020 and 2024. This period was selected because AI-related research in digital marketing has expanded rapidly in recent years, particularly with the increasing adoption of AI-based personalization, automation, and data-driven marketing practices. Using the search string TITLE-ABS-KEY ("artificial intelligence" AND "digital marketing"), the initial search produced 1,154 documents. After applying filters for publication year, document type, language,

and publication stage, 148 final journal articles were obtained and analyzed using Biblioshiny, the web-based interface of the bibliometrix package in RStudio.

This study aims to map the scientific development of artificial intelligence research in digital marketing and to identify the key contributors, intellectual structure, and emerging themes in the field. Specifically, this study addresses the following research questions:

RQ1: How has the scientific production of artificial intelligence and digital marketing research developed from 2020 to 2024?

RQ2: Which authors, sources, documents, institutions, and countries have contributed most significantly to the field?

RQ3: What are the most influential keywords and thematic clusters in artificial intelligence and digital marketing research?

RQ4: How are collaboration patterns among authors, institutions, and countries structured in this field?

RQ5: What emerging themes and future research directions can be identified from the bibliometric mapping?

This study contributes to the literature in several ways. First, it provides a comprehensive bibliometric overview of artificial intelligence and digital marketing research from 2020 to 2024. Second, it identifies the most productive and influential contributors in the field, including authors, journals, countries, institutions, and documents. Third, it maps the conceptual structure of the field through keyword analysis, co-occurrence networks, thematic maps, and trend topics. Fourth, it offers insights into emerging research directions that can guide future studies on AI-driven digital marketing. Finally, the study provides practical value for researchers, marketers, and decision-makers by clarifying how AI-related topics have developed within the digital marketing domain.

## **METHOD**

### **Research Design**

This study employed a bibliometric analysis to examine the development of research on artificial intelligence in digital marketing. Bibliometric analysis was selected because it enables researchers to systematically evaluate the scientific structure of a research field using publication and citation data. This method is useful for identifying publication trends, influential authors, leading sources, highly cited documents, productive countries, collaboration patterns, and emerging themes within a specific research domain (Gutiérrez-Salcedo et al., 2017; Oliveira et al., 2019).

Unlike traditional literature reviews that rely mainly on qualitative interpretation, bibliometric analysis provides a quantitative and systematic approach to mapping the development of academic knowledge (S. Kumar et al., 2022). Therefore, this method is suitable for understanding how research on artificial intelligence and digital marketing has evolved over time, especially during the rapid growth of AI-based technologies in marketing practices (Thakur & Kushwaha, 2023).

This study used Biblioshiny, the web-based interface of the bibliometrix package in RStudio, to analyze and visualize the bibliographic data. Biblioshiny was selected because it provides an integrated platform for conducting bibliometric analysis, including descriptive analysis, source analysis, author analysis, document analysis, keyword analysis, conceptual structure analysis, and collaboration network analysis (Aria & Cuccurullo, 2017).

## Data Source

To The bibliographic data were collected from the Scopus database. Scopus was selected because it is one of the largest multidisciplinary academic databases and provides comprehensive bibliographic metadata, including article titles, abstracts, keywords, authors, affiliations, citations, source titles, and references (Kumpulainen & Seppänen, 2022). The use of Scopus was considered appropriate because this study aimed to analyze peer-reviewed journal articles indexed in a widely recognized international database (Baas et al., 2020).

The search was conducted using the keywords “artificial intelligence” and “digital marketing”. These keywords were selected because they directly represent the intersection between AI-related technologies and digital marketing research. The search was limited to the title, abstract, and keyword fields to ensure that the retrieved documents were directly related to the topic.

## Search Strategy

The search string used in the Scopus database was as follows:

TITLE-ABS-KEY ( "artificial intelligence" AND "digital marketing" ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( LIMIT-TO ( PUBSTAGE , "final" ) ) AND PUBYEAR > 2019 AND PUBYEAR < 2025

The initial search using the keywords “artificial intelligence” AND “digital marketing” resulted in 1,154 documents. The search was then refined by applying several filters. First, the publication year was limited to 2020–2024, resulting in 509 documents. Second, the document type was limited to journal articles, reducing the number of documents to 156. Third, the language was limited to English, resulting in 150 documents. Finally, the publication stage was limited to final publications, producing a final dataset of 148 articles.

## Inclusion and Exclusion Criteria

This study applied inclusion and exclusion criteria to ensure that the dataset was relevant to the research objective. The inclusion criteria were: documents indexed in Scopus, articles related to artificial intelligence and digital marketing, publications from 2020 to 2024, journal articles, English-language publications, and final-stage publications.

Documents were excluded if they were published before 2020 or after 2024, categorized as conference papers, book chapters, reviews, editorials, notes, letters, or other non-article document types, written in languages other than English, or still in press. These criteria were applied to maintain consistency and ensure that the final dataset consisted only of peer-reviewed journal articles relevant to the research topic.

**Table 1.**

Data Screening Process.

Screening Stage	Criteria Applied	Number of Documents
Initial search	“artificial intelligence” AND “digital marketing”	1,154
Year limitation	2020–2024	509
Document type	Article only	156
Language	English only	150
Publication stage	Final publication only	148
Final dataset	Documents analyzed using Biblioshiny	148

## Data Export and Analysis Procedure

After the final dataset was obtained, the bibliographic records were exported from Scopus for further analysis. The exported data included citation information, bibliographical information, abstracts, author keywords, index keywords, affiliations, references, and source information. The data were then imported into Biblioshiny through RStudio.

The analysis was conducted using several bibliometric indicators and visualization techniques. First, descriptive bibliometric analysis was used to identify the main information about the dataset, including total documents, annual scientific production, average citations, number of authors, author collaboration, and annual growth rate. Second, source analysis was conducted to identify the most relevant journals and publication outlets in the field. Third, author and affiliation analyses were performed to identify the most productive authors and institutions.

Fourth, document analysis was used to identify the most globally cited articles, which represent influential works in artificial intelligence and digital marketing research. Fifth, country analysis was conducted to examine scientific production and collaboration among countries. Sixth, keyword analysis was used to identify the most frequent author keywords and index keywords. Finally, conceptual structure analysis was conducted through co-occurrence network analysis, thematic map, and trend topic analysis to identify major research themes and emerging topics in the field.

## Bibliometric Indicators

Several bibliometric indicators were used in this study. Publication productivity was measured through annual scientific production, most relevant sources, most productive authors, and country scientific production. Scientific influence was examined through citation-based indicators, including most cited documents and source impact. Collaboration patterns were analyzed through country collaboration and co-authorship networks.

To identify the conceptual structure of the field, keyword co-occurrence analysis was conducted. This analysis helps reveal the relationships among frequently used keywords and identifies thematic clusters within the literature. Thematic map analysis was also used to classify research themes into four categories: motor themes, basic themes, niche themes, and emerging or declining themes. These analyses provide a more comprehensive understanding of the intellectual and thematic development of artificial intelligence in digital marketing research.

## Research Workflow

The research workflow consisted of five main stages. First, the research topic and search keywords were determined. Second, the bibliographic data were retrieved from the Scopus database using a predefined search string. Third, inclusion and exclusion criteria were applied to obtain the final dataset. Fourth, the data were exported and processed using Biblioshiny in RStudio. Fifth, the bibliometric results were interpreted to identify publication trends, influential contributors, collaboration patterns, thematic structures, and future research directions.

## RESULT AND DISCUSSION

### Main Information of the Dataset

The bibliometric analysis was conducted using 148 journal articles published between 2020 and 2024. These documents were retrieved from 114 sources, indicating that research on artificial intelligence and digital marketing has been distributed across a wide range of publication outlets. The dataset showed an annual growth rate of 56.51%, suggesting a rapid increase in scholarly attention to this topic during the selected period.

The document average age was 3.13 years, which indicates that the dataset consisted of relatively recent publications. This is consistent with the rapid development of artificial intelligence applications in digital marketing, particularly in areas such as personalization, marketing automation, consumer analytics, social media marketing, and digital customer experience. The average citation per document was 53.61, indicating that the publications in this field have received considerable scholarly attention.

The dataset included 441 Keywords Plus and 543 author keywords, reflecting diverse research themes in artificial intelligence and digital marketing. It involved 496 authors, with an average of 3.42 co-authors per document and 29.73% international co-authorship, indicating moderate global collaboration.

**Table 2.**

Main Information About the Dataset.

Description	Results
<b>Main Information About Data</b>	
Timespan	2020:2024
Sources (Journals, Books, etc)	114
Documents	148
Annual Growth Rate %	56.51
Document Average Age	3.13
Average citations per doc	53.61
References	0
<b>Document Contents</b>	
Keywords Plus (ID)	441
Author's Keywords (DE)	543
<b>Authors</b>	
Authors	496
Authors of single-authored docs	29
<b>Authors Collaboration</b>	
Single-authored docs	30
Co-Authors per Doc	3.42
International co-authorships %	29.73
<b>Document Types</b>	
article	148

Overall, the main information indicates that artificial intelligence in digital marketing is an emerging and rapidly growing research area. The high annual growth rate and relatively recent document age demonstrate that the field has gained increasing academic attention in recent years. The large number of authors and keywords further suggests that this research area is multidisciplinary and conceptually diverse.

### Annual Scientific Production

Annual scientific production was analyzed to identify the publication trend of research on artificial intelligence and digital marketing from 2020 to 2024. As shown in Table 3, the number of publications increased steadily during the selected period. In 2020, there were 12 articles published on this topic. The number increased to 17 articles in 2021, 21 articles in 2022, and 26 articles in 2023. A substantial increase occurred in 2024, with 72 articles published.

This trend indicates that scholarly attention to artificial intelligence in digital marketing has grown significantly in recent years. The sharp increase in 2024 suggests that AI has become an increasingly important topic in digital marketing research, particularly with the rapid development of AI-driven personalization, marketing automation, generative AI, data analytics, customer experience management, and digital consumer behavior. The growth pattern also reflects the increasing relevance of AI technologies in transforming marketing practices and consumer-brand interactions in digital environments.

**Table 3.**  
Annual Scientific Production.

Year	Articles
2020	12
2021	17
2022	21
2023	26
2024	72

Overall, the annual scientific production shows a strong upward trend, especially in 2024. This finding confirms that artificial intelligence and digital marketing represent a rapidly expanding research domain. The increase in publications also suggests that researchers are increasingly interested in examining how AI reshapes digital marketing strategies, consumer engagement, and marketing decision-making.

### Most Relevant Sources

The most relevant sources were analyzed to identify the journals and publication outlets that contributed most frequently to research on artificial intelligence and digital marketing. As shown in Table 4, the Journal of Digital and Social Media Marketing was the most productive source, with 6 articles. This was followed by Applied Marketing Analytics, with 5 articles. Several sources contributed 3 articles each, including Financial and Credit Activity: Problems of Theory and Practice, IAES International Journal of Artificial Intelligence, Information (Switzerland), International Journal of Data and Network Science, Journal of Retailing and Consumer Services, and Sustainability (Switzerland).

These findings indicate that research on artificial intelligence and digital marketing is published across diverse interdisciplinary outlets. The presence of marketing-oriented sources such as the Journal of Digital and Social Media Marketing, Applied Marketing Analytics, and Journal of Retailing and Consumer Services suggests that AI has become an important topic in marketing and consumer behavior research. At the same time, the inclusion of journals related to artificial intelligence, information systems, sustainability, and data science indicates that the field is multidisciplinary and involves contributions from both business and technology perspectives.

**Table 4.**  
Most Relevant Sources.

Sources	Articles
Journal Of Digital And Social Media Marketing	6
Applied Marketing Analytics	5
Financial And Credit Activity: Problems Of Theory And Practice	3
Iaes International Journal Of Artificial Intelligence	3
Information (Switzerland)	3
International Journal Of Data And Network Science	3
Journal Of Retailing And Consumer Services	3
Sustainability (Switzerland)	3
Applied Sciences (Switzerland)	2
Business Ethics And Leadership	2

Overall, the distribution of sources shows that artificial intelligence in digital marketing is not confined to a single publication domain. Instead, the topic is discussed across marketing, retailing, data science, artificial intelligence, sustainability, and business ethics journals. This reflects the broad relevance of AI in digital marketing as both a technological and managerial research area.

### Most Relevant Authors

The most relevant authors were analyzed to identify researchers who contributed most frequently to the field of artificial intelligence and digital marketing. As shown in Table 5, the most productive authors each contributed 2 articles. These authors include Allahham Mahmoud, Cutler Kelly, Dwivedi Yogesh K., Giannakopoulos Nikolaos T., Kanellos Nikos, Li Chia-Ying, Migkos Stavros P., Sakas Damianos P., Saura Jose Ramon, and Wang Yichuan.

The results indicate that no single author strongly dominated the research field during the 2020–2024 period. Instead, the publication output was distributed across many researchers. This pattern suggests that artificial intelligence in digital marketing is an emerging and interdisciplinary research area, attracting scholars from different academic backgrounds, including marketing, information systems, artificial intelligence, data analytics, consumer behavior, and business management.

**Table 5.**  
 Most Relevant Authors.

Author	Articles	Articles Fractionalized
Allahham Mahmoud	2	0.33
Cutler Kelly	2	2.00
Dwivedi Yogesh K	2	0.22
Giannakopoulos Nikolaos T	2	0.42
Kanellos Nikos	2	0.42
Li Chia-Ying	2	0.83
Migkos Stavros P	2	0.42
Sakas Damianos P	2	0.42
Saura Jose Ramon	2	0.67
Wang Yichuan	2	0.22

The fractionalized article score provides additional insight into the authors' relative contribution by considering co-authorship patterns. Cutler Kelly had the highest fractionalized score of 2.00, indicating full authorship contribution across the documents included in the dataset. In contrast, authors such as Dwivedi Yogesh K. and Wang Yichuan had lower fractionalized scores, suggesting that their publications involved larger co-author teams. Overall, the results show that the field is characterized by collaborative and distributed authorship rather than concentration around a small group of dominant researchers.

### Most Globally Cited Documents

The most globally cited documents were analyzed to identify influential publications in the field of artificial intelligence and digital marketing. As shown in Table 6, the most cited article was Dwivedi et al. (2021), entitled Setting the future of digital and social media marketing research: Perspectives and research propositions, with 1,744 citations. This article represents a foundational contribution because it discusses future research directions in digital and social media marketing, including the growing role of emerging technologies such as artificial intelligence.

The second most cited document was Liye and Sun (2020), entitled Machine learning and AI in marketing: Connecting computing power to human insights, with 487 citations. This article highlights the role of machine learning and AI in transforming marketing insights and decision-making. The third most cited document was Chintalapati and Pandey (2022), entitled Artificial intelligence in marketing: A systematic literature review, with 375 citations, indicating the importance of review-based studies in consolidating knowledge about AI applications in marketing.

Other highly cited documents focus on AI-based customer relationship management, chatbot communication, trust in chatbot interactions, virtual influencers, and AI-powered influencer marketing. For example, Saura et al. (2021) examined B2B digital marketing in AI-based customer relationship management, while Kull et al. (2021) and Toader et al. (2020) focused on chatbot-related engagement and trust. More recent highly cited articles, such as Allal-Chérif et

al. (2024) and Kim and Park (2024), indicate that virtual influencers and AI-powered influencer marketing are becoming important emerging themes in the field.

**Table 6.**  
Most Globally Cited Documents.

Author	Paper	Total Citations
(Dwivedi et al., 2021)	Setting the future of digital and social media marketing research: Perspectives and research propositions	1744
(Liye & Sun, 2020)	Machine learning and AI in marketing Connecting computing power to human insights	487
(Chintalapati & Pandey, 2022)	Artificial intelligence in marketing: A systematic literature review	375
(Saura et al., 2021)	Setting B2B digital marketing in artificial intelligence-based CRMs: A review and directions for future research	247
(Kull et al., 2021)	How may I help you? Driving brand engagement through the warmth of an initial chatbot message	216
(Toader et al., 2020)	The effect of social presence and chatbot errors on trust	203
(Van Esch & Black, 2021)	Artificial Intelligence (AI): Revolutionizing Digital Marketing	178
(da Silva Oliveira & Chimenti, 2021)	“Humanized Robots”: A Proposition of Categories to Understand Virtual Influencers	166
(Allal-Chérif et al., 2024)	Intelligent influencer marketing: how AI-powered virtual influencers outperform human influencers	154
(Kim & Park, 2024)	When digital celebrity talks to you: How human-like virtual influencers satisfy consumer's experience through social presence on social media endorsements	140

Overall, the most globally cited documents show that the intellectual foundation of this field is shaped by several major themes: digital and social media marketing transformation, machine learning in marketing, AI-based customer relationship management, chatbot interaction, consumer trust, and virtual influencer marketing. The presence of both older and recent highly cited articles indicates that the field is rapidly evolving from general AI adoption in marketing toward more specific applications such as AI-powered personalization, chatbots, and virtual influencers.

### Most Relevant Affiliations

The most relevant affiliations were analyzed to identify institutions that contributed most frequently to research on artificial intelligence and digital marketing. As shown in Table 7, the State University of Trade and Economics was the most productive affiliation, with 5 articles. This was followed by Swansea University, Universitat Politècnica de València, and Universiti Teknologi MARA, each contributing 4 articles.

Several institutions contributed 3 articles each, including Instituto Universitário de Lisboa, Manchester Metropolitan University, State University of Information and Communication

Technologies, and University of Southern California. Meanwhile, Agricultural University of Athens and Al-Ahliyya Amman University contributed 2 articles each.

**Table 7.**  
 Most Relevant Affiliations.

Affiliation	Articles
State University Of Trade And Economics	5
Swansea University	4
Universitat Politècnica De València	4
Universiti Teknologi Mara	4
Instituto Universitário De Lisboa	3
Manchester Metropolitan University	3
State University Of Information And Communication Technologies	3
University Of Southern California	3
Agricultural University Of Athens	2
Al-Ahliyya Amman University	2

The findings indicate that research on artificial intelligence and digital marketing is contributed by institutions from different geographical and academic contexts. The presence of universities from Europe, Asia, and North America suggests that this research field has attracted global scholarly attention. However, the relatively small number of articles contributed by each institution indicates that the field is still emerging and institutionally dispersed, rather than being dominated by a limited number of research centers.

### Country Scientific Production

Country scientific production was analyzed to identify the countries that contributed most actively to research on artificial intelligence and digital marketing. As shown in Table 8, the United States was the most productive country, with 53 publications. This indicates that the United States has played a leading role in developing research on AI applications in digital marketing. India ranked second with 43 publications, followed by Ukraine with 36 publications and the United Kingdom with 24 publications.

Other countries also contributed to the development of the field, including Jordan with 20 publications, China with 18 publications, Spain with 16 publications, Portugal with 12 publications, Indonesia with 11 publications, and France with 10 publications. The presence of countries from North America, Europe, Asia, and the Middle East indicates that artificial intelligence in digital marketing has become a globally relevant research topic.

Overall, the results show that research on artificial intelligence and digital marketing is geographically diverse, although publication output is still concentrated in several leading countries. The dominance of the United States and India suggests strong scholarly interest in AI-driven marketing transformation, digital platforms, consumer analytics, and marketing automation. Meanwhile, the inclusion of Indonesia among the top ten contributing countries indicates that emerging economies are also beginning to participate in this research domain.

**Table 8.**

Country Scientific Production.

Country	Freq	Country	Freq
USA	53	China	18
India	43	Spain	16
Ukraine	36	Portugal	12
Uk	24	Indonesia	11
Jordan	20	France	10

### Most Frequent Words

The most frequent words were analyzed to identify the dominant concepts in the literature on artificial intelligence and digital marketing. As shown in Table 9, the most frequently occurring term was artificial intelligence, with 80 occurrences, followed by digital marketing, with 78 occurrences. These two terms represent the core focus of the dataset and confirm that the retrieved documents are closely aligned with the research topic.

The term marketing appeared 35 times, indicating that AI-related research is strongly connected to broader marketing studies. Meanwhile, machine learning appeared 20 times, suggesting that machine learning is one of the most frequently discussed AI techniques in digital marketing research. Other important terms include commerce with 17 occurrences, social media with 15 occurrences, and big data with 12 occurrences. These terms indicate that AI in digital marketing is closely associated with digital commerce, social media platforms, and data-driven marketing practices.

The presence of terms such as social media marketing, marketing strategy, and deep learning further shows that the field is developing around both managerial and technological themes. On the managerial side, researchers focus on marketing strategy and social media marketing. On the technological side, researchers examine machine learning, big data, and deep learning as tools for improving digital marketing effectiveness.

**Table 9.**

Most Frequent Words.

Words	Occurrences
artificial intelligence	80
digital marketing	78
marketing	35
machine learning	20
commerce	17
social media	15
big data	12
social media marketing	9
marketing strategy	8
deep learning	7

Overall, the most frequent words indicate that artificial intelligence and digital marketing research is centered on the integration of AI technologies with marketing practices. The frequent appearance of machine learning, big data, and deep learning suggests that the technological foundation of the field is strongly data-driven. At the same time, terms such as social media, commerce, and marketing strategy show that the application of AI is closely related to digital platforms, consumer interaction, and strategic marketing decision-making.

### **Thematic Map**

The thematic map was used to identify the conceptual structure of research on artificial intelligence and digital marketing. The map classifies themes based on two dimensions: centrality and density. Centrality indicates the relevance of a theme to the overall research field, while density indicates the level of internal development within the theme. Based on these dimensions, themes can be classified into four quadrants: motor themes, basic themes, niche themes, and emerging or declining themes.

As shown in Figure 1, the cluster consisting of artificial intelligence, digital marketing, and marketing appears as one of the most central themes in the field. This indicates that these terms represent the core intellectual foundation of the research domain. The position of this cluster suggests that AI and digital marketing are strongly connected to other themes and serve as the central focus of the literature.

The thematic map also shows several basic themes, including machine learning, commerce, and marketing strategy. These themes have high centrality but relatively lower density, meaning that they are important and widely connected to the field but still have room for further theoretical and methodological development. The presence of machine learning and commerce indicates that AI in digital marketing is closely associated with data-driven decision-making, digital commerce, and strategic marketing applications.

Another basic theme includes AI, digital transformation, and learning algorithms. This cluster suggests that digital transformation and algorithmic technologies are important foundations for understanding the role of AI in marketing. However, its lower density indicates that these themes are still developing and may become more mature as future studies further examine AI-enabled transformation in marketing practices.

In the niche themes quadrant, terms such as SEO, ChatGPT, and search engine optimization appear as specialized but relatively isolated topics. These themes show higher internal development but lower centrality, indicating that they are well-defined within specific research areas but not yet fully integrated into the broader artificial intelligence and digital marketing literature. The presence of ChatGPT as a niche theme reflects the growing interest in generative AI, although this topic may still be emerging as a more specialized research stream during the selected period.

The cluster consisting of consumer behavior, mobile marketing, and content marketing appears closer to the emerging or declining themes area. This suggests that these themes may represent either developing topics or areas that require stronger integration with the central AI and digital marketing literature. Since consumer behavior and content marketing are highly relevant to digital marketing, their position may indicate that future research needs to connect these themes more explicitly with AI-based personalization, predictive analytics, generative content, and customer experience.



**Figure 1.** Thematic Map of Artificial Intelligence and Digital Marketing Research.

Overall, the thematic map indicates that artificial intelligence and digital marketing form the central structure of the field, while machine learning, commerce, marketing strategy, digital transformation, SEO, ChatGPT, and content marketing represent important supporting or emerging themes. These findings suggest that the field is evolving from general discussions of AI in marketing toward more specific applications involving machine learning, generative AI, search optimization, digital transformation, and consumer-oriented marketing strategies.

### Trend Topics

Trend topic analysis was conducted to identify the temporal development of important keywords in artificial intelligence and digital marketing research. As shown in Table 10, the earliest terms appearing in the trend analysis include human and article, with median years around 2021 and 2022. These terms are likely related to database indexing and should be interpreted cautiously. More substantive terms such as big data, artificial intelligence, digital marketing, marketing, commerce, artificial intelligence (AI), and deep learning provide clearer insight into the thematic evolution of the field.

The term big data appeared with a frequency of 12 and had a median year of 2022, indicating that early research in the selected period strongly emphasized the role of large-scale data in digital marketing. This reflects the importance of data-driven marketing practices, customer

analytics, and consumer behavior prediction. The terms artificial intelligence and digital marketing had the highest frequencies, with 80 and 78 occurrences respectively, and both had a median year of 2023. This suggests that AI and digital marketing became increasingly central topics during the middle of the 2020–2024 period.

In more recent years, terms such as commerce, artificial intelligence (AI), and deep learning show median years of 2024. This indicates that recent studies have shifted toward more specific AI applications in digital commerce and advanced computational techniques. The emergence of deep learning suggests that researchers are increasingly paying attention to more advanced AI methods, while the appearance of commerce reflects the growing connection between AI, e-commerce, social commerce, and digital business models.

**Table 10.**  
Trend Topics

Term	Frequency	Year (Q1)	Year (Median)	Year (Q3)
human	6	2020	2021	2023
big data	12	2022	2022	2024
article	5	2020	2022	2023
artificial intelligence	80	2022	2023	2024
digital marketing	78	2022	2023	2024
marketing	35	2022	2023	2024
commerce	17	2022	2024	2024
artificial intelligence (ai)	8	2022	2024	2024
deep learning	7	2023	2024	2024

Overall, the trend topic analysis shows that research on artificial intelligence and digital marketing has developed from broader discussions of big data and marketing toward more specific topics such as AI-driven commerce and deep learning. The dominance of artificial intelligence and digital marketing confirms that these two concepts form the central research focus, while the emergence of commerce and deep learning indicates future opportunities for research on AI-enabled digital commerce, predictive marketing, automated decision-making, and advanced analytics.

### Keyword Co-occurrence Network

A keyword co-occurrence network was generated to visualize the conceptual relationships among the most frequently occurring terms in the field of artificial intelligence and digital marketing. In this network, node size represents the frequency of keyword occurrence, while the links between nodes represent co-occurrence relationships. Different colors indicate thematic clusters, showing how keywords are grouped into related research streams.

As shown in Figure 2, the term artificial intelligence appears as the largest and most central node in the network. This indicates that it is the dominant concept connecting multiple research themes within the field. Its central position suggests that artificial intelligence serves as the intellectual core of the literature and is strongly linked to other topics in digital marketing research.

The network reveals several thematic clusters. The red cluster is centered on artificial intelligence and appears to represent the broad conceptual foundation of the field. This cluster



Third, the thematic map and keyword co-occurrence network show that the field is structured around several major themes, including artificial intelligence, digital marketing, machine learning, commerce, marketing strategy, big data, and deep learning. These findings indicate that future theoretical development should not treat AI as a single broad concept, but should distinguish between specific AI applications, such as personalization, recommendation systems, chatbots, generative AI, predictive analytics, and virtual influencers.

Fourth, the presence of emerging themes such as ChatGPT, deep learning, and digital transformation suggests that the field is moving toward more advanced and specialized research streams. This provides an opportunity for future researchers to develop new theoretical models explaining how generative AI and advanced analytics influence consumer engagement, brand trust, customer experience, and digital marketing performance.

Finally, this study contributes methodologically by demonstrating the value of bibliometric analysis for mapping the development of AI in digital marketing. By using Biblioshiny, this study provides a systematic overview of publication trends, influential contributors, thematic clusters, and emerging research directions. This can help future researchers identify research gaps and position their studies within the broader intellectual structure of the field.

## **Practical Implications**

The findings also provide practical implications for marketers, managers, digital strategists, and technology developers. First, the rapid growth of AI and digital marketing research indicates that firms should pay greater attention to AI-based marketing capabilities. AI can support marketers in customer segmentation, personalization, campaign optimization, content creation, predictive analytics, and customer relationship management.

Second, the frequent appearance of keywords such as machine learning, big data, commerce, social media, and marketing strategy suggests that AI should be integrated into broader digital marketing strategies. Firms should not use AI only for automation, but also for generating customer insights, improving decision-making, and creating more personalized consumer experiences.

Third, the emergence of topics such as ChatGPT, virtual influencers, and deep learning indicates that marketers need to prepare for new forms of AI-driven consumer interaction. Generative AI can support content creation, chatbot communication, search optimization, and personalized recommendations. However, firms must also consider ethical issues, transparency, consumer trust, and privacy concerns when implementing these technologies.

Fourth, the results suggest that AI in digital marketing requires collaboration between marketing professionals, data scientists, IT specialists, and strategic decision-makers. Since the field is multidisciplinary, organizations need cross-functional capabilities to effectively use AI in marketing. This includes not only technological skills, but also consumer understanding, ethical awareness, and strategic marketing knowledge.

Finally, the findings can help practitioners identify future areas of investment. Themes such as AI-driven commerce, deep learning, predictive marketing, social media analytics, and generative AI are likely to become increasingly important. Firms that understand these trends may be better prepared to adapt to changing digital marketing environments and consumer expectations.

## **Limitations and Future Research**

This study has several limitations that should be acknowledged. First, the bibliometric data were collected only from the Scopus database. Although Scopus is a comprehensive and widely recognized academic database, it may not include all relevant publications on artificial intelligence and digital marketing. Future studies may combine data from Scopus, Web of Science, Dimensions, or Google Scholar to obtain a broader dataset.

Second, this study only included journal articles written in English and published between 2020 and 2024. While this period is relevant because AI-related research in digital marketing has grown rapidly in recent years, the exclusion of conference papers, book chapters, reviews, and non-English publications may limit the scope of the analysis. Future research may include other document types and languages to capture a wider range of scholarly contributions.

Third, the search strategy used the terms “artificial intelligence” and “digital marketing.” Although these keywords directly represent the focus of the study, some relevant studies may use different terms, such as “machine learning,” “marketing analytics,” “AI-powered personalization,” “generative AI,” “chatbots,” or “algorithmic marketing.” Future studies may expand the search string to include these related terms and compare the results.

Fourth, this study relied on bibliometric indicators such as publication counts, citations, keywords, thematic maps, and co-occurrence networks. These indicators are useful for mapping the structure of the field, but they do not provide a detailed qualitative evaluation of the theoretical arguments, methods, or findings of each article. Future research may combine bibliometric analysis with systematic literature review or content analysis to provide deeper insights.

Fifth, the thematic map and keyword co-occurrence network depend on the quality of author keywords, index keywords, and metadata exported from Scopus. Some keywords may be too general or generated by indexing systems, such as “human” or “article,” and therefore require careful interpretation. Future studies may apply keyword cleaning and standardization procedures to improve the precision of conceptual mapping.

Future research can explore several promising directions. First, researchers can examine the role of generative AI in digital marketing, including ChatGPT, AI-generated content, virtual influencers, and automated copywriting. Second, future studies can investigate how AI-powered personalization affects consumer trust, privacy concerns, perceived intrusiveness, and purchase intention. Third, researchers can examine ethical issues in AI-driven marketing, such as algorithmic transparency, data privacy, bias, and consumer manipulation. Fourth, future studies can focus on AI applications in social commerce, influencer marketing, customer relationship management, and omnichannel marketing. Finally, future research can develop empirical models that test the impact of AI adoption on marketing performance, customer engagement, and brand loyalty.

## **Conclusion**

This study conducted a bibliometric analysis of artificial intelligence and digital marketing research using 148 Scopus indexed journal articles published between 2020 and 2024. The analysis was conducted using Biblioshiny, the web-based interface of the bibliometrix package in RStudio. The findings show that research on artificial intelligence and digital marketing has grown rapidly, with a strong increase in publication output, particularly in 2024. This indicates that AI has become a highly relevant and expanding research topic in the digital marketing domain.

The results show that the field is interdisciplinary and globally distributed. Publications appeared across diverse sources, including marketing, data science, artificial intelligence, information systems, sustainability, and retailing journals. The most relevant authors and affiliations indicate that the field is still emerging and not yet dominated by a small group of scholars or institutions. Country production analysis shows that the United States, India, Ukraine, the United Kingdom, Jordan, and China were among the leading contributors, while Indonesia also appeared among the top ten contributing countries.

The keyword and thematic analyses reveal that artificial intelligence, digital marketing, machine learning, commerce, big data, social media, marketing strategy, and deep learning are key themes in the field. The thematic map indicates that artificial intelligence and digital marketing form the central structure of the literature, while topics such as ChatGPT, SEO, digital transformation, and deep learning represent specialized or emerging areas. The co-occurrence network further confirms that artificial intelligence acts as the main conceptual hub connecting multiple research streams.

Overall, this study concludes that artificial intelligence in digital marketing is a rapidly growing and conceptually diverse research field. The literature has evolved from broad discussions of AI and big data toward more specific applications involving machine learning, digital commerce, generative AI, virtual influencers, customer engagement, and marketing strategy. Future research should further explore the theoretical, ethical, and practical implications of AI-driven marketing, particularly in relation to consumer trust, privacy, personalization, and marketing performance.

## REFERENCES

- Allal-Chérif, O., Puertas, R., & Carracedo, P. (2024). Intelligent Influencer Marketing: How AI-Powered Virtual Influencers Outperform Human Influencers. *Technological Forecasting And Social Change*, 200. <https://doi.org/10.1016/j.techfore.2023.123113>
- Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R-Tool For Comprehensive Science Mapping Analysis. *Journal Of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus As A Curated, High-Quality Bibliometric Data Source For Academic Research In Quantitative Science Studies. *Quantitative Science Studies*, 1(1), 377–386. [https://doi.org/10.1162/qss\\_a\\_00019](https://doi.org/10.1162/qss_a_00019)
- Babadoğan, B. (2024). Unveiling The Power Of AI-Driven Personalization: Transforming Consumer Behavior In The Age Of Digital Marketing. *Next Frontier For Life Sciences And AI*. <https://doi.org/10.62802/fj43xy18>
- Bormane, S., & Blas, E. (2024). Artificial Intelligence In The Context Of Digital Marketing Communication. *Frontiers In Communication*. <https://doi.org/10.3389/fcomm.2024.1411226>
- Chintalapati, S., & Pandey, S. K. (2022). Artificial Intelligence In Marketing: A Systematic Literature Review. *International Journal Of Market Research*, 64(1), 38–68. <https://doi.org/10.1177/14707853211018428>
- Da Silva Oliveira, A. B., & Chimenti, P. (2021). “Humanized Robots”: A Proposition Of Categories To Understand Virtual Influencers. *Australasian Journal Of Information Systems*, 25, 1–27. <https://doi.org/10.3127/ajis.v25i0.3223>
- Davenport, T., Guha, A., Grewal, D., & Bressgott, T. (2020). How Artificial Intelligence Will Change The Future Of Marketing. *Journal Of The Academy Of Marketing Science*, 48(1), 24–42. <https://doi.org/10.1007/s11747-019-00696-0>
- De Mauro, A., Sestino, A., & Bacconi, A. (2022). Machine Learning And Artificial Intelligence Use In Marketing: A General Taxonomy. *Italian Journal Of Marketing*, 2022, 439–457. <https://doi.org/10.1007/s43039-022-00057-w>
- Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., Jacobson, J., Jain, V., Karjaluoto, H., Kefi, H., Krishen, A. S., Kumar, V., Rahman, M. M., Raman, R., Rauschnabel, P. A., Rowley, J., Salo, J., Tran, G. A., & Wang, Y. (2021). Setting The Future Of Digital And Social Media Marketing Research: Perspectives And Research Propositions. *International Journal Of Information Management*, 59, 102168. <https://doi.org/10.1016/j.ijinfomgt.2020.102168>
- Gupta, S., & Chhabria, S. (2023). The Use Of Artificial Intelligence And Machine Learning In Digital Marketing In 2023: Trends And Insights. *International Journal Of Computer Applications*. <https://doi.org/10.5120/ijca2023922635>
- Gutiérrez-Salcedo, M., Martínez, M. Á., Moral-Munoz, J., Herrera-Viedma, E., & Cobo, M. (2017). Some Bibliometric Procedures For Analyzing And Evaluating Research Fields. *Applied Intelligence*, 48, 1275–1287. <https://doi.org/10.1007/s10489-017-1105-y>
- Islam, M. A., Fakir, S. I., Masud, S. Bin, Hossen, M. D., Islam, M. T., & Siddiky, M. R. (2024). Artificial Intelligence In Digital Marketing Automation: Enhancing Personalization, Predictive Analytics, And Ethical Integration. *Edelweiss Applied Science And Technology*. <https://doi.org/10.55214/25768484.v8i6.3404>
- Kim, H., & Park, M. (2024). When Digital Celebrity Talks To You: How Human-Like Virtual Influencers Satisfy Consumer’s Experience Through Social Presence On Social Media Endorsements. *Journal Of Retailing And Consumer Services*, 76. <https://doi.org/10.1016/j.jretconser.2023.103581>
- Kull, A. J., Romero, M., & Monahan, L. (2021). How May I Help You? Driving Brand Engagement Through The Warmth Of An Initial Chatbot Message. *Journal Of Business Research*, 135, 840–850. <https://doi.org/10.1016/j.jbusres.2021.03.005>
- Kumar, V., Rajan, Bharath, Venkatesan, Rajkumar, & Lecinski, Jim. (2019). Understanding The Role Of Artificial Intelligence In Personalized Engagement Marketing. *California Management Review*, 61(4), 135–155. <https://doi.org/10.1177/0008125619859317>
- Kumar, S., Lim, W. M., Sivarajah, U., & Kaur, J. (2022). Artificial Intelligence And Blockchain

- Integration In Business: Trends From A Bibliometric-Content Analysis. *Information Systems Frontiers*, 25, 871–896. <https://doi.org/10.1007/S10796-022-10279-0>
- Kumpulainen, M., & Seppänen, M. (2022). Combining Web Of Science And Scopus Datasets In Citation-Based Literature Study. *Scientometrics*, 127, 5613–5631. <https://doi.org/10.1007/S11192-022-04475-7>
- Liye, & Sun, B. (2020). Machine Learning And AI In Marketing – Connecting Computing Power To Human Insights. *International Journal Of Research In Marketing*. <https://doi.org/10.1016/J.Ijresmar.2020.04.005>
- Mariani, M., Perez-Vega, R., & Wirtz, J. (2021). AI In Marketing, Consumer Research And Psychology: A Systematic Literature Review And Research Agenda. *Psychology & Marketing*. <https://doi.org/10.1002/Mar.21619>
- Oliveira, O., Da Silva, F. F., Juliani, F., Barbosa, L., & Nunhes, T. (2019). Bibliometric Method For Mapping The State-Of-The-Art And Identifying Research Gaps And Trends In Literature: An Essential Instrument To Support The Development Of Scientific Projects. *Scientometrics Recent Advances*. <https://doi.org/10.5772/Intechopen.85856>
- Potwora, M., Vdovichen, O., Semchuk, D., Lypych, L., & Saienko, V. (2024). The Use Of Artificial Intelligence In Marketing Strategies: Automation, Personalization And Forecasting. *Journal Of Management World*. <https://doi.org/10.53935/Jomw.V2024i2.275>
- Sakalauskas, V., & Kriksuniene, D. (2024). Personalized Advertising In E-Commerce: Using Clickstream Data To Target High-Value Customers. *Algorithms*, 17, 27. <https://doi.org/10.3390/A17010027>
- Saura, J. R., Ribeiro-Soriano, D., & Palacios-Marqués, D. (2021). Setting B2B Digital Marketing In Artificial Intelligence-Based Crms: A Review And Directions For Future Research. *Industrial Marketing Management*, 98, 161–178. <https://doi.org/10.1016/J.Indmarman.2021.08.006>
- Şenyapar, H. N. D. (2024). Artificial Intelligence In Marketing Communication: A Comprehensive Exploration Of The Integration And Impact Of AI. *Technium Social Sciences Journal*. <https://doi.org/10.47577/Tssj.V55i1.10651>
- Thakur, J., & Kushwaha, B. (2023). Artificial Intelligence In Marketing Research And Future Research Directions: Science Mapping And Research Clustering Using Bibliometric Analysis. *Global Business And Organizational Excellence*. <https://doi.org/10.1002/Joe.22233>
- Theodorakopoulos, L., & Theodoropoulou, A. (2024). Leveraging Big Data Analytics For Understanding Consumer Behavior In Digital Marketing: A Systematic Review. *Human Behavior And Emerging Technologies*. <https://doi.org/10.1155/2024/3641502>
- Toader, D.-C., Boca, G., Toader, R., Măcelaru, M., Toader, C., Ighian, D., & Rădulescu, A. T. (2020). The Effect Of Social Presence And Chatbot Errors On Trust. *Sustainability (Switzerland)*, 12(1). <https://doi.org/10.3390/SU12010256>
- Van Esch, P., & Black, S. (2021). Artificial Intelligence (AI): Revolutionizing Digital Marketing. *Australasian Marketing Journal*, 29, 199–203. <https://doi.org/10.1177/18393349211037684>
- Verma, S., Sharma, R., Deb, S., & Maitra, D. (2021). Artificial Intelligence In Marketing: Systematic Review And Future Research Direction. *Int. J. Inf. Manag. Data Insights*, 1, 100002. <https://doi.org/10.1016/J.Jjime.2020.100002>
- Vlačić, B., Corbo, L., Silva, S., & Dabić, M. (2021). The Evolving Role Of Artificial Intelligence In Marketing: A Review And Research Agenda. *Journal Of Business Research*, 128, 187–203. <https://doi.org/10.1016/J.Jbusres.2021.01.055>
- Ziakis, C., & Vlachopoulou, M. (2023). Artificial Intelligence In Digital Marketing: Insights From A Comprehensive Review. *Inf.*, 14, 664. <https://doi.org/10.3390/Info14120664>

