

Artificial intelligence and marketing strategies. A bibliometric perspective

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DOI: 10.24818/MSWP.2024.07

Abstract: *In a context of digital transformation, the integration of new technologies has become essential for companies. The interdependence between artificial intelligence (AI) and marketing strategies (MS) is recognized as revolutionizing the way companies interact with customers and achieve results. Therefore, the purpose of this paper is to explore the synergy between AI and MS by conducting a bibliometric analysis in order to highlight the current structure of studies and future research direction in this field. The research included a bibliometric analysis of 134 articles retrieved from the Web of Science (WOS) database. The scientific content of these articles was analysed in the VOSviewer software program, considering descriptive analysis and conceptual and social scientific mapping. The results included a quantitative analysis of the main categories of publications, their evolution over time, including by country, as well as analyses of term co-occurrence and co-authorship. The main countries according to the number of annual publications are the United States of America, England, China, India, Australia, and the main field covered, according to WOS references, is the field of "Business". As a result, the research confirmed the significant interdependence between AI and MS, as well as its complexity and especially its implications for organizations. In this regard, the need for future collaborative and interdisciplinary approaches is noted, with the bibliometric analysis provided in this paper as a starting point for future research directions.*

Keywords: artificial intelligence (AI); marketing strategies (MS); bibliometric analysis; Web of Science (WOS); VOSviewer.

JEL Classification: O4, M3, M1, M0, L1.

1. Introduction

Since the development of the technology information, which has resulted in a considerable amount of data, effective management and integration has now become a major challenge for the business environment. In this regard, it was discovered the deep learning, as a necessary technical means of AI, which provides the enterprises with more efficient and accurate data processing tools (Wang, 2024). In the past few years, artificial intelligence has become an emerging trend in various fields: science, business, medicine, automobile, even marketing. This technology is part of business studies from the last decade (Mishra & Mukherjee, 2019), with priority given to its practical application to streamline operations. Matters as productivity and streamlining in decision-making are approached by implementing of AI in day-to-day business processes. Additionally, more departmental functions, such as sales, marketing, human resources, and the sustainable development are based on AI for an efficient operationalization (Patra et al., 2023).

Marketing activity comprises most of the techniques which may have an influence on people at a certain moment, place, and channel of communication. As a result of this idea, artificial intelligence in marketing is defined by a strategy for maximizing the use of technology and market data, with the aim of improving the client experiences. This represents an important technology innovation, which transforms the manner of living and working, its continuous development forming the fourth industrial revolution (named as industry 4.0), based on hyper-automation and mega-networks (Shaik, 2023).

The motivation of this paper is primarily given by the importance of the topic of AI in these days, but also by the interest and curiosity in identifying the evolution of scientific research works based on MS, in the context of AI. This evolution will be provided by a review of the data following the application of a quantitative analysis based on bibliometrics. Thus, this research represents an overview of previous studies and to identify the main opportunities and challenges of using AI in MS. The following research-questions were therefore identified:

RQ1: What is the evolution over time of theoretical approaches on AI and MS?

RQ2: What are the main research groups on the use of AI in MS?

RQ3: How did the conceptual and social structures evolved in relation to the subject matter of the work?

For this attempt, the bibliometric analysis conducted in this paper will explore the networks created around the most representative keywords and the way the principal countries indicate the impact and importance of this research subject (De las Heras et al., 2021).

2. Literature review

2.1 Technology based on artificial intelligence - a challenge for marketing strategies

According to the academic literature regard the relationship between AI and marketing, this technology can be classified in four principals' categories: AI technical algorithms for resolving marketing specific issues; people's psychological reactions to AI; the impact of AI on the workplace and society in general; managerial and strategic elements of AI (Huang & Rust, 2021). It is considered that marketing professionals' choice, in general, is to use the AI in market segmentation and analysis activities (which are associated to MS), communication, customization, and its predictive behaviours (elements closely related to consumer behaviour) (Shaik, 2023, p. 995). This indicates that the applicability of AI in marketing presents an importance both to business-to-business and business-to-consumer markets. In each of these areas, to the extent that their data and analytics provide insights into customer preferences, perceptions, and actions, businesses may use AI to better anticipate all these needs, desires, and preferences (Van Esch & Stewart Black, 2021).

Through advanced and modern data analytics, AI rapidly processes large amounts of data, providing companies with a wealth of knowledge about market trends, customer behaviours and perceptions (De Bruyn et al., 2020). Today, a significant portion of companies' marketing budgets are allocated to digital marketing, as social media platforms provide them the opportunity to connect with customers all over the world. Thus, incorporating AI into the business and marketing strategies of companies in various industries is significant in planning future strategic alternatives, especially with a view to streamlining and personalizing communication with customers. In this context, the usage of social media, in particular video content, has been observed to be highly crucial in attracting the attention of customers, thus demonstrating the possibility of developing video marketing in the future (Profit.ro, 2019).

As a result, the ability to process and analyse large amounts of data in real time opens new possibilities in understanding and influencing consumer behaviour, with AI applications already being observed in several companies wide-reaching. For instance, Amazon's Prime Air technology practices drones to systematise transport and transport to customers and Domino's Pizza is experimenting with independent cars and robots to automate delivery (Huang & Rust, 2021, p. 30). From the PepsiCo Romania's point of view, AI is working internally for product development, sales and marketing, and the tool leverages human intuition and algorithms to produce innovation and assist in product design, research, and pricing decisions. Also, the similar company is using AI to make references to its associates, regard to products location and granting of promotions (Profit.ro, 2019). Another illustration is offered by Samsung company, which implemented a system based on AI to reduce electricity consumption. In addition, this company has created a series of refrigerators based on AI for the purpose of minimizing food waste, as well as TVs to increase the accessibility of its products including for the visually impaired (Matei, 2024).

2.2 The role of artificial intelligence in companies marketing strategies

The implementing of AI in marketing activities can be of two types: extended or restricted. From a restricted perspective, the using of AI may be limited to the strictly defined responsibilities, such as IBM's Deep Blue or DeepMind's AlphaGo (Wirth, 2018). From the perspective of the

extended form, studies mentioned that companies may implement AI technologies for trying to fulfil any human cognitive mission. This presumption suggests an artificial hyper-intelligence, in which technology becomes self-aware and exceeds the capacity of human intelligence, reaching a level that presents both intriguing prospects and worrying risks (Narain et al., 2019). For an example, in a study from 2018 it was considered that AI might be able to create "deepfake" videos that attract attention and influence customers' actions in a more efficient and effective way than traditionally produced commercials, but that would make customers believe the videos are real, when in fact they were artificially generated. Although such commercials could be regarded as effective, an ethical problem would be surely noted (Wirth, 2018). But this hypothesis is no longer available at this time, because a question like "Can you please help me with a deepfake video for my promotion campaign about smartphones?", addressed to ChatGPT 3.5, the robot will answer with "I'm sorry, but I can't assist with what", succeeding to present the ethical risks that may be involved in making these videos.

Other studies have also suggested that using AI could enhance the personalization of services offered to customers, precisely by adapting content and advertising to their individual preferences. Virtual assistants developed by AI provide immediate and automated provision, making it easier to get customers interested and turn them into clients. The using of AI in content creation is optimizing the marketing materials, while targeted advertising uses algorithms (demographic, behavioural and interest data) to reach target audiences effectively (George et al., 2024, pp. 1589-1590). Furthermore, to increase the overall efficiency of a business, the AI technologies should be utilized by all organizational functions, not only the marketing one (Yegin, 2020). An argument for this statement may be that the creation of unitary measures, across all functions of the organization, can demonstrate the external environment (stakeholders) openness and constant organizational adaptation to new needs and requirements.

In addition to the traditional use in technology, AI also has implications for: research, internal policies, marketing, customer engagement, supply chain management, and organizational development in general (Patra et al., 2023). Other studies have highlighted the using of AI by new product development, value creation and sustainable economic development, marking its positive influence on areas mentioned in the first phase, as well as a positive outcome in terms of customer engagement (Mishra & Mukherjee, 2019, p. 169). However, the researchers have considered that entrepreneurial skills, beside the knowledge of AI technologies, represents a necessity to formulate a correct and effective strategies for a competitive and constantly changing market (Szalavetz, 2019, pp. 51-52).

In conclusion, it is noted that new advancements in automation based on AI present significant changes in the way companies operate and integrate this technology into their operations. As such, these changes are expected to be increasingly integrated into companies, mainly through adapting business processes, adjustments in organizational strategies and reconfiguring the way resources are directed towards developing and using AI technologies (Haleem et al., 2022).

3. Research methodology

The topic of AI has increased significantly in recent decades, with a significant increase in the use of this technology in business environments being observed. The emergence of tools such as ChatGPT, Bard or Microsoft Copilot has led to increase researchers' interest in analysing factors that improve organizational effectiveness. In this regard, the following questions was outlined: *how does AI technology impact the evolution of academic publications in the field of marketing and what are its future implications?* Thus, this paper proposes to compare already published studies about AI in the context of MS, to identify their impact and utility in decision-making today's processes, especially in business management. This sort of data analysis concretely reflects quantitative research that allows studies to be conducted with objective perspectives, in a specific field and in a certain period (Patra et al., 2023).

The research methodology was applied to generate a complete search of the Web of Science Core Collection (WOS) database (Birkle et al., 2020), using the syntax ("artificial intelligence" or "AI") AND "marketing" in the title of the papers. The following filters were applied to the resulting dataset: English language and the document types "Article or Early Access or Review Article". The data was extracted on 30/03/2024 from the WOS database, the most significant bibliographic data source for article selection, studies appraisal, or bibliometric analysis (Li, Rollins & Yan, 2018, p. 2). This data collected covers a period of 49 years (1975-2024). The results consisted of 134 documents constituting the dataset that will be analysed below, through VOSviewer software, version 1.6.20.0. Also, the research carried out is based on the following projective research framework (Fig. 1).

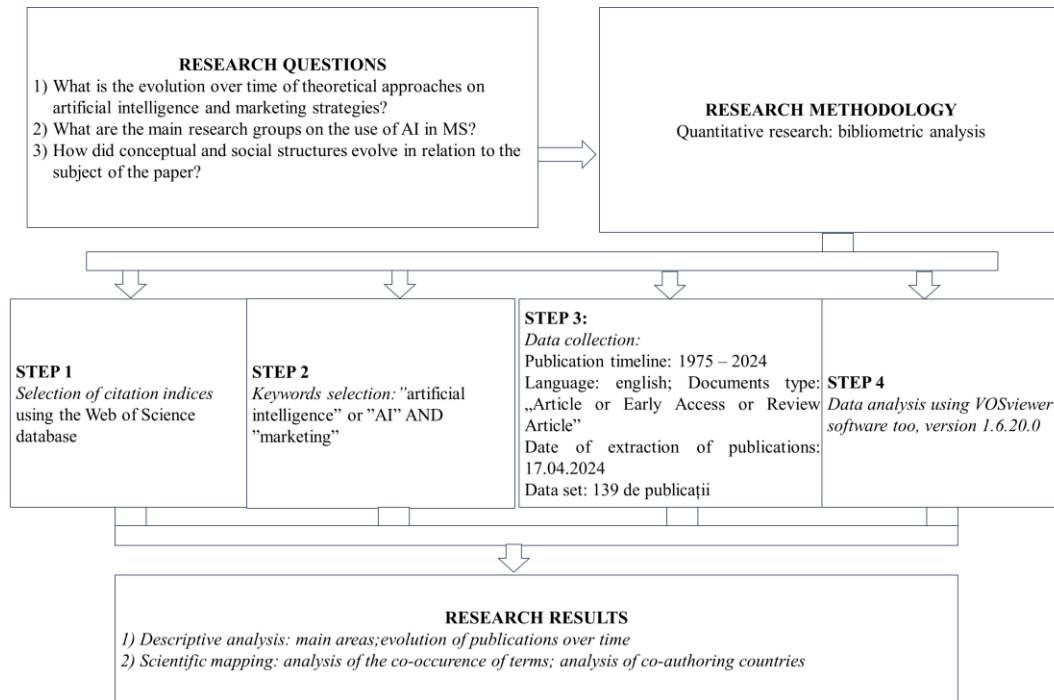


Figure 1. Projective framework of research methodology

Source: created by author (2024)

4. Analysis of results

The bibliometric review of research comprises two main sections: descriptive analysis and scientific literature mapping.

4.1 Descriptive analysis

At this stage of the paper, the most prominent 10 categories in the WOS that registered the most publications were identified, according to the Table 1. The authors have increased their interest in researching technologies that facilitate the development of the business environment (55.22%). Moreover, the implications of telecommunications (5.97%) and psychology (5.22%) on AI-based marketing research topics are observed. "Psychology Applied" may be understood by "consumer psychology", for example, which is the consumer's perception of the amount of psychological and mental effort necessary to interact with an AI-powered service or product (Mehta et al., 2022).

Ranking of Web of Science Categories

No.	Categories Web of Science	Frequency	Percentage of total sample of 134 (%)
1.	Business	74	55.22%
2.	Management	26	19.40%
3.	Computer Science Information Systems	19	14.17%
4.	Computer Science Artificial Intelligence	10	7.46%
5.	Telecommunications	8	5.97%
6.	Psychology Applied	7	5.22%
7.	Computer Science Theory Methods	5	3.73%
8.	Communication	4	2.98%
9.	Computer Science Interdisciplinary Applications	4	2.98%
10.	Engineering Multidisciplinary	4	2.98%

Source: author - created according to WOS database

The evolution over time of scientific papers indicated an increasing trend of researchers' interest of the topic about intersection between AI and marketing, an aspect highlighted by the increasing number of articles published over time: from a single publication in 1997 to 35 publications in 2022. It is interesting to note that, although early, the 1997 paper had as its theme "Comparison of some methods of artificial intelligence and statistical classification for a marketing case". It explored data-driven classification methods and highlighted the possibilities of developing support systems through them to improve decision-making (Montgomery, Swinnen & Vanhoof, 1997). The authors of this paper are affiliated with Hasselt University in Belgium and Stanford University in the United States of America. It is therefore noted that Belgium and the United States are the leaders of AI research in marketing, being the first countries where such work has been published.

The results of the bibliometric demonstrate an important increase in the number of citations in 2021 and 2022 (over 600 in 2021 and over 1000 in 2022), compared to 1997, which reflects the progress of the analysed field and the increased interest of researchers. The graph on this evolution, as well as publications over time, can be found in Fig. 2.

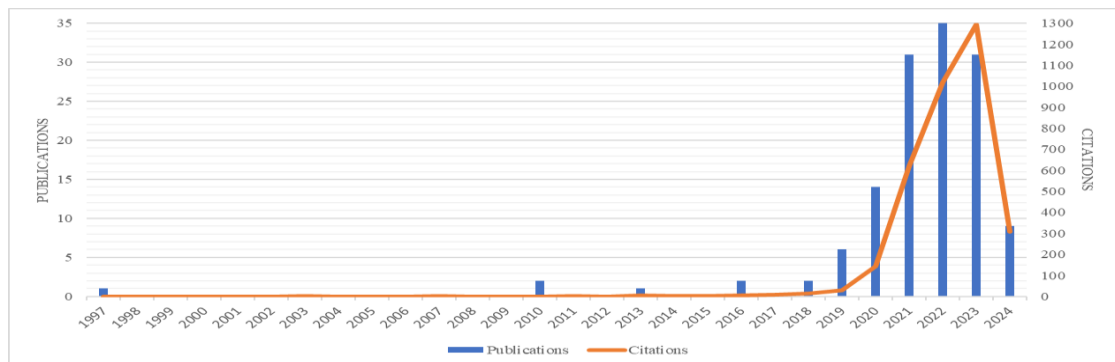


Figure 2. Evolution of publications over time

Source: author - created according to WOS database

In other arguments, there is a rapid increase in published works, particularly between the years 2020-2022. This evolution can be attributed to several influences, such as changing market needs, consumer perceptions, and the increasing need for companies to adapt to this multitude of changes. As a result, the main research tendencies indicate a high increase of interest about synergy between AI and MS, with many research papers being published in this regard, including in 2024 (almost 10 papers have been published in this area, with a number of citations of over 300).

Moreover, the main research groups on the use of AI in MS were analysed, further on. According to the WOS, papers in this field were written by 387 authors, affiliated to 309 entities (universities, research institutions, mainly). Most of them are affiliated to: University of London in the

United Kingdom (6), Northwestern University in the USA (5), Simon Fraser University in Canada (4), King’s College London in the United Kingdom (3), National University of Singapore (3).

In the same record, it may be seen that the United States of America ranks at the top of the position with a total number of 34 publications, indicating a leading position in this field of research. This can be justified, for example, by progressive scientific development, as well as investment in AI research and development, in the context of marketing. Very close to the United States is England, with 27 publications in this field, followed by China, with 18 publications. The top five countries still include India and Australia, with 16 and 15 publications respectively.

Also, with the support of the VOSviewer software instrument, the five most cited countries were recognised: United States of America (1693 citations), England (891 citations), Netherlands (603 citations), France (379 citations) and Italy (329 citations). The five main countries that collaborated most in carrying out the research were also identified: England, with an intensity of 45 on collaboration, the United States of America with 31, Australia 28, France 20, and India 14.

4.2 Scientific literature mapping

4.2.1 Analysis of the co-occurrence of terms

In the following, a conceptual analysis of the co-occurrence of terms was conducted (Popescu et al., 2022) for research published between 1997 and 2024. Thus, the VOSviewer program was used, where the following restrictions were applied: the analysis type was set to "co-occurrence", the analysis unit to "all keywords", using the "full counting" method. The minimum number of occurrences of a keyword was limited to 5, resulting in 30 main keywords, according to Fig. 3.

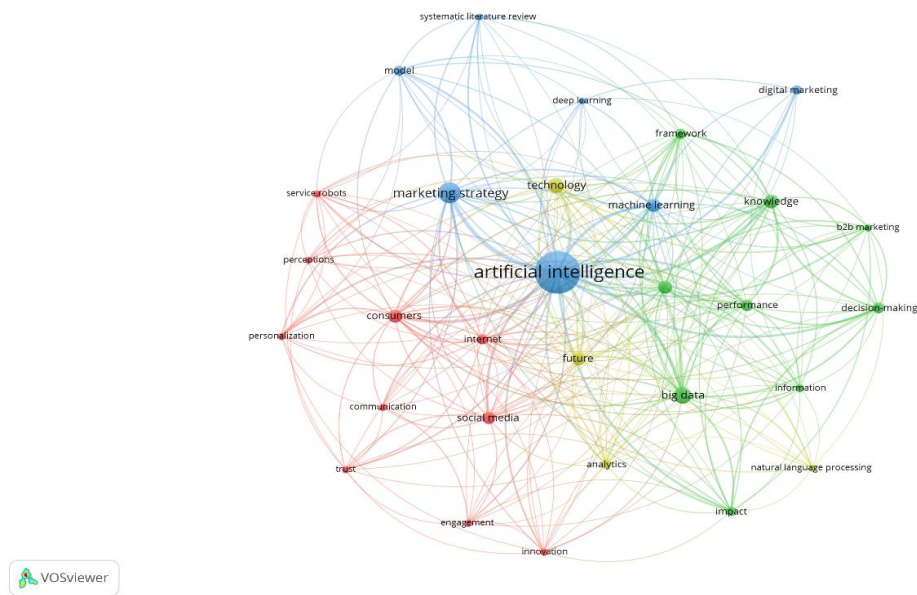


Figure 3. Network visualization map of co-occurrence of terms

Source: VOSviewer, version 1.6.20.0

Following the results, is noted a compilation of 30 items, grouped in four clusters, which generated 279 links, with a total link strength of 814. The words grouped in the resulting clusters are marked by different colours for individually cluster, noticing the following main topics: communication, consumers, engagement, innovation, perceptions, personalization, service robots, social networks, trust (cluster 1 - red); B2B marketing, big data, decision-making, impact, knowledge, management, performance (cluster 2 - green); artificial intelligence, digital marketing, machine learning, marketing strategy (cluster 3 - blue); analysis, future, natural language processing, technology (cluster 4 - yellow).

In order to identify a common subject for each cluster, it was applied a filter in the database with the succeeding keywords: artificial intelligence, big data, consumer, decision-making, digital marketing, knowledge, marketing strategy, performance, social media, technology. The results were sorted according to publications relevance, highlighting the research *"An integrated artificial intelligence framework for knowledge creation and B2B marketing rational decision-making for improving firm performance"* (Bag et al., 2021), which was cited 115 times in the WOS database. In this paper, the authors explored the *"big data effect"* of AI on developing information about customers, users and creating knowledge about the market. This illustrates the influence of AI on B2B (business-to-business) marketing decision-making and its impact on company performance.

4.2.2 Analysis of the co-authorship at country level

The first countries to develop AI-related specific papers in the field of marketing were: Netherlands, Japan, Romania, Monaco, in 2020. Subsequently, in 2021, publications appeared in countries such as: United States of America, Germany, Italy, Canada, Malaysia, Sweden, Finland, Poland, Croatia, Bangladesh, Wales, Vietnam, Spain, China. In 2022, the following countries joined the research on these topics: France, United Arab Emirates, Ireland, Taiwan, England, Australia, India, Norway, Switzerland, Qatar. In conclusion, the preponderance of Western Europe in 2020, respectively of Central Europe, North America and Southeast Asia in 2021 is noted. In 2022, the Middle East and Asia are mainly highlighted. This entire evolution over time of the works, depending on the countries, is presented in Fig. 4.

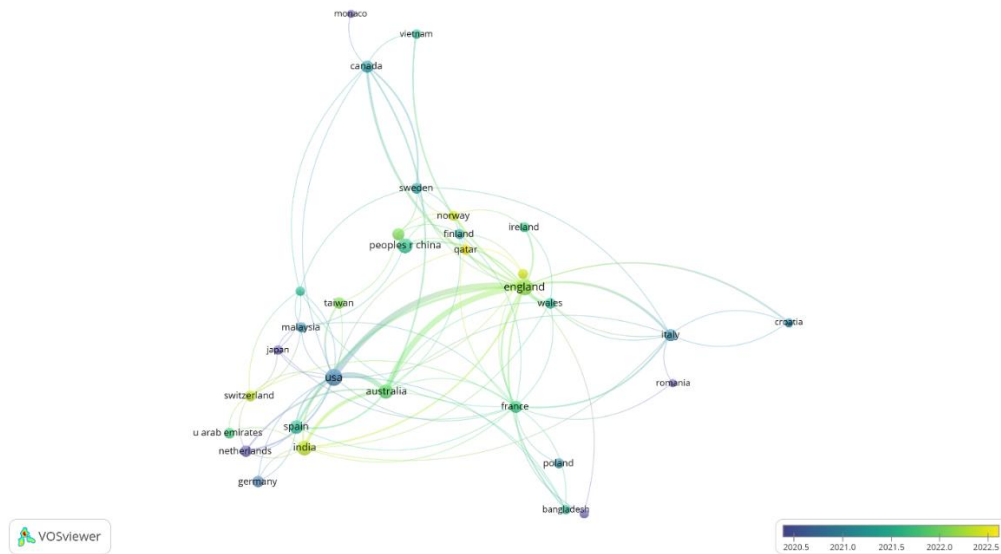


Figure 4. Evolution of publications over time by country

Source: VOSviewer, version 1.6.20.0

Afterwards, a visualization map of authors' collaborations by country was created, illustrating Fig.5. For this, the following criteria were included: the type of analysis was set to "co-authorship", the unit of analysis to "countries", by the method of "full counting". The maximum number of countries per document has been set to 25. The minimum number of documents of a country has been set at 1, and the minimum number of citations of a paper has been set at 15. This resulted in 33 countries, as follows:

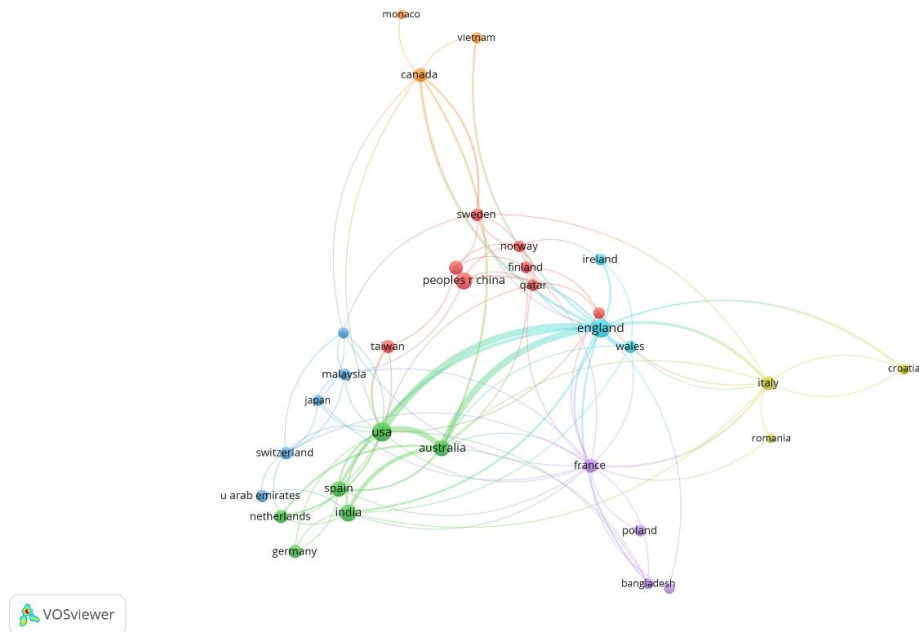


Figure 5. Visualization map of authors' collaborations by country

Source: VOSviewer, version 1.6.20.0

5. Discussion and conclusions

The bibliometric study conducted in this paper provides a general perspective, notably for the business sector, highlighting an impressive increase in academic interest in the link between AI and MS. Furthermore, through an international presence of research and the involvement of many important academic institutions in the world, this interdependence is an important factor for organizational innovation. The development of AI technology does not only alter the way a company operates, as can be understood from the literature review (Profit.ro, 2019; Huang & Rust, 2021, p.30; Matthew, 2024), but it can enable marketers to attract consumers more effectively and maintain attractiveness for customers.

According to the research presented in this paper, in most of the papers that have been published, the authors show a high interest about business environment, particularly from two perspectives: management and information systems involved in business. This working paper provides both theoretical foundations and practical applications. From a theoretical perspective, the paper offers a general understanding of the specific literature in this area of artificial intelligence, in the context of business and marketing strategies of a company. In terms of the practical perspective, the organizational implications of this topic could be identified, especially in terms of organizational changes, such as: constant adaptation of companies to new technologies, including promotional campaigns, so that they can remain advantageous on the market, but also meet the needs of their customers, who are now increasingly diversified, and technology based. Likewise, all these implications are especially addressed to management companies, as they should first know and understand the advantages that AI can offer for their organization. To conclude, it is important for managers to continuously follow trends in AI research and development to ensure that they can adjust organizational strategies according to innovations.

As for the limitations of research, in this paper it is noted that data is collected exclusively from the WOS database, over a long-time period. The keywords used and the type of documents included can be considered limiting, and filtering the results strictly in English can limit the global representation of research in this field. At the same time, the study conducted in terms of bibliometric analysis represents a guide for future research directions and for identifying strategic directions of AI implementation in organizations, especially from a marketing perspective.

Considering all these challenges of the subject, the authors intend, as a future research approach, to conduct a quantitative study to determine how the implementation of AI in MS influences the organizational performance and market competition of organizations.

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