

Mapping the Landscape of Artificial Intelligence in Marketing: A Literature-Based Study

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Abstract:

Artificial intelligence (AI) has become a widely adopted technology in companies, with marketing emerging as one of its most dynamic areas of application. Its adoption is expected to grow further driven by AI's potential to enhance efficiency, enable personalization, and support strategic decision-making. This study synthesizes recent academic research on AI in marketing. To provide context, a historical perspective traces the evolution of AI in marketing from early implementations to contemporary practices. It also identifies the key marketing domains where AI is most commonly applied. The study highlights the primary focus areas that receive the most attention in contemporary scholarly work as reflected in the keywords that appear most frequently across publications. Based on the keywords, EU-related AI marketing research is structured into six thematic clusters covering technology, performance, adoption, human–AI interaction, digitalisation and organisational decision-making. Compared to the US, EU research is broader and more nuanced, while US studies focus primarily on technological and performance aspects. In CEE, emphasis lies on management, adoption, and digitalisation. By synthesizing findings, the study offers actionable insights for scholars and practitioners. Future research will explore AI adoption among small and medium-sized enterprises in Hungary and its implications for organizational efficiency and competitiveness.

Keywords: Artificial Intelligence, Marketing-purpose Application, Literature Review, Web of Science, Keyword Co-occurrence Network

JEL Classification: M31, O33

The evolution of the use of AI in Marketing

Marketing has traditionally focused on understanding customers and creating value. It has gone through several major transformations including the rise of digital marketing, and many studies now identify artificial intelligence (AI) as the next stage in this evolution (Davenport et al., 2020).

Its corporate use is also widespread: according to McKinsey's global study with around 1500 participants, 78% of businesses use AI in at least one business function with marketing and sales among the top areas of application (Singla et al., 2025). This shows that AI has become a widely adopted technology in companies.

Historical evolution of AI in marketing

To understand how artificial intelligence is applied in contemporary marketing, it is important to consider its historical evolution as shown in Figure 1. In general, the origins of AI can be traced back to the 1940s, when Alan Turing, through his test demonstration of machines being capable of producing human-like responses, and Isaac Asimov, introducing the Three Laws of Robotics, laid the early groundwork for the discipline. However, AI did not appear in marketing

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until the early 2000s, when marketers began adopting data-mining tools to analyse large datasets, which enabled them to gain deeper insights into customer behaviour. A major development in the use of AI emerged in the mid-2000s with the rise of Search Engine Optimisation (SEO) and Pay-Per-Click (PPC) advertising. The technologies behind these tools allowed marketers to target consumers more precisely and to track user preferences more effectively. By the 2010s, the advent of Big Data enabled AI techniques to advance further supporting more sophisticated forecasting of customer behaviour, trend identification, and predictive analytics. In the 2020s, AI has become a central component of marketing (Kumar et al., 2023). It has transformed how companies engage with customers and make data-driven decisions (Labib, 2024).

It must be noted that the integration of AI into marketing functions require a strong digital infrastructure with digital marketing playing a critical role in creating the technological and organizational conditions necessary for AI development. The COVID-19 pandemic further accelerated this digital transformation, which led to increased adoption of AI-driven tools and strategies across industries (Cioppi et al., 2023). As a result, marketing now not only incorporates AI but AI is becoming increasingly specialized for distinct marketing functions (Kumar et al., 2023).

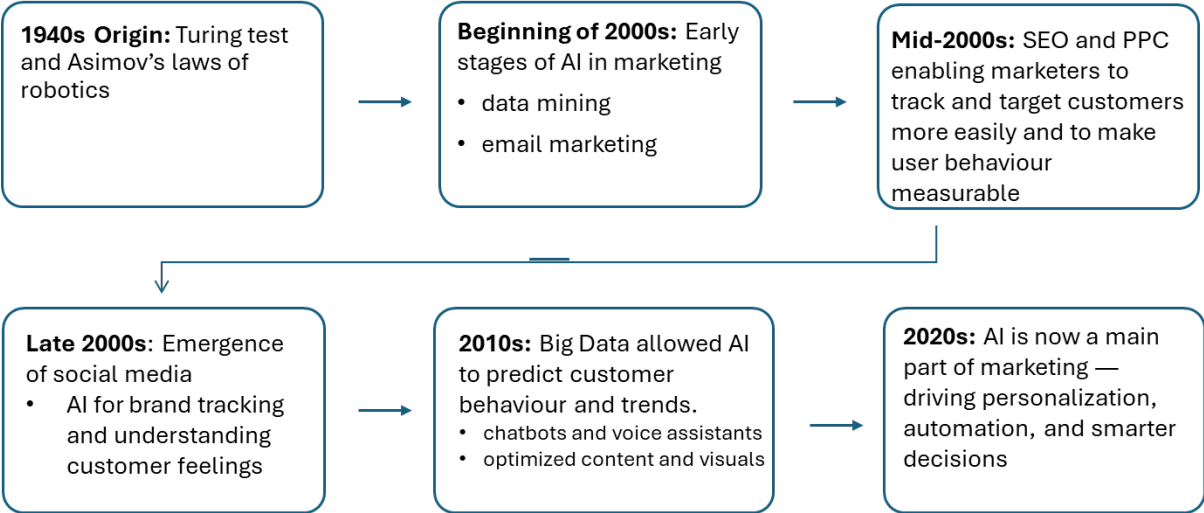


Figure 1: History of the use of AI in Marketing

Source: based on the 2023 publication of Kumar et al. 'AI-powered marketing: What, where, and how?'

Classification of AI

AI can be classified in multiple ways. Based on a **functional and structural approach**, we can distinguish AI by intelligence levels, task types, and whether it is embedded in a robotic system (Davenport et al., 2020). Additionally, AI can be categorized based on **technological capabilities**, including machine learning, computer vision, robotics, speech recognition, and natural language processing, as well as supporting technologies such as cloud computing, Augmented Reality (AR), and Virtual Reality (VR) (Cioppi et al., 2023).

Thirdly, AI can be classified according to **marketing functions**. AI can support a wide range of marketing functions thanks to its ability to process large amounts of data quickly and accurately (Haleem et al., 2022). AI can be used throughout the whole marketing process from the early stages of market research and strategic planning to the implementation and evaluation of marketing activities.

AI enables personalized customer experiences, optimizing digital advertising, improving customer engagement through chatbots. It can be also applied to optimize market and competitive analysis, and can be used for predictive analytics, dynamic pricing as well as to automate content creation and to carry out sentiment analysis. Furthermore, AI enhances voice and visual search optimization, and marketing automation. Not the least, it can also be implemented in e-commerce and social media, which currently represent the fastest-growing fields (Kumar et al, 2023; Ziakis & Vlachopoulou, 2023).

Strategic planning: AI technologies, such as machine learning and statistical algorithms, are often implemented to support the planning of data-driven, integrated marketing campaigns. They enable forecasting based on historical data, analysis and synthesis of customer preferences and market trends, and allow businesses to proactively adjust their strategies, moving beyond decisions based on intuition or past experience. AI can also be used to predict product attributes, such as design preferences, and to optimize marketing decisions like media planning and scheduling. (Verma et al., 2021); (Durmuş Senyapar, 2024)

Social media: AI can process massive amounts of data in real time, therefore it enables marketers to create dynamic campaigns including personalized and customized messaging based on individual customer preferences (Huang & Rust, 2020). Algorithms allow companies to track what customers like or dislike and align their strategies with customer interests. Additionally, by analysing content performance, AI helps improve message relevance and impact (Verma et al., 2021),

Customer relationship management (CRM): It focuses on building and maintaining long-term customer relationships by using information technology (IT) to effectively store, manage, and apply data across the customer lifecycle. AI has significantly transformed CRM systems by advanced data analysis, which subsequently enables increasingly personalized customer experiences and improved customer journey as a result. Additionally, key developments such as chatbots and virtual assistants have further optimized processes by enabling real-time interaction with customers. At the same time, the integration of AI into CRM requires careful consideration because of data privacy and ethical issues linked to the sensitive nature of customer information. (Ledro et al., 2025)

Budget optimization: AI can be also used to increase efficiency and cost-effectiveness by optimizing marketing strategies in line with available budgets. With AI, businesses can develop their own dynamic pricing strategies, where AI adjusts product prices in real time based on demand, competitor pricing, and consumer behaviour thus ensuring optimized revenue (Haleem et al., 2022); (Verma et al., 2021).

E-commerce: AI adoption in e-commerce opens new strategic avenues. With AI, e-commerce platforms can run real-time campaigns, retarget users, dynamically adjust offers and prices, and respond fast to changing consumer behaviour or external conditions. Additionally, by implementing chatbots, virtual assistants, and computer-vision-based applications businesses can further increase customer experience. Studies suggest that while the use of AI provides a strong competitive advantage in the digital marketplace it is also becoming increasingly inevitable (Zhuk & Yatskyi, 2024).

Performance: Research indicates that AI can improve both marketing and organizational performance by supporting both automated processes and human decision-making. By automating repetitive tasks, extracting insights from and synthesizing large volumes of data, AI enables more effective value creation and drives improved sales outcomes (Vlačić et al., 2021).

As detailed above, research highlights that AI's integration in marketing brings numerous benefits, including increased efficiency, improved customer targeting, and more precise market predictions. It is also shown that AI is increasingly integrated across multiple marketing functions from planning to the end and evaluation of marketing campaign. AI

supports activities ranging from customer relationship management to social media to campaign optimization and predictive analytics. Its adoption is widespread, which reflects its growing importance in contemporary marketing practice.

Methodology

After taking a glance at how the use of AI evolved over time and how it is used in marketing, the next goal was to identify sources and key research areas on the use of AI in marketing. For this, we started by identifying and analysing scientific articles from the Web of Science database focusing specifically on publications that included the terms „AI”; “marketing” and either the term “application” or “use” in their titles or topics. The study centred on sources that belong to the following categories in the Web of Science database: “business”, “economics”, or “management”. Recognizing that AI is a rapidly evolving field, and at the same time to incorporate the most current insights, the study considered publications from 2020 to 2025. It focused on scholarly publications from three geographic regions: the European Union (EU), the United States (US), and Central and Eastern Europe (CEE). Three separate searches were conducted for each region, and then the resulting findings were compared to identify similarities and differences. The search identified 350 scientific sources originating from the EU, 75 from the US, and 170 from the CEE region. Keywords extracted from the resulting dataset were visualized using VOSviewer, a software platform for creating and visualizing bibliometric networks. Relying on the keyword visualization function of the software a co-occurrence network was created, which highlights the main research domains and their interconnections within each region.

A minimum co-occurrence threshold of five was applied, which means that only keywords appearing at least five times in the analysed sources were included in the visualization. This threshold was set in order to only highlight concepts that are recurrent within the research field. Non-relevant terms such as geographical names that do not belong to either of the studied regions were excluded, and terms with the same meaning such as “artificial intelligence” – “AI” were regrouped and listed in a thesaurus file, which enabled the software to treat these items as a unified concept to avoid duplications. Through the keyword visualization of the Web of Science publications for the EU that appeared between 2020 and 2025, six color-coded clusters were identified with each representing distinct thematic areas (see Figure 2).

much trust they have in AI, and how AI promotes service management and customer relationship practices and what role service robots play in customer relationship.

- The **purple** (*Digitalization, Social Media & Consumption Patterns*) **cluster** includes sources that examine how *digitalization* and *social media* shape consumer behaviour, and how consumption patterns evolve in the online space. The inclusion of ethical considerations (ethics is the 5th most common keyword as shown by Table 5) points to growing concerns surrounding privacy, data use, and responsible marketing practices in digital spaces.
- The **light blue cluster** with keywords like *systems*, *industry*, and *globalization* examines how AI-enabled systems and algorithms drive organizational transformation, industry wide modernization and global integration.

As indicated in Tables 1–6, within each cluster the five most important keywords were selected based on their occurrence, which means how often these keywords appeared in the literature, and their total link strength (TLS), which reflects how frequently a keyword appears together with others.

Keywords that scored well on both measures were ranked highest. When two keywords had similar occurrence counts, TLS was used to guide the final selection. This approach ensures that the chosen keywords are not only common in the literature but are also closely connected to other topics.

Table 1: *Red - Cluster 1 - AI Technologies*

Source: *own research, based on VOSviewer keyword visualization*

Red - Cluster 1 —AI Technologies			
Rank	Keyword	Occurrence	TLS
1	AI	222	744
2	Technology	53	247
3	Machine learning	42	145
4	Future	25	107
5	Market	23	101

In the red cluster (see Table 1), ‘AI’ and ‘technology’ are the most common keywords and are represented with the largest nodes (see Figure 3). They are also the central elements of the whole network. Several keywords in the cluster – including ‘AI’, ‘technology’ as well as ‘future’, ‘market’, or ‘machine learning’ – show strong interconnections both within the cluster and across clusters representing the technological base which, in conjunction with other focus areas, draws further scholarly attention. As illustrated in Figure 3, the centrality of “AI” is demonstrated by its extensive interconnections across the network.

keyword ‘management’ despite its location in another cluster indicating the corporate oriented applications of AI. Furthermore, ‘innovation’ and ‘knowledge’ also show a direct link with ‘marketing’ (also from another cluster), which signals that contemporary marketing research is strongly focused on knowledge creation and innovation.

Table 3: *Dark - Cluster 3 — Information, Adoption & User Behaviour*
Source: *own research, based on VOSviewer keyword visualization*

Dark - Cluster 3 — Information, Adoption & User Behaviour			
Rank	Keyword	Occurrence	TLS
1	Information / IT / IoT	33	144
2	Adoption	13	48
3	Behaviour	14	47
4	Data analytics	5	33
5	Determinants	6	23

In the dark cluster, ‘information’ the most prominent keyword of the cluster (see Table 3) shows links to multiple other clusters, including ‘AI’ and ‘technology’ from the red cluster, ‘innovation’ and ‘performance’ from the green cluster, ‘management’ from the yellow cluster, ‘impact’, ‘systems’ and ‘decision-making’ from the blue cluster, as well as ‘digitalization’ and ‘social media’ from the purple cluster (see Figure 2). This pattern highlights the highly integrative function of information. The keyword ‘adoption’ is strongly connected to ‘behaviour’ and ‘user acceptance’ in the dark cluster, which might suggest that information is being explored through the lens of human responses to emerging technologies, as well as through AI- and technology-oriented perspectives. Interestingly, no direct connection between behaviour and information is visible in the network. Moreover, adoption is linked to both ‘management’ and ‘marketing’ despite the fact that these terms belong to different clusters, which indicates that AI adoption-related issues are discussed across both organizational and market-oriented contexts.

Table 4: *Yellow - Cluster 4 - Human–AI Interaction*
Source: *own research, based on VOSviewer keyword visualization*

Yellow - Cluster 4 - Human–AI Interaction			
Rank	Keyword	Occurrence	TLS
1	Management	43	206
2	Marketing	20	73

3	Trust	13	49
4	Customer engagement	7	37
5	Service robots	5	20

In the yellow cluster, both ‘management’ and ‘marketing’ – the most important keywords of the cluster as shown in Table 4 – form many cross-cluster links. Within this cluster AI is strongly linked to concepts such as ‘customer engagement’, ‘trust’, and ‘acceptance’, which reflects the human-centred aspects of technology adoption in marketing (see Figure 2). Additionally, beyond its own cluster, marketing also connects to the red cluster through AI, ‘machine learning’, ‘generative AI’ and ‘future’ with the notion of ‘future’ further tied to ‘innovation’ in the green cluster, which shows a direct connection to marketing. Other links of marketing to the green cluster include ‘knowledge’ and ‘big data’, which highlight that modern marketing relies significantly on data. Marketing also connects to the blue cluster through decision-making, and to the purple cluster through consumption, experiences, ethics, and e-commerce, which indicates the broader consumer and ethical implications associated with AI-enabled marketing practices (see Figure 2).

Table 5: *Purple - Cluster 5 Digitalization, Social Media & Consumption Patterns*
Source: *own research, based on VOSviewer keyword visualization*

Purple - Cluster 5			
Digitalization, Social Media			
& Consumption Patterns			
Rank	Keyword	Occurrence	TLS
1	Social media	23	108
2	Digitalization	28	82
3	Framework	17	83
4	Consumption	13	50
5	Ethics	5	33

In the purple cluster, as indicated in Table 5, the main keywords: ‘social media’, ‘digitalization’, ‘framework’, and ‘consumption’ centred around digital consumer behaviour and are closely linked within the cluster. In addition, they are all linked to management, which is situated in the yellow cluster (see Figure 2). This indicates that digital consumption patterns and social media dynamics appear as important managerial concerns and prominent topics within current research. Additionally, ‘social media’, ‘consumption’, and ‘framework’ show significant connections with ‘ethics’, which suggests that ethical considerations play a central role in discussions related to digital platforms and consumer practices. These keywords show strong links to multiple other clusters, which highlight their multidisciplinary nature.

In the sixth, light blue cluster ‘impact’, appears as the central element within this hub (see Table 6) connecting the keywords of this cluster with each other, which also show strong internal connectivity. Beyond its own cluster, as shown in Figure 2, ‘impact’ also demonstrates significant links to the AI-focused red cluster, as well as to business-oriented keywords such as ‘management’, ‘business’, ‘performance’, ‘innovation’, and ‘knowledge’, which emphasizes organizational implications. Additionally, ‘impact’ shows links to marketing-related terms including ‘social media’ and ‘customer engagement’, as well as to ‘chatbots’, which latter indicates intersections with customer-facing and digital marketing domains. Overall, this positions ‘*impact*’ as a central integrative concept thus bridging technological advancements with managerial, organizational, and marketing considerations.

Table 6: *Light-blue - Cluster 6 AI Impact on Organisational Decision-Making and Systems Transformation*

Source: *own research, based on VOSviewer keyword visualization*

Light-blue - Cluster 6			
AI Impact on Organisational			
Decision-Making and Systems Transformation			
Rank	Keyword	Occurrence	TLS
1	Impact	39	175
2	Decision-making	18	104
3	Systems	15	80
4	Transformation	9	54
5	Industry	7	35

The clusters demonstrate that research on the use and application of AI in marketing within the European Union is well-developed and is characterized by a diverse range of sub-topics and focus areas. These results align with the literature overview, which pointing out that AI can be applied in marketing in various ways, based on different AI technologies and across distinct marketing areas. The clusters show that research spans technological, corporate-focused, strategic, and behavioural aspects. The interconnected nature of these clusters illustrates that AI in marketing constitutes an integrated system, and its impact extends beyond technical innovation thereby introducing structural transformations including new organizational practices, and new ways of interaction between businesses and consumers. Consequently, AI’s social implications are also topical.

Regarding **keyword co-occurrence in the US**, the Web of Science shows a smaller research base, with 75 articles identified, compared with 350 in the EU. As shown in Figure 4, the focus of US research is on the technological, performance-related and impact-driven aspects of AI as reflected in frequent keywords such as ‘AI’, ‘technology’, ‘machine learning’, ‘performance’, ‘management’, ‘big data’ and ‘impact’. Although four clusters are present, the keyword network is less diversified than in the EU, and the themes are more closely interconnected. Researchers in this field are primarily interested in the technological, performance-related aspects of AI, and focus on how innovations like machine learning and big data influence management, organizational outcomes and strategic value.

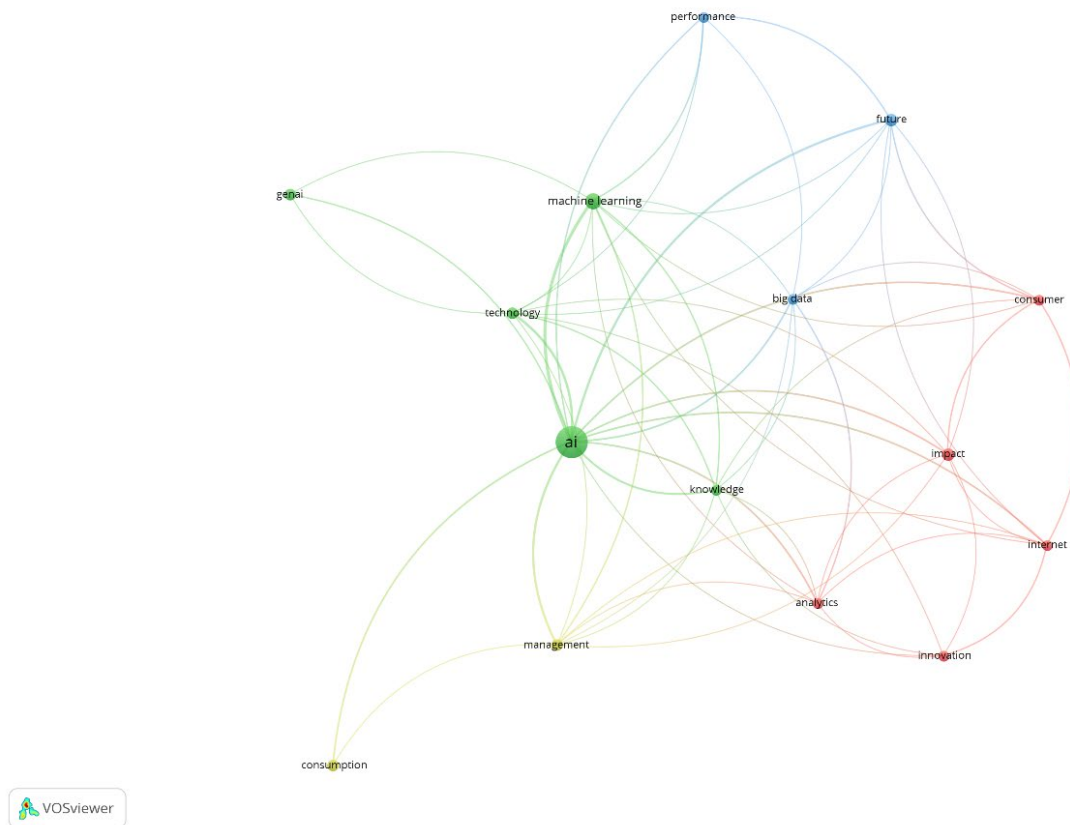


Figure 4: Co-occurrence network visualization for the US

Source: own visualization based on Web of Science publications from 2020-2025, using VOSviewer

In CEE, the research base is broader than in the United States with 170 sources identified in the Web of Science database. Sources are also more diversified than in the US and there is a stronger focus on the marketing and management perspective (see Figure 5). The network shows that ‘AI’ is closely linked to ‘management’ as these two terms are in the same cluster. This shows that these two terms frequently co-occur in the same publications, and scholars in this region tend to study AI primarily through a managerial lens.

AI’s link to ‘adoption’ also indicates that AI is primarily examined from an organizational rather than a technical perspective.

A strong emphasis on ‘digitalization’ and ‘digital transformation’ appears in a related cluster, where ‘competitiveness’, ‘automation’, and ‘technology’ are tightly linked. This suggests that AI is often studied within the broader context of digital change and its impact on organizational and regional competitiveness. Overall, the structure of the network indicates that while these themes are strongly interconnected, the CEE literature remains less extensive than in the wider EU research landscape.

stronger emphasis on transformative value creation, whereas the current review emphasizes performance, and shifts the focus towards a more corporate, efficiency-driven and results-oriented interpretation of AI's role in marketing.

As for further differences, in the current review ethical considerations appear embedded within broader thematic categories, particularly those related to consumer behaviour and digitalisation in the purple cluster. While this cluster partially overlaps with Labib's ethical focus, it extends its scope to digitalisation and consumption patterns.

It is also to be noted that clusters in this study arise from the co-occurrence patterns, which means that themes are formed based on how topics are directly connected in the literature in terms of keywords. This produces thematic groupings that differ from those derived through theoretical reasoning. Finally, the divergence is reinforced by the fact that AI is a rapidly evolving field, and by the study's methodological choice to analyse the literature across distinct geographical regions.

The clusters identified in this study also show a degree of convergence with the systematic literature review conducted by Mariani and Wirtz (2022). The latter is a multidisciplinary research with a significant focus on consumer research and psychology that identifies eight thematic areas: (1) memory and computational logic; (2) decision-making and cognitive processes; (3) neural networks; (4) machine learning and linguistic analysis; (5) social media and text mining; (6) social media content analytics; (7) technology acceptance and adoption; and (8) big data and robots.

While Mariani and Wirtz place a stronger emphasis on cognitive processes, neural networks, and psychological mechanisms, several of these themes are also visible in the keyword co-occurrence clusters of the present study although they are regrouped or framed under different topics. In contrast, the current analysis demonstrates a relatively stronger focus on systems, technological infrastructures as well as broader corporate and organisational dimensions of AI adoption.

The observed divergence can be attributed to the broader and more business-oriented scope of the present study. This is coupled with the identification of some new research streams that were less visible at the time of earlier reviews such as the spread and recent emergence of large language models, generative AI, and more advanced machine-learning techniques that has brought renewed focus to technological themes within the research landscape.

Conclusion

Following an overview of how the use of AI evolved in marketing and how it is applied currently, a study based on scientific sources from the Web of Science database published from 2020 to 2025 was carried out. The keyword co-occurrence network, based on extracted keywords, reveals the core topics and main focus areas in the EU and the US-based publications.

For publications from the EU, keywords were regrouped into six distinct clusters, representing the main thematic areas within AI-marketing research. The six clusters include (1) AI technologies, (2) AI-enabled Performance, Innovation & Knowledge development, (3) Information, Adoption and User Behaviour, (4) Human - AI interaction, (5) Digitalisation, Social Media and Consumption Patterns, and (6) AI Impact on Organisational Decision-Making and Systems. Core keywords were also defined for each cluster, which highlights the main thematic areas within each grouping. The findings also reveal the key areas of research focus in the EU and the US, and highlight differences between the two regions. Research in the EU spans technological, corporate-focused, strategic and behavioural aspects with a larger number of studies. In the US researchers are primarily interested in the technological, performance-related aspects of AI.

This study also examined how the previously identified focus areas within the EU specifically appear in the CEE region. This was studied as a preliminary step to provide context for further research on Hungary. Analysis of the CEE co-occurrence network indicates that research in marketing and AI is concentrated on management, adoption and digitalization.

Overall, the visualization highlights the prevalence of topics such as the technological aspects of AI, consumer behaviour and technology adoption as well as organizational adoption and implications to management in recent-current research while also highlighting a shift towards more recent technological developments related to generative AI, large language models, advanced machine-learning techniques.

It is to be noted that this study includes publications from a single database, which entails certain limitations, and a more detailed analysis of content is planned to further refine research results.

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