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Analysis of Generative Artificial Intelligence Applications in Strategic Sectors: A Literature Review

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ABSTRACT

Introduction: Generative Artificial Intelligence (GAI) is a disruptive technology capable of creating data that mimics real patterns, transforming strategic sectors such as healthcare, education, finance, and transportation. This study addresses three key questions: What are its main applications? What benefits does it offer? And what challenges does it present? From an analysis of 7,902 articles published between 2020 and 2024, 198 relevant studies were selected, highlighting both its practical applications and challenges. **Methodology:** The research was conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology, using databases such as ACM Digital Library, IEEE Xplore, ScienceDirect, and Web of Science. Tools like VOSviewer and Scimat were employed to identify co-citation patterns and thematic evolution. The analysis focused on key technologies such as Generative Adversarial Networks (GANs) and language models. **Results:** GAI has transformative applications: in education, it personalizes learning with virtual tutoring and adaptive content; in healthcare, it enhances clinical simulations and accelerates drug development; in transportation, it optimizes routing and sustainability; in marketing, it enables precise segmentation and creative content generation; and in communication, AGI revolutionizes interpersonal and organizational dynamics by improving real-time decision-making, automating text generation, and optimizing human-machine interaction. These applications have driven efficiency and innovation across multiple sectors. **Discussion:** The adoption of GAI drives technological progress, advancing personalization and operational optimization. Its impact could be broadened by adapting applications to local contexts and emerging sectors, maximizing its reach and benefits. **Conclusions:** GAI is establishing itself as a key tool for sustainable and inclusive development. This study provides a foundation for future research, encouraging innovative applications that effectively and globally transform strategic sectors.

Keywords: Generative AI; artificial intelligence; generative adversarial networks; language models; personalization; sustainability; ethics; communication.

1. INTRODUCTION

Generative Artificial Intelligence (Generative AI) is a core sub-discipline within the field of artificial intelligence, distinguished by its ability to generate new data that mimics patterns found in existing data (Goodfellow et al., 2014). This technology is having a profound impact on sectors such as health (Udegbe et al., 2024), education (Carbonell-Alcocer et al., 2025), finance (de la Mata et al., 2024), transportation (Perez-Cerrolaza et al., 2024) or in digital communication, journalism and social media (Lopezosa et al., 2024). Its influence on how it is disseminated, consumed, and produced information, generative AI is considered as a phenomenon of great interest to communication studies.

This breakthrough has been based on several key technologies that define the capabilities and limitations of generative AI. Antagonistic generative networks (GANs), introduced by Goodfellow et al. (2014), represent a shift in artificial intelligence. These networks consist of two models, a generator and a discriminator, that compete with each other. The generator produces data that mimics real characteristics, and the discriminator evaluates and classifies this data as real or synthetic. This iterative process strengthens the generator's ability to produce data indistinguishable from the original. GANs have shown remarkable efficiency in tasks such as image generation, audio synthesis, and textual content creation.

Large-scale language models (LLMs), such as ChatGPT, are designed to process and generate coherent, contextualized text. Trained on extensive data sets, these models use deep learning to recognize linguistic nuances, comprehend complex contexts, and produce relevant responses. According to Dwivedi et al. (2023), LLMs have redefined human-computer interaction by providing advanced capabilities for customer support, automatic copywriting, and content generation.

Deep learning is a subfield of machine learning that uses deep neural networks to model complex, hierarchical patterns in large amounts of data. This approach is based on the multilayered structure of neural networks, in which each layer learns to represent the data at an increasingly abstract level. According to Gupta et al. (2021), this technique is essential for tasks such as speech recognition, image analysis, and natural language processing. It provides the technical basis for many generative AI applications.

Automated content generation refers to the ability of AI models to automatically produce text, images, videos, and audio, mimicking specific styles and formats. According to Cooper (2023), this capability has become an important tool for industries such as marketing and education, where speed and adaptability in content production are essential. Multimodal models integrate data from various sources, including text, images, and audio, to provide richer analytics and outcomes. According to Rane et al. (2024), this integration provides a broader and more contextualized understanding of data, which is crucial in areas such as simulation and highly personalized content generation.

Deep learning (DL) is defined as a subset of machine learning (ML) offering great flexibility and learnability by representing the world through a hierarchy of nested concepts. These concepts are defined in simpler terms and abstract representations that reflect fewer abstract terms. Specifically, DL builds progressive representations through multilayered hidden architectures. In a face recognition system, for example, dark or light areas are first identified, then geometric primitives such as lines and shapes are recognized and combined to form a complete representation of the face (Alzubaidi et al., 2023).

Artificial intelligence (AI) has transformed the way society communicates. It has impacted not only interpersonal interactions, but also the media, social network content moderation, and information dissemination. In recent years, the development of AI-based technologies has led to the creation of natural language processing (NLP) systems and automatic content generation tools that have altered traditional communication structures. According to Guzman and Lewis (2019), AI facilitates communication and introduces a new category of communicative agents, blurring the boundaries between human interaction and machine-human interaction. This transformation raises fundamental questions about credibility, privacy, and power dynamics in digital communication.

In journalism, generative AI has been adopted for automated news production, giving rise to “automated journalism” or “robot journalism”. Guzman and Lewis (2019) point out that organizations such as the Associated Press have integrated algorithms to produce financial and sports reports more quickly and accurately than human journalists can. However, this development has raised concerns about the transparency and authorship of AI-generated content, as well as the impact on reporting objectivity. An increasing reliance on these systems could influence the media agenda by prioritizing certain topics or algorithmic biases in news selection.

Social networks are another space where AI has redefined communication. The implementation of content recommendation and moderation algorithms has transformed how users consume and share information. Hohenstein et al. (2023) have shown that AI-generated automatic responses can influence social perception in online conversations by increasing communication speed and encouraging a more positive tone in messaging. However, researchers also note that users who suspect their interlocutor is using AI to respond tend to evaluate it more negatively, suggesting a paradox in the acceptance of technology within human interaction. Additionally, AI-driven moderation systems have been criticized for their lack of transparency and for arbitrarily removing content without regard for social or political context.

Content moderation is a key aspect where AI plays a key role. Platforms such as Facebook and YouTube have implemented AI systems to detect and remove hate speech, fake news and misinformation. However, these systems are not without flaws: context, sarcastic language or cultural nuances can be difficult for an AI to

interpret, which can lead to errors such as censoring legitimate posts or missing harmful content that escapes algorithmic filters. Implementing these systems also raises ethical questions about freedom of expression and technology platforms' responsibility for regulating public discourse.

In terms of information dissemination, AI has enabled the creation and distribution of content on an unprecedented scale. Tools such as ChatGPT can generate articles, summaries, and responses in real time, leading to new models of interacting with information. However, Guzman and Lewis (2019) caution that this automation of communication poses risks, including the dissemination of misinformation and reduced diversity in public discourse. AI's ability to create hyper-personalized content has also been used for information manipulation campaigns, calling into question the authenticity and reliability of information available online.

In this context, this research uses a systematic literature review based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology to analyze the primary themes and contributions that generative AI is bringing to academia. The review focuses on identifying emerging patterns, practical applications, and associated ethical challenges, providing a comprehensive view that highlighgts the importance of this technology in the current research landscape.

Additionally, this literature review aims to highlight the distribution of research in terms of thematic areas, scholarly contributions, and geography, allowing us to identify current trends and establish a framework for future research. Advanced tools such as VOSviewer and Scimat have been employed to map thematic relationships and analyze the evolution of topics, ensuring a comprehensive and methodologically sound perspective.

This research focuses on evaluating the current state of generative AI and emphasizing the need for regulatory and ethical frameworks to ensure its sustainable and inclusive development. By moving in this direction, this study aims to contribute to a comprehensive understanding of how to use this technology to maximize benefits while mitigating inherent risks. In doing so, it positions itself as a key reference in the emerging field of generative artificial intelligence.

2. OBJECTIVES

The main objective of this review is to answer three key research questions:

- What are the main applications of generative AI?
- What benefits does it offer in sectors where it is implemented?
- What are the ethical challenges and risks involved in its adoption?

Through a comprehensive literature review, we aim to present a thorough overview of generative AI's impact on various strategic fields, emphasizing its practical applications, technological advancements, and related challenges.

3. METHODOLOGY

So as to ensure transparency, replicability, and rigor in the selection and analysis of literature on the applications and impacts of generative artificial intelligence, this research was conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology. For the literature search and selection, we used academic databases that are internationally recognized for their prestige and quality, including the ACM Digital Library, IEEE Xplore, ScienceDirect, and Web of Science. These databases were strategically chosen because they offer broad and updated access to peer-reviewed scientific articles, ensuring

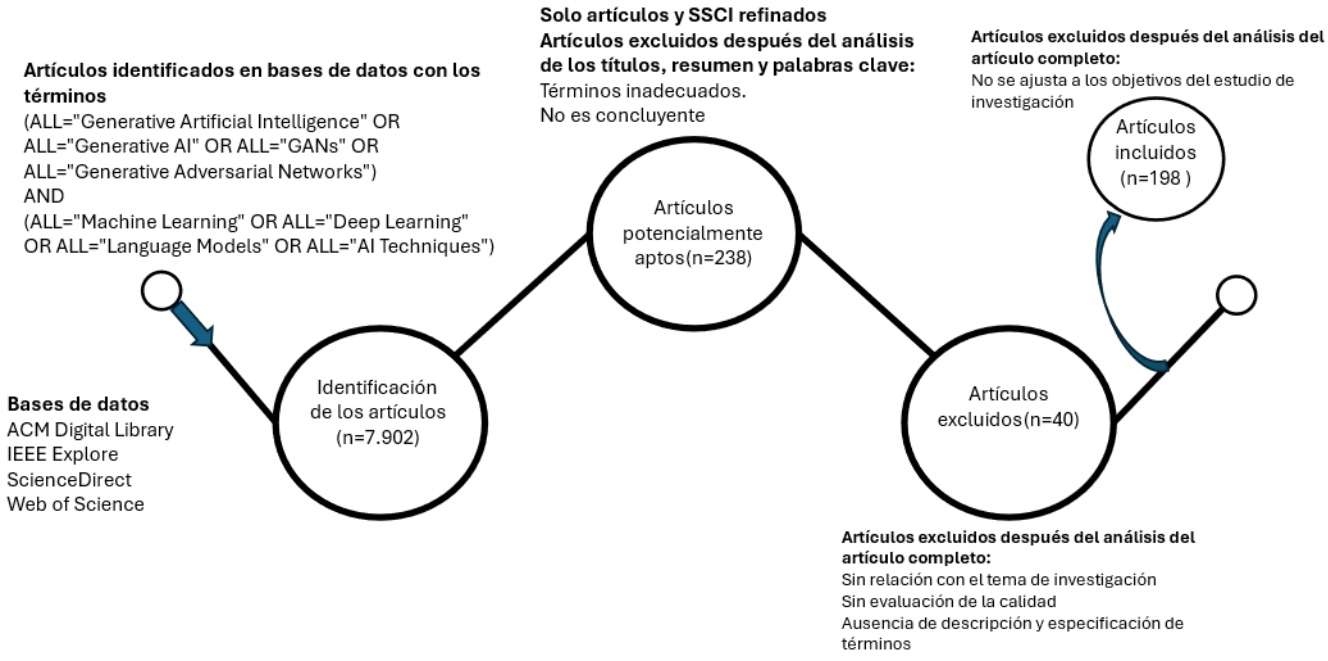
the quality and relevance of the research included in this review.

The search process began with the clear definition of key terms related to generative artificial intelligence. Among these terms, specific Boolean operators were used to refine and narrow the search: "Generative AI" OR "generative artificial intelligence" AND ("generative antagonistic networks" OR GAN OR "generative adversarial networks") AND ("*aprendizaje profundo*" OR "deep learning" OR "*modelos de lenguaje*" OR "language models"). These Boolean combinations were selected to extract relevant research on the practical applications, potential benefits, and ethical challenges of generative artificial intelligence technologies in different sectors.

Initially, this search yielded a total of 7,902 academic articles published between January 2020 and June 2024. Then, specific inclusion and exclusion criteria were applied to filter this first broad selection of articles and insure that the selected studies contributed significantly to the research questions posed. As inclusion criteria, peer-reviewed scientific articles published within the last five years (2020-2024) were considered, presenting solid empirical data, rigorous systematic reviews, or detailed analyses of the use, development, and effects of generative artificial intelligence in various strategic contexts. Conversely, clear and explicit exclusion criteria were defined to rule out non-peer-reviewed articles, publications prior to 2020, studies with no direct relationship to the aforementioned key terms, and those that lacked sufficient methodological rigor or did not provide conclusive data.

This rigorous selection process was divided into several stages according to the PRISMA criteria: initially, the identification phase collected a total of 7,902 articles through a search of the aforementioned databases. Subsequently, in the screening phase, duplicate articles and those that obviously did not meet the basic thematic relevance criteria were eliminated by reviewing titles and abstracts, thus reducing the initial sample to 238 articles. Then, during the eligibility phase, an in-depth review of the abstracts and full texts of the remaining 238 articles was carried out to thoroughly verify their relevance and methodological quality, as well as the number of citations. Finally, this resulted in the definitive selection of 198 articles for inclusion in the final review.

Figure 1. *Prisma methodology for selecting literature*



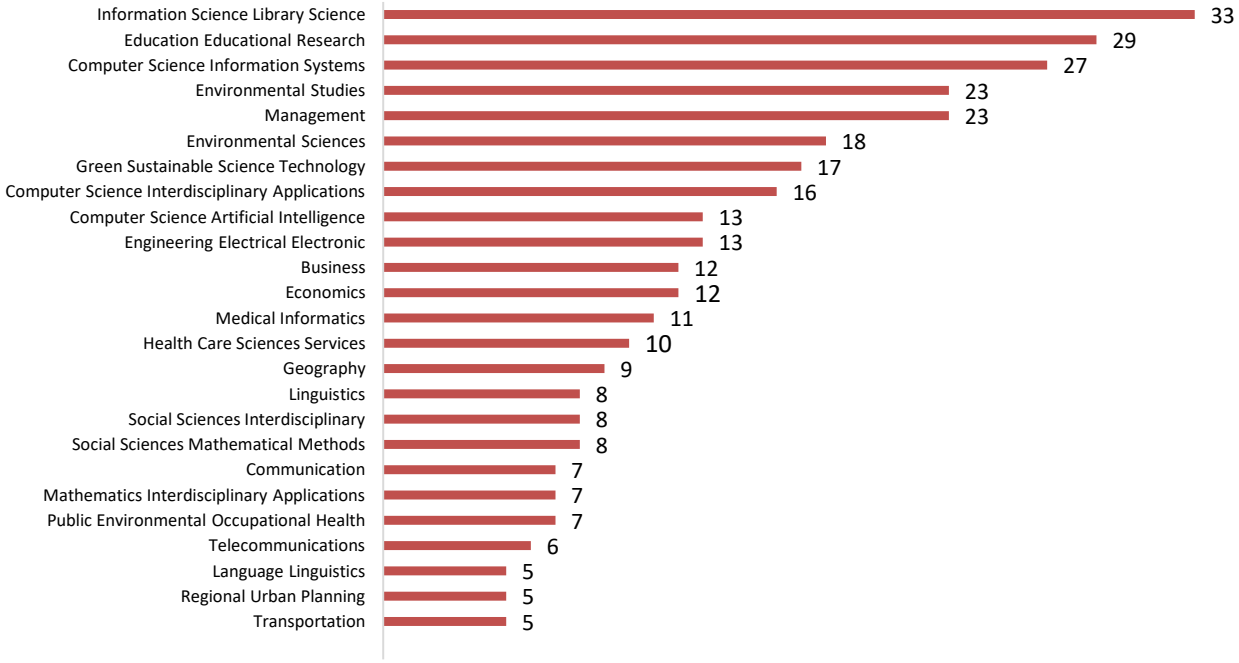
Source: Own elaboration

4. RESULTS

The systematic literature review allowed us to identify and categorize existing research on generative artificial intelligence. The results and analysis based on the collected data are presented below.

The distribution of articles varies significantly according to the research areas addressed. Among these, "Information Science and Library Science" stands out with 33 publications, "Computer Science Information Systems" with 29, and "Management" with 23 articles. This pattern indicates a notable academic interest in the confluence between generative artificial intelligence and management and information technology-related disciplines. This finding aligns with the observations of Dwivedi et al. (2023), who emphasize the broad applicability and cross-cutting impact of these technologies in various sectors.

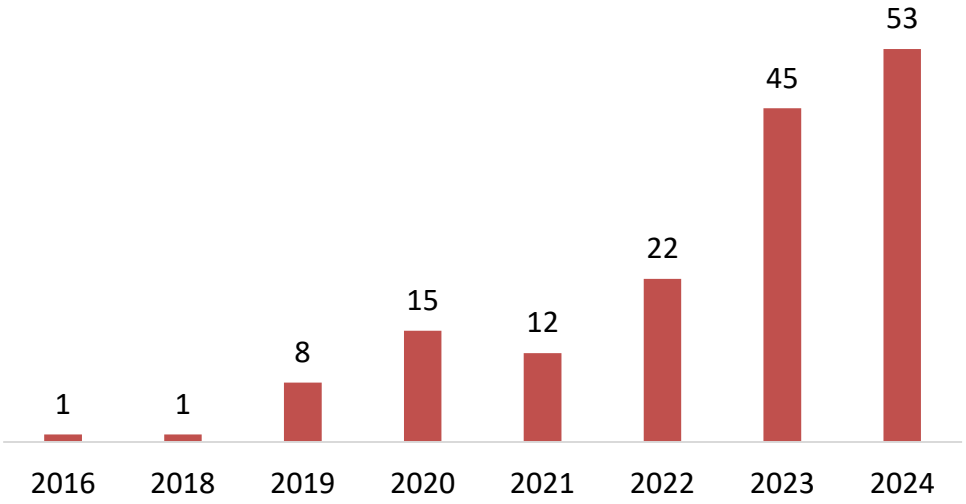
Figure 2. *Distribution by research areas*



Source: Own elaboration.

The graph below shows the evolution of publications over time, highlighting a notable increase in recent years. In particular, an increase is observed in 2024 with 53 articles (up to June 30) and in 2023 with 45 articles. This increase underscores the growing importance of research on generative artificial intelligence, which aligns with the emerging trends identified by Gupta et al. (2021) in Figure 3 regarding research and technological development.

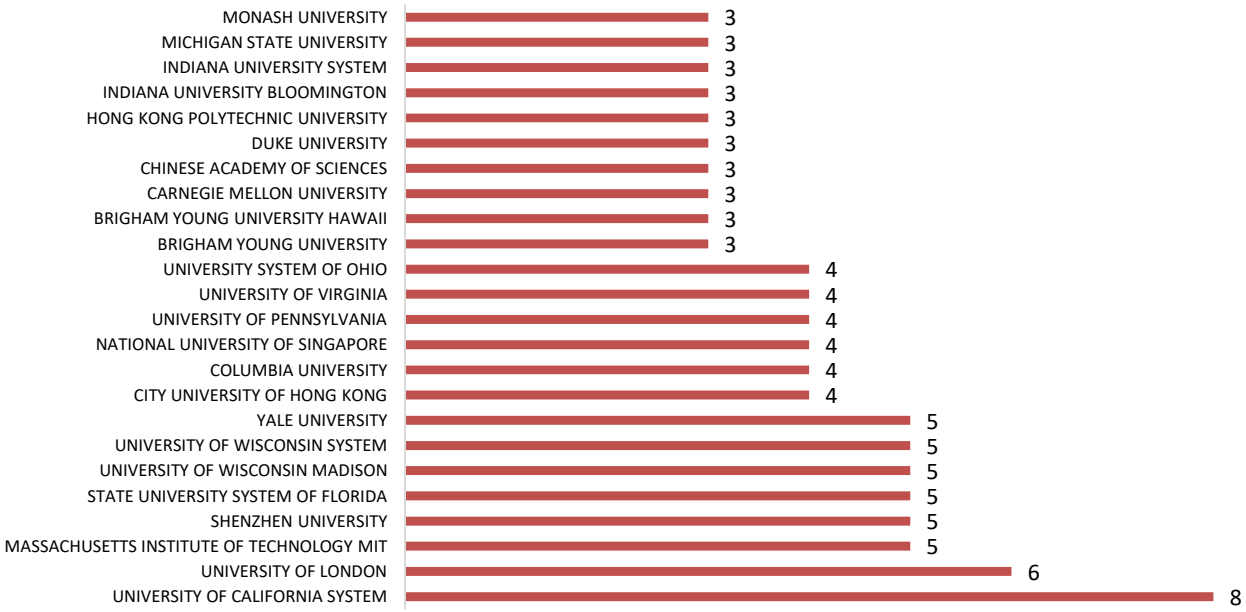
Figure 3. *Productivity per year*



Source: Own elaboration.

The most common institutional affiliations among the authors of the reviewed articles are listed below. The University of California leads with 8 articles, followed by the Massachusetts Institute of Technology with 6 articles. This concentration in highly reputable institutions underscores the cutting-edge nature of generative AI research and highlights the involvement of internationally recognized institutions. See Figure 4.

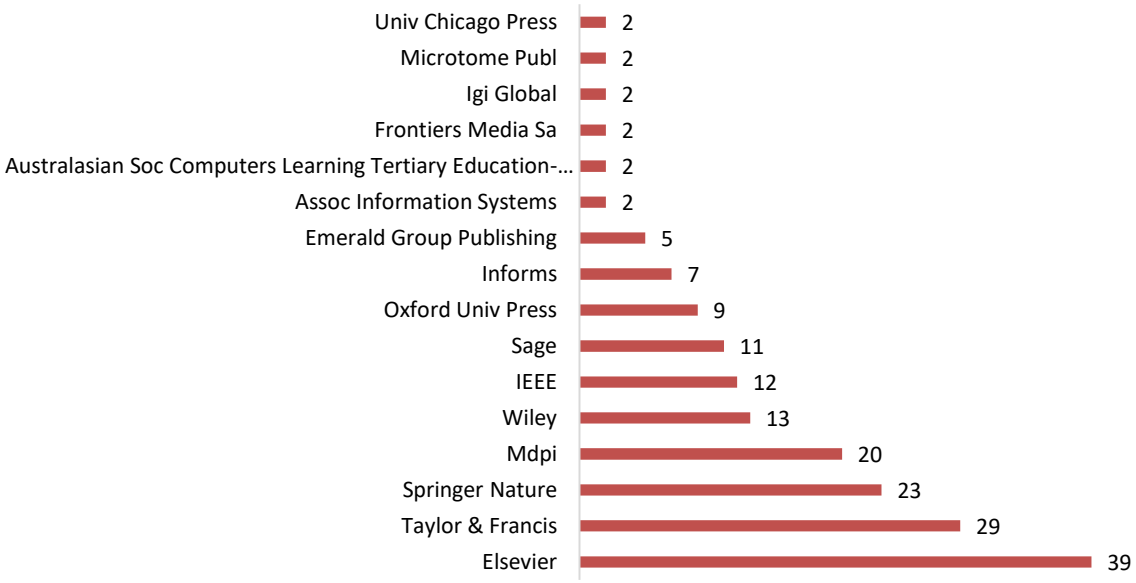
Figure 4. *Distribution by authors' institutional affiliation*



Source: Own elaboration.

The distribution of articles by publishing houses is analyzed below. Elsevier tops the list with 39 publications, followed by Taylor & Francis with 29 and Springer Nature with 23. These results align with the significance of these publishing houses in disseminating high-quality scientific and technological research, as demonstrated by Cooper's (2023) studies on knowledge dissemination in academia.

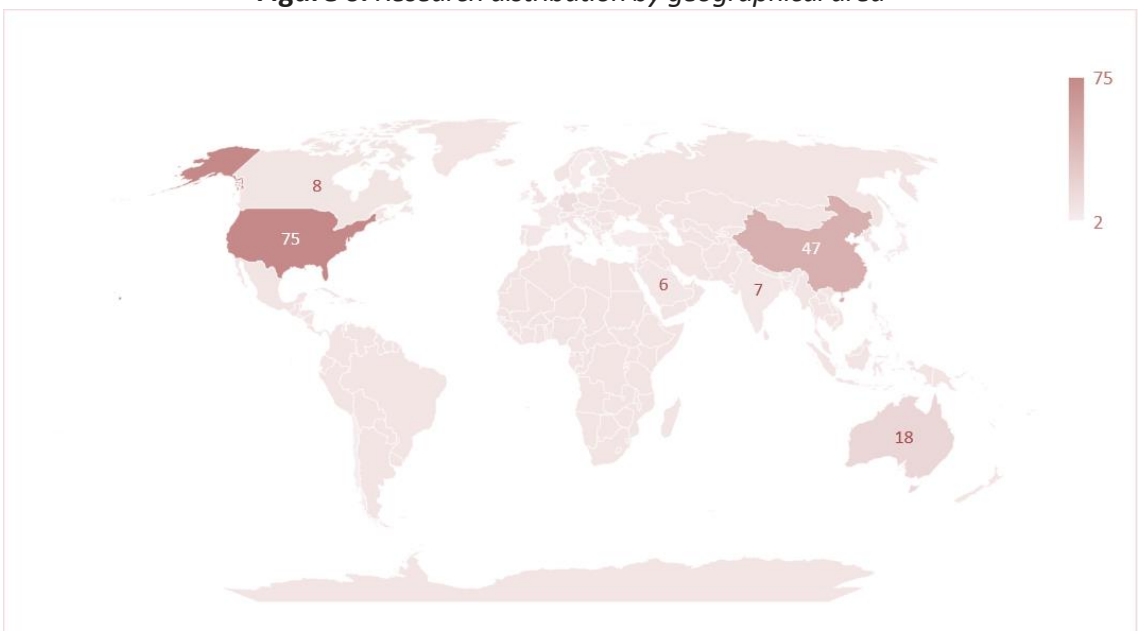
Figure 5. *Distributions per publishing houses*



Source: Own elaboration.

The geographical distribution of the research, as shown in Figure 6, reveals that most of the studies come from the United States (75 articles), followed by China (47 articles) and England (20 articles). This geographical distribution highlights the predominance of research in countries with high levels of technological development and a strong research infrastructure, which is essential for the advancement of emerging fields such as generative AI.

Figure 6. *Research distribution by geographical area*



Source: Own elaboration

The following is a detailed analysis of the most significant contributions to the field of generative artificial intelligence, as determined a thematic review. This analysis identified the most influential studies based on citations, methodologies, analyzed data, key variables, practical usages, and contributions to literature. This approach enabled us to identify emerging trends and significant advances in areas such as education, health, finance, transportation, and marketing. Table 1 summarizes these outstanding contributions and provides a reference to the most relevant studies and their academic impact.

Table 1. Main contributions (by number of citations)

Authors	Journal	Citations	Methodology	Data	Variables	Usages	Contributions to the literature
Dwivedi *et al.* (2023)	*International Journal of Information Management*	639	Multidisciplinary perspectives	Existing literature review	ChatGPT capabilities and challenges	Productivity improvement, ethical issues and regulation	Comprehensive overview of ChatGPT in various fields, future research agenda.
Gupta *et al.* (2021)	*Molecular Diversity*	357	Review and analysis	Genomics, proteomics, clinical trials	Efficacy, toxicity prediction, structure-activity relationships	Drug design and development	Modernization of drug discovery processes by using AI and deep learning.
Cooper (2023)	*Journal of Science Education and Technology*	173	Self-study, qualitative analysis	Educator interviews, ChatGPT usage records	ChatGPT's pedagogical roles	Science education, resource design	ChatGPT assessment in education, implications for critical thinking.
Song *et al.* (2022)	*Journal of Retailing and Consumer Services*	154	Experimental design with five scenario-based studies	Experiments with e-commerce users, human-chatbot interaction simulations	Quality of communication, privacy risk, type of agent (human vs. chatbot), need for human interaction	Consumer-chatbot interaction, customer service management, privacy and technology adoption.	Clarification of the mediating role of communicative quality and privacy risk in the adoption of chatbots; moderating role of the human need for interaction in digital services.
Wiese *et al.* (2020)	*Quantitative Finance*	93	Quantitative GAN modeling	Financial time-series data	Volatility, distribution of returns	Financial forecasting, risk management	Introduction of quantitative GAN for financial time-series modeling.
L. Li et al. (2020)	*International Journal of Geographical Information Science*	87	Conditional GAN for spatial interpolation	Geospatial data	Spatial continuity, heterogeneity	Geostatistical forecasting	Advances in spatial data modeling through deep learning.
Baowaly *et al.* (2019)	*Journal of the American Medical Informatics Association*	82	medGAN, medWGAN, medBGAN	MIMIC-III and NHIRD databases	Electronic medical records	Medical data synthesis	Enhanced synthetic electronic health record (EHR) generation, GAN model comparison.
Y. Lin et al. (2020)	*Accident Analysis and Prevention*	75	GAN for incident detection	Traffic data, I-80 freeway segment	Incident detection rate, false alarm rate	Traffic incident detection	Application of GANs in intelligent transportation systems.
Takahashi *et al.* (2019)	*Physica A: Statistical Mechanics and Its Applications*	67	GAN for financial time-series data	Financial data	Price returns, volatility clusters	Financial time-series analysis	Modeling of complex financial data by using GAN.
Getchell *et al.* (2022)	*Business and Professional Communication Quarterly*	67	Literature review and conceptual analysis	Academic sources on AI and communication in the business environment	Implementation, lexicography and grammar, collaboration, design, trust, bias, management concerns, tool evaluation, and demographics.	Improving business communication, tools for teaching, impact of AI on organizational communication and business education.	Framework on AI in business communication, proposed research and teaching agenda, exploration of tools and ethical risks.
Jeon and Lee (2023)	*Education and Information Technologies*	65	Qualitative analysis	Professors' interviews	ChatGPT roles, professor roles	Integration of educational technology	Complementary roles of AI and

							professors in education.
Bertsimas *et al.* (2016)	*Management Science*	57	Machine learning, optimization	Clinical trial data	Survival rate, toxicity	Chemotherapy regimen design	Predictive models of chemotherapy efficacy and safety.
Campbell *et al.* (2022)	*Journal of Advertising*	48	Framework development, qualitative analysis	Literature review, theoretical model	Ad manipulation, consumer response	Advertising ethics and consumer psychology	Framework for understanding synthetic advertising.
L. C. Li et al. (2020)	*Transportmetrica A: Transport Science*	41	GAN, temporospatial autoencoders	Traffic flow data	Accuracy in incident detection	Real-time traffic management	Hybrid model to improve incident detection accuracy.
Lodge, J. M., *et al.* (2023)	*Australasian Journal of Educational Technology*	39	Editorial and speculative analysis	Educational technology literature	AI in education: policy implications	Higher education, research agenda	Editorial on the impact of generative AI on education.
De Rosa and Papa (2021)	*Pattern Recognition*	37	Literature review, text generation	Research on text generation	GAN architectures	Natural language processing	Review of GAN-based text generation techniques.
J. Li *et al.* (2020)	*Artificial Intelligence in Medicine*	37	Random forest, differential privacy	Clinical data, colorectal cancer	Accuracy of prognostic forecasting	Clinical research, data privacy	Multicenter data analysis for prognostic forecasting.
Dumas *et al.* (2022)	*Applied Energy*	36	Flow normalization, probabilistic forecasting	Renewable energy data	Accuracy of energy forecasting	Energy management, forecasting	Application of deep learning in energy forecasting.
Zhao *et al.* (2020)	*Journal of Neuroscience Methods*	34	GAN, functional network connectivity	fMRI data	Mental disorder classification	Identification of biomarkers by neuroimaging	Application of GAN in mental disorder classifications.
Friederichs *et al.* (2023)	*Medical Education Online*	32	Analysis of progress tests	Multiple choice answers	Accuracy, response time	Medical education	ChatGPT performance on medical knowledge tests.
Saetra (2023)	*Technology in Society*	32	Commentary, ethical analysis	Literature review	Social impact, AI ethics	Technology and society	Debate on the social implications of generative AI.
Tian *et al.* (2022)	*IEEE Journal of Biomedical and Health Informatics*	31	GANs, restoration of dental prostheses	Dental data	Accuracy in crown restoration	Medical device designing	Reconstruction of the surface of the dental crown by using GAN.
Wong *et al.* (2023)	*Journal of Hospitality and Tourism Management*	28	Commentary, qualitative analysis	Tourist literature	Artificial intelligence in tourism and travel decision making.	Generative artificial intelligence in tourism	Preliminary discussion on the role of generative AI in tourism.

Source: Own elaboration.

5. DISCUSSION

The results of this research study prove the increasing significance and expansion of generative artificial intelligence across various disciplines and regions. The concentration of publications in fields such as information systems and library science, as well as the recent surge in scholarly output, suggests a growing interest in and acceptance of these technologies. Participation by high-profile institutions and publishing houses emphasizes the quality and relevance of current research.

5.1. Education sector

One of the issues identified is in education so as to personalize learning, optimize pedagogical resources and design content to meet students' individual needs. According to Cooper (2023), models such as ChatGPT have proven their effectiveness as virtual tutors by providing detailed, personalized explanations that democratize access to education, particularly in contexts with limited resources. Conversely, Lodge et al. (2023) emphasize that these technologies play a catalytic role in higher education by promoting the integration of hybrid environments combining face-to-face and remote teaching. The personalization of learning is one of the major advances of generative AI in education. Jeon and Lee (2023) demonstrate that ChatGPT-type tools automate repetitive tasks, such as correcting exercises, and generate pedagogical materials, enabling teachers to focus on strategic and creative aspects. Additionally, these tools foster the development of critical thinking and problem-solving skills, preparing students for the challenges of the global job market. This impact is particularly evident in medical education, where Boscardin et al. (2024) note that generative AI can simulate clinical scenarios, providing a safe environment for students to practice and develop essential skills. The use of generative AI has significant implications for assessment automation. According to Preiksaitis and Rose (2023), these tools can analyze open-ended responses in real time and provide immediate feedback, allowing students to correct errors and improve continuously. Additionally, real-time educational content creation is a key trend. AI-based tools, such as ChatGPT, are particularly useful in dynamic disciplines that require constant updates, such as technology and applied sciences (Dwivedi et al., 2023). Another emerging trend is integrating multimodal models into learning by combining text, images, and numerical data to provide richer, more comprehensive educational experiences. Rane et al. (2024) argue that these approaches can transform the presentation and assimilation of educational information, creating new opportunities for personalized learning. However, implementing these technologies is not without its challenges. Lodge et al. (2023) caution that excessive use of AI in education may hinder students' development of social and emotional skills, which are crucial for their personal and professional growth. Furthermore, Ning et al. (2024) stress the importance of establishing ethical frameworks that protect data privacy and minimize biases in generative models. It is also crucial to address digital divides that could widen if equitable access to these technologies is not ensured, as Yu and Guo (2023) point out.

In education, generative AI optimizes pedagogical resources, designs content tailored to individual needs and automates assessments. Cooper (2023) points out that models such as ChatGPT have proven to be effective virtual tutors, providing access to education, particularly in contexts with limited resources. According to Jeon and Lee (2023), these tools reduce repetitive tasks, enabling teachers to focus on more strategic and creative tasks. Preiksaitis and Rose (2023) emphasize their use for immediate feedback on assessments. Rane et al. (2024) highlight the integration of multimodal models that combine text, images, and numerical data for more comprehensive educational experiences. However, ethical challenges remain, such as data privacy, the risk of bias, and digital divides (Ning et al., 2024; Preiksaitis & Rose, 2023).

5.2. Healthcare sector

Another relevant area of study is healthcare, which has enabled significant advances in diagnosis, treatment, and professional training. Its ability to analyze large volumes of data, generate clinical simulations, and facilitate biomedical research processes has had a transformative impact on the sector. According to Boscardin et al. (2024), generative AI is being integrated into medical education through advanced simulations that allow students to practice complex clinical scenarios in controlled environments. This enhances hands-on training and optimizes preparation for real-world situations. In the field of biomedical research, generative AI has been instrumental in accelerating the discovery of new drugs and therapies. Gupta et al. (2023) highlight that AI-based technologies are helping to predict the efficacy and toxicity of pharmacological compounds, thereby optimizing drug design and development processes. This approach has modernized clinical research, enabling faster and more accurate tests that can save lives. Additionally, generative AI has transformed the use of electronic medical records. According to Baowaly et al. (2019), models such as medGAN and medBGAN are improving the synthesis

of electronic medical data. This facilitates health research while protecting patient privacy. This is particularly important in multicenter studies, where synthetic data generation enables the analysis of trends and patterns without sharing sensitive information. Generative AI's application in medicine helps overcome historical barriers, such as limited access to specialists and reliance on traditional diagnostic methods. Dwivedi et al. (2023) note that generative tools, such as ChatGPT, are being used to provide patients with detailed explanations, thereby improving communication and treatment understanding. This personalization of medical care fosters patient confidence and promotes more comprehensive care. Generative AI is also helping to identify key biomarkers in neuroscience. Zhao et al. (2020) stress how generative models can analyze functional magnetic resonance imaging (fMRI) data to classify mental disorders, opening new possibilities for early diagnosis and personalized intervention. Furthermore, in the dental field, Tian et al. (2022) demonstrate that these models are being used to restore dental prostheses, improving the accuracy and efficiency of designs. The future of generative AI in medicine is marked by its increasing adoption in clinical practice and research. One notable trend is the development of multimodal models that integrate various data sources, including images, text, and clinical records, to provide more complete and accurate diagnoses (Rane et al., 2024). These platforms promise to revolutionize medical care by enabling holistic analyses that combine structured and unstructured data. Another emerging area is generative AI-assisted medical training. Boscardin et al. (2024) highlight how these tools can generate personalized scenarios for simulation-based learning, enabling healthcare professionals to acquire critical competencies in a safe environment. This capability is also being used to design continuing education programs tailored to physicians' levels of experience. Additionally, biomedical research is adopting generative models to predict disease behavior and evaluate responses to novel treatments. Gupta et al. (2023) argue that these technologies accelerate drug discovery and have the potential to reduce clinical trial-related costs significantly. Despite their benefits, the use of generative AI in healthcare poses significant ethical challenges. Ning et al. (2024) emphasize the need to ensure that the data used to train generative models are representative and free of biases that could negatively impact certain demographic groups. In addition, there is a growing concern for patient privacy, especially in the use of AI-generated synthetic data. Baowaly et al. (2019) emphasize that, although these data are important for research, it is crucial to guarantee that they cannot be reversed to reveal sensitive information. Another major challenge is integrating these technologies into healthcare systems with limited infrastructure. Yu and Guo (2023) warn that, although generative AI can democratize access to health care, there is also a risk that it will widen inequalities if not implemented equitably.

5.3. Financial sector

Another relevant area of application for generative artificial intelligence (Generative AI) is the financial sector, where it is transforming market prediction and risk management. Generative AI's ability to model complex data and generate accurate simulations enables financial institutions to optimize investment strategies, identify potential risks, and improve decision-making processes. According to Wiese et al. (2020), generative models, such as Quant GANs, have proven effective in modeling financial time series. These models provide more accurate predictions of volatility and return distributions, which are essential for portfolio managers and analysts. One of the major advances of generative AI in finance is its ability to analyze large volumes of market data in real time. Takahashi et al. (2019) note that generative models can identify hidden patterns in historical data, enabling the prediction of future trends with greater accuracy. This capability enhances financial forecasting and assists with risk management by identifying potential crises before they occur. The application of generative AI in the financial sector provides innovative solutions to complex problems. According to Dwivedi et al. (2023), these technologies automate repetitive processes such as financial reporting and credit risk assessment. This reduces operational costs and improves the overall efficiency of financial institutions. Additionally, generative AI plays a crucial role in democratizing access to financial services. Rane et al. (2024) argue that generative tools embedded in fintech platforms help users understand and manage their personal finances by generating personalized analytics and recommendations. This is particularly important in emerging markets, where these technologies can promote financial inclusion. In the regulatory arena, generative AI is used to model "what if" scenarios and assess the impact of new policies. Kanbach et al. (2024) mention that this capability is crucial for ensuring institutional

compliance with complex regulations, minimizing the risk of noncompliance, and strengthening transparency within the sector. The use of generative AI in finance is ushering in new trends and opportunities. One of these is the adoption of hybrid models that combine generative AI with traditional financial analytics techniques. Wiese et al. (2020) note that this integration can improve the accuracy of predictive models by leveraging the strength of both methodologies. Another key trend is the development of real-time analytics tools powered by generative AI. These platforms respond immediately to changes in the market, enabling institutions to adjust their investment strategies in real time (Takahashi et al., 2019). This is particularly important in highly volatile markets, where quick decisions are crucial to minimize losses. Additionally, generative AI facilitates the creation of personalized financial products. Dwivedi et al. (2023) point out that generative models can design portfolios tailored to investors' goals and risk tolerances, offering more accurate solutions aligned with individual needs. Despite its potential, implementing generative AI in finance faces several challenges. Ning et al. (2024) warn that using historical data to train generative models can introduce biases that may result in inaccurate or unfair predictions. Additionally, overreliance on these tools can lead to the automation of critical decisions without adequate human oversight, increasing the risk of errors. Another significant challenge is cybersecurity. Rane et al. (2024) point out that, since generative models process large amounts of sensitive data, financial institutions must secure these platforms to prevent data breaches and fraud.

5.4. Transportation and logistics sector

Another sector where generative artificial intelligence (generative AI) is changing operations is in transportation and logistics by optimizing operations, advanced data analytics and generating innovative solutions to complex problems. These technologies are facilitating efficient traffic management, incident detection and route planning in real time, resulting in a significant impact on the sustainability and efficiency of the sector. According to P. Li et al. (2023), generative models such as spatio-temporal autoencoders are used to improve the accuracy in incident detection in dense traffic networks by providing early warnings that allow immediate decisions to be made to minimize the impact on vehicle flow. The integration of generative AI into urban transport has also transformed the planning and management of intelligent transport systems. H. Lin et al. (2023) highlights how generative models help to improve the detection of road incidents by analyzing large sets of real-time traffic data. These tools optimize emergency response, and reduce downtime, promoting safer and more efficient mobility.

The impact of generative AI on transportation lies in its ability to process large volumes of heterogeneous data and generate adaptive solutions in real time. These technologies improve route planning accuracy and optimize fuel consumption and reduce greenhouse gas emissions. Dwivedi et al. (2023) emphasize that generative AI allows transportation companies to predict demand and adjust their operations accordingly, thus achieving greater operational efficiency.

In the field of public transport, generative AI is facilitating the service personalization by analyzing mobility patterns. P. Li et al. (2023) argue that these models can identify trends in traffic and passenger data, helping authorities to design more effective schedules and routes. In addition, systems based on generative AI are enabling the integration of traditional modes of transport with more sustainable options, such as shared bicycles and electric vehicles. The use of generative AI in transportation and logistics is creating new trends that promise to transform the industry. One of the most notable trends is the implementation of mobility-as-a-service (MaaS) platforms, which integrate various transportation modes into a single, generative AI-based solution. These platforms enable users to plan and pay for trips seamlessly, optimizing time and costs (Rane et al., 2024).

Another key trend is the adoption of multimodal generative models that combine satellite imagery, GPS, and IoT sensor data to improve the accuracy of planning and managing complex transportation networks. Zhu et al. (2023) note that these models are being used to perform more accurate spatial interpolations, resulting in

more effective and sustainable urban planning. Additionally, generative AI plays a crucial role in vehicle automation and autonomous navigation. Generative models are used to train algorithms that allow autonomous vehicles to adapt to changing traffic and weather conditions in real time (H. Lin et al., 2023). This capability improves safety and encourages the adoption of autonomous driving technologies in urban environments.

Despite its benefits, implementing generative AI in transportation faces significant challenges. Ning et al. (2024) emphasize the importance of ensuring the privacy of the data used to train these models because the extensive collection of user and vehicle information poses substantial risks. In addition, equitable access to these technologies is a growing concern, particularly in regions with limited infrastructure. Another challenge is ensuring the reliability of generative models in critical situations. P. Li et al. (2023) emphasize that AI-based systems must undergo rigorous testing to ensure that they can respond effectively in emergencies, avoiding errors that could endanger human lives.

5.5. Advertising and marketing sector

Another area where generative artificial intelligence stands out is in advertising and marketing, introducing new ways to interact with consumers, personalize content, and optimize campaigns. Its ability to analyze large volumes of data, predict consumer trends, and generate creative content has marked a turning point in brand strategy. According to Dwivedi et al. (2023), generative AI allows for the automation of the creation of complete advertising campaigns, including generating slogans and producing personalized images and videos, significantly improving efficiency and reach. Furthermore, Campbell et al. (2023) emphasize that generative AI is reshaping persuasion models in advertising by providing ethical frameworks for campaign design that balance effectiveness with consumer protection. This ability to segment audiences and tailor messages to individual needs is essential for brands seeking to build meaningful, lasting relationships with customers. Implementing generative AI in marketing offers key benefits, including mass content personalization. Rane et al. (2024) point out that AI-based tools enable brands to create ads that uniquely resonate with each user, thereby increasing the likelihood of conversion. In addition, these tools can predict consumer behavior by analyzing historical and real-time data, facilitating strategic decision-making. In content marketing, generative AI can produce persuasive texts, striking images, and interactive videos in minutes. This reduces campaign creation costs and speeds up response time to the market. Kshetri et al. (2024) highlight that this capability is especially relevant in competitive contexts where trends change rapidly and brands need to adapt with agility. One of the most notable emerging trends in generative AI-driven marketing is hyper-segmented personalization. According to Campbell et al. (2023), brands are using generative models to design unique advertising experiences that adapt to user preferences and context in real time. For instance, e-commerce platforms integrate these tools to recommend products and promotions based on browsing behavior. Another key trend is the creation of AI-assisted user-generated content (UGC). Rane et al. (2024) argue that generative AI can help consumers create their own stories and visual representations of products, thereby encouraging engagement and increasing emotional connection to the brand. In the field of data analysis, generative AI facilitates the identification of consumption patterns and the design of predictive strategies. These tools analyze structured data or unstructured information, such as social media comments and product reviews, to extract valuable knowledge (Kshetri et al., 2024). Despite its potential, generative AI in advertising and marketing faces significant challenges. One of the main challenges is transparency in the use of AI-generated content. Campbell et al. (2022) caution that consumers may feel deceived if they are not informed that advertising content has been created by a machine. This underscores the need to establish clear ethical standards that govern the use of these technologies. Another challenge is data privacy. Ning et al. (2024) emphasize the importance of ensuring that the data used to train generative models are obtained and managed in an ethical manner. Additionally, misusing these models could amplify stereotypes and biases, negatively affecting certain demographic groups.

5.6. Communication sector

The impact of generative artificial intelligence (AI) on digital communication is extensive and complex. It affects interpersonal communication, as well as organizational and media processes. Song et al. (2022) emphasize that the adoption of AI, particularly chatbots, hinges on factors like perceived communication quality, accuracy, credibility, openness in communication, and the capacity to address complex or emotionally charged situations. Although chatbots provide operational efficiency and quick responses, human interaction is valued for its empathy and emotional understanding, which are key factors in positive perception and building consumer trust (Song et al., 2022; Pillai and Sivathanu, 2020).

Conversely, Getchell et al. (2022) provide a thorough overview of the application of artificial intelligence technologies in business communication. These authors point out that AI is transforming communication dynamics within organizations by providing advanced tools for team collaboration, automated writing platforms, oral communication assistants, and conversational agents that extend beyond basic customer service interactions. Getchell et al. (2022) highlight that generative learning tools are revolutionizing automatic content generation by producing texts indistinguishable from human-generated texts which has broad ethical and practical implications for organizational and journalistic communication.

In addition, AI has deeply penetrated internal organizational communication processes, from the automation of writing through tools that assist in the creation of inclusive and less biased messages, to advanced systems that support real-time decision-making in meetings through sentiment analysis and automatic transcription of discussions (Getchell et al., 2022). These authors warn of the associated ethical risks, such as personal data privacy and possible biases inherent in algorithms trained with historical data, which could perpetuate inequalities or discrimination in internal and external communications (Getchell et al., 2022; Rese et al., 2020).

Similarly, Getchell et al. (2022) emphasize the need to generate a clear and consistent ethical framework for implementing AI technologies in communication contexts, stressing that users must clearly understand how these tools process and use the data they collect. This ethical framework is crucial to ensure that the adoption of AI-based technologies is both operationally effective and also fair and equitable from a societal perspective.

To ensure the ethical and effective implementation of these technologies, aspects such as perceived communicative quality, data privacy, algorithmic biases, and the need for human interaction must be addressed (Song et al., 2022; Getchell et al., 2022; Pillai & Sivathanu, 2020).

6. CONCLUSIONS

The literature review conducted on Generative Artificial Intelligence has provided a comprehensive overview of the current state of research in this field. The initial analysis identified 7,902 academic papers published between 2020 and 2024 (until June 30), reflecting the growing interest and relevance of this topic in academia and industry. After rigorously screening these papers using the PRISMA methodology, the number was reduced to 198 highly relevant studies. These studies were analyzed in detail to understand the applications, benefits, and challenges of generative AI. After a rigorous screening process using the PRISMA methodology, this number was reduced to 198 highly relevant studies, which were analyzed in detail to understand the applications, benefits and challenges of generative AI.

The distribution of the reviewed research shows a predominance of publications in areas such as information sciences (33 articles), computer science information systems (29 articles) and management (23 articles). This thematic focus underscores the cross-cutting nature of generative AI and its potential to integrate into various disciplines and provide innovative and practical solutions. Geographically, the majority of the publications come from the United States, followed by China and England, highlighting the leadership of countries that invest heavily in technology and science. At the institutional level, the University of California and the Massachusetts Institute

of Technology stand out as epicenters of research, while publishers such as Elsevier and Taylor & Francis are leading the dissemination of knowledge in this field.

From a practical applications perspective, generative AI has shown its capacity to revolutionize various sectors. In education, the personalization of content through generative models such as ChatGPT has opened up new possibilities for designing adaptive learning experiences that respond to students' specific needs. These tools also allow teachers to optimize their time by focusing on more creative and strategic tasks, while delegating repetitive tasks such as correcting exercises. In medicine, generative AI has catalyzed the development of advanced clinical simulations and the generation of synthetic data, facilitating research without compromising patient privacy. Additionally, their use in biomedical research has significantly accelerated drug and treatment discovery, modernizing traditional processes and reducing costs. In the financial sector, generative models, such as Quant GANs, have proven to be effective tools for predicting market trends, managing risks, and optimizing investment portfolios. These applications benefit large financial institutions and are being implemented in fintech platforms to make personalized financial services more accessible. On the other hand, in transportation and logistics, generative AI improves route planning, detects incidents real-time and manages complex urban mobility systems. These innovations optimize operational efficiency and contribute to reducing environmental impact, aligning with global sustainability objectives. From a communication standpoint, the adoption of generative AI in various contexts has significantly transformed both user-technology interaction and internal organizational communication. Communication quality, privacy and credibility emerge as key factors for the acceptance of these technologies, presenting important ethical challenges that require constant attention.

However, these advances come with significant challenges that require attention. Ethically speaking, data privacy is a major concern, particularly in sensitive sectors such as healthcare and finance. Additionally, biased representation in the data used to train generative models may perpetuate existing inequalities and negatively affect certain demographic groups. The risk of over-reliance on these technologies has also been identified, which could limit essential human skills, such as critical thinking and problem solving, in sectors such as education.

7. CONTRIBUTIONES AND LIMITATIONS

The review emphasizes the significant contributions of generative AI to literature and practical applications. First, it establishes a solid framework for understanding the its cross-cutting impact on strategic sectors, providing a detailed analysis of its benefits and limitations. Second, the review promotes a deeper understanding of the underlying technologies, such as Generative Adversarial Networks (GANs) and large-scale language models, and emphasizes their relevance in solving complex problems in various contexts. Finally, this work lays the groundwork for future researches to address ethical, technical, and social challenges, thereby fostering the responsible and equitable development of these tools.

Despite its achievements, this study has inherent limitations. First, this study was confined to specific academic databases and did not consider all possible Boolean operators in the literature search. Second, it focused on a limited geographical framework, which may bias the findings toward specific contexts. The concentration of research in developed countries indicates an absence of geographic diversity, which could restrict the generalization of the findings to contexts with fewer technological resources. Moreover, while the focus on recent publications is relevant for capturing current trends, it may omit pioneering studies that laid the groundwork for generative AI development. Finally, while multiple sectors were addressed, others, such as art and culture, could benefit from further analysis.

8. FUTURE RESEARCHES

The research agenda for generative artificial intelligence (GAI) identifies key areas to address current challenges and future opportunities of this technology. It proposes exploring the cultural adaptation of generative AI by

investigating how to customize its applications for different cultural contexts, with the goal of ensuring the relevance and acceptance of generated content, which could transform digital marketing by making it more effective and culturally sensitive (Dwivedi et al., 2023; Gupta et al., 2021). Additionally, the need to mitigate ethical and privacy risks is emphasized by developing strategies to minimize misinformation and privacy violations and promote the ethical and responsible use of this technology (Gupta et al., 2021; Cooper, 2023). Comparing generative AI with other emerging technologies, such as machine learning, is also crucial to identifying its competitive advantages and limitations and optimizing its role in digital marketing and beyond (Dwivedi et al., 2023; Goodfellow et al., 2014).

Regarding research proposals, the importance of developing specific international regulatory frameworks for generative AI that address ethics and safety and establish clear, uniform standards for its use is emphasized (Gupta et al., 2021; Cooper, 2023). A social impact assessment is also crucial to understand public perceptions and trust in this technology, which enables a more accepted implementation (Dwivedi et al., 2023). Finally, investigating how generative AI can foster sustainable innovation by improving content creation and operational efficiency is proposed, thus contributing to responsible and sustainable business practices (Goodfellow et al., 2014; Cooper, 2023). These lines of research establish a comprehensive framework for maximizing the benefits of generative AI while addressing its ethical and social challenges.

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