



Artificial Intelligence and Digital Transformation: Automation, Human-Machine Interaction and Social Impact

Inteligencia Artificial y Transformación Digital: Automatización, Interacción Humano-Máquina e Impacto Social

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ABSTRACT

Artificial intelligence (AI) has evolved from being a field strictly limited to computer science into a cross-cutting element capable of transforming sectors such as industry, healthcare, energy, and finance. However, despite the existence of thousands of specialized studies, there is still no comprehensive work that integrates, within the context of digital transformation, key aspects such as human-machine interaction, automation, and social impact. For this reason, this article presents the results of a systematic literature review aimed at identifying and classifying the advances, approaches, and challenges reported in previous scientific research regarding the role of AI in areas such as the automation of complex processes, natural language processing, predictive modeling, human-centered systems, and the implications for equity in access to technology. In this context, 61 studies from four academic databases were analyzed. The findings indicate that AI is significantly transforming how activities are carried out across different sectors, that conversational systems improve access to digital platforms, and that predictive models enable the anticipation of social and economic behaviors. Nevertheless, important challenges remain, including algorithmic fairness, data protection, and the digital divide.

Keywords: artificial intelligence, digital transformation, automation, natural language processing, human-machine interaction, social impact, systematic review.

RESUMEN

La inteligencia artificial (IA) ha dejado de ser un campo netamente exclusivo de la informática para convertirse en un elemento transversal, capaz de transformar sectores como la industria, la salud, la energía y las finanzas. No obstante, a pesar de hallarse miles de estudios específicos, no hay alguno con enfoque integral que maneje en conjunto dentro de la transformación digital las temáticas de interacción humano-máquina, la automatización y el impacto social. Por ello, el presente artículo presenta los resultados de una revisión sistemática de la literatura, con el objetivo de especificar y clasificar los avances, enfoques y retos documentados en investigaciones científicas anteriores relacionados al papel que ha tomado la IA en diversas áreas como la automatización de procesos complejos, el procesamiento de lenguaje natural, los modelos predictivos, los sistemas centrados en el comportamiento humano y las implicaciones en términos de equidad en el acceso a la tecnología. En este contexto, se analizaron 61 estudios provenientes de cuatro bases de datos académicas. Los resultados arrojaron que la IA está realizando cambios importantes en la forma en como se realizan las actividades en diferentes sectores, que los sistemas conversacionales mejoran el acceso a plataformas digitales y que los modelos predictivos permiten predecir comportamientos sociales y económicos. Pese a lo anterior, se presentan desafíos importantes como la equidad en los algoritmos, la protección de los datos y la brecha digital.

Palabras clave: inteligencia artificial, transformación digital, automatización, procesamiento de lenguaje natural, interacción humano-máquina, impacto social, revisión sistemática.

INTRODUCTION

Artificial intelligence is defined in essence as a set of systems and tools whose purpose is to solve complex problems through the imitation of intelligent behavior and human cognitive capacities [1][2].

AI research focuses on the concept of rationality, aiming for machines to perform functions that would normally require human cognitive intervention, although there is no complete agreement on a unique definition; over time, this approach has undergone a notable evolution, moving from models based on logic and expert systems in previous decades to the current perspective centered on the massive processing of data[3].

Today, a significant shift is occurring from the “digital era” to the “intelligent era,” based on the use of contemporary equipment and algorithmic models with a direct and significant impact on the global economy. This transition goes beyond the technical; it is the next wave of digital disruption, so organizations must accelerate their digital transformation processes to adapt to new cognitive contexts [4][5].

Many studies address specific dimensions of artificial intelligence, such as predictive models, natural language processing, or interaction systems, but in Ibero-America, no systematic work has been found that congruently integrates the axes of automation, social impact, and human-machine interaction in the context of digital transformation.

The objective of this article is to present the results obtained from a systematic literature review on the role of artificial intelligence in digital transformation, considering six research questions on the topics addressed, which allow identifying current trends and challenges in technological evolution.

The document is organized into several sections: Section 2 presents a conceptual approach to artificial intelligence and digital transformation; Section 3 details the method used in the research; Section 4 presents the findings organized by research question; Section 5 analyzes the results; and finally, Section 6 presents the conclusions.

Artificial intelligence and digital transformation

Defining artificial intelligence as a set of algorithms, techniques, and computational systems capable of simulating human cognitive processes, such as reasoning, continuous learning, perception, and decision-making [6],[7], is an acceptable concept of AI; indeed, this is what differentiates it from conventional systems: the capacity for adaptive learning from data is what makes AI a powerful tool for solving complex, dynamic problems considered high-dimensional for humans [8],[9].

It is necessary to understand that digital transformation is the process by which organizations and institutions integrate new digital technologies, seeking to implement them in all their areas of operation; this leads to a fundamental change in operations, value delivery, and their relationship with the environment [7],[10]; all of this is thanks to the automation of workflows, the generation of knowledge from big data, and facilitating more natural interaction between humans and technological systems [6],[11].

All this would not be possible without the capacity of PLN, understood as natural language processing; it is a central piece, since it allows computer systems to interpret, generate, and respond to human language, offering an increasingly better accuracy percentage [11],[12]; likewise, machine learning, which enables predictive modeling, results in resource optimization, real-time decision-making, and anticipation of behaviors [2][26][37][61].

All this is not perfect: the social environment and a non-homogeneous economic environment affect the reach of these technologies; the lack of technological infrastructure, the lack of digital skills, and the asymmetries in regulatory frameworks generate a persistent inequality and fuel the debate on digital transformation and AI [12][43][54].

METHODS

An approach based on software engineering research processes [Kitchenham, 2007] was adopted to conduct the systematic literature review presented in this article, thus providing a comprehensive overview of the research area, identifying the type and number of available studies, and subsequently establishing a valid and replicable classification scheme. The stages are described below:

Research questions

The objective of this study was to present the results of applying a systematic review of the scientific literature related to the role of artificial intelligence in process automation, human-machine interaction, and the social impact of converging technologies. Fig. 1 presents the stages of the method defined for this review.

The research questions formulated are as follows:

RQ1: How does artificial intelligence influence the automation of complex processes in different technology sectors?

RQ2: How do the study of human behavior and the analysis of socio-behavioral profiles influence the design of AI interaction systems?

RQ3: What advances have been developed in natural language processing to improve interaction between humans and intelligent systems?

RQ4: What is the role of predictive modeling in the analysis of future scenarios and in understanding the social impact of converging technologies?

RQ5: What strategies have been proposed to ensure that AI-based technologies reduce technological access gaps?

RQ6: How do AI-based conversational agents contribute to improving communication between users and digital platforms?

Table 1. Definition of general concepts with PIPOH.

Criterion	Description
Population	AI in automation processes, human-machine interaction, and social impact of digital transformation
Intervention	AI techniques, NLP, predictive modeling, conversational agents, and digital inclusion strategies
RESULTS	Scientific publications that report findings, proposals, or experiences related to the thematic areas
Professionals	Computer Science, Systems Engineering, Social Sciences, and related areas
Context	Academic, industrial, and social

Source: own elaboration.

Search

The search strategy consisted of explaining general terms and synonyms in specialized scientific databases, aiming to broaden the coverage of this article. Search terms combined with Boolean operators were determined by applying time filters from 2017 onward, thereby ensuring the relevance and timeliness of the included studies.

Table 2 presents the terms, synonyms, and filters used.

The search process was performed in the databases listed in Table 3, consulting fields such as title, keywords, abstract, and full text.

Table 2. Search terms.

Main term	Synonyms	Additional filters
Artificial Intelligence and Automation	AI-driven automation, intelligent systems, machine learning applications	Year ≥ 2020; language: Spanish and English
Human-Machine Interaction	Human-AI interaction, user experience, conversational agents, NLP	Year ≥ 2020
Social Impact of AI	Digital divide, algorithmic fairness, AI ethics, predictive modeling	Year ≥ 2020

Source: own elaboration.

Table 3. Databases consulted.

Main term	Database
AI and Digital Transformation	IEEE Xplore
AI and Digital Transformation	DOAJ
AI and Digital Transformation	Research Rabbit
AI and Social Impact	Redalyc

Source: own elaboration.

Table 4. Search string.

Main term	Search string
AI and Digital Transformation	("Artificial Intelligence" OR "Machine Learning" OR "Deep Learning") AND ("Automation" OR "Digital Transformation" OR "Human-Machine Interaction" OR "Natural Language Processing" OR "Predictive Modeling" OR "Social Impact") AND (publication year >= 2017)

Source: own elaboration.

Selection

The studies identified in the search were analyzed according to the following aspects: title, keywords, abstract, introduction, background, methodology, results, and conclusions.

The inclusion criteria are defined as follows: scientific documents related to the role of artificial intelligence in process automation, human-machine interaction, predictive models, conventional AI agents, and digital equity, all within the context of digital transformation.

The exclusion criteria are defined as follows: studies without a verifiable bibliographic citation, documents or works not available for download, and publications prior to 2020.

Given that this systematic review used 4 databases, along with their respective synonyms and filters, and applied 3 phases in each, it was necessary to conduct the searches at different times, as shown in Table 5.

The selection was carried out in 3 phases:

Phase 1: Duplicate removal

Phase 2: Removal of articles not available for download.

Phase 3: Application of inclusion and exclusion criteria.

Table 5. Dates of consultation and file download.

Database	Search date
IEEE Xplore	25/02/2026
DOAJ	26/02/2026
Research Rabbit	26/02/2026
Redalyc	27/02/2026

Source: own elaboration.

Quality assessment

To assess the quality of the selected documents, 7 criteria were considered: provenance of the sources, impact of the study, relevance of the content, objective of the research, context of the study, objectivity of the methodological design, and scientific rigor in data analysis. Next, Table 6 presents the results of this evaluation process.

Data extraction and synthesis of results

Following the selection and quality assessment phases, the 61 documents were read. The data were obtained and organized according to the 6 defined questions, thereby constructing the state of the art on the role of AI in digital transformation from the dimensions of automation

and interaction.

Table 6. Quality evaluation in the search and selection processes.

Main term	Search results	Duplicates	Excluded	Relevant	Database
AI and Digital Transformation	48	4	24	20	IEEE Xplore
AI and Digital Transformation	27	3	8	15	DOAJ
AI and Digital Transformation	18	2	7	9	Research Rabbit
AI and Social Impact	27	4	2	21	Redalyc
Total	120	13	41	61	---

Source: own elaboration.

RESULTS

AI in the automation of complex processes (RQ1)

Artificial intelligence in the automation of complex processes is applicable to many sectors of knowledge, industry, or production. The reviewed documents show that AI enables the transition from human reasoning to computational thinking that optimizes time, processes, precision, and resources in areas as diverse as the energy sector, health, industry, finance, and the environment [1][2][10][16][26].

In the energy sector, artificial intelligence helps electricity reach homes and businesses more efficiently. This is achieved through specialized algorithms that reduce energy losses in distribution networks, facilitate the prediction of electricity demand, and optimize the use of renewable energy such as solar and wind [1][2][3][4]. Likewise, AI systems can detect and prevent possible cyberattacks on electrical systems [5], which is crucial to ensure the security and continuity of energy supply.

Within the health sector, AI is also being applied to disease diagnosis, the design of new drugs, and hospital management. By analyzing large volumes of information, such as clinical images or patient data, deep learning models can identify patterns that would be impossible to detect manually [10][11]. Additionally, intelligent systems support risk assessment in clinical environments and the personalization of medical treatments [12][13][14][15].

In the industrial domain, AI systems enable real-time anomaly detection and equipment failure prediction, thereby facilitating preventive maintenance and improving operational efficiency [16][17][18][19]. Likewise, in construction projects, AI-assisted automation optimizes planning, time control, and resource distribution [9][20].

In finance, machine learning models make it possible to assess credit risks, detect fraudulent behavior, and make market predictions with greater precision [26][27]. Finally, in environmental applications, AI contributes to tasks such as solid waste classification, tsunami detection, and earthquake response [31][32][33].

Human behavior and socio-behavioral profiles in interaction systems (RQ2)

The study of human behavior and the analysis of socio-behavioral profiles are key foundations in the design of AI interaction systems. The reviewed documents show that the incorporation of behavioral models into intelligent systems enables greater personalization, adaptability, and efficiency in user-system interaction [39][40][41][42].

A prominent approach in the literature is Human-Centered AI (HCAI), which proposes developing intelligent systems by placing human well-being, autonomy, and values at the center. This approach argues that AI systems should complement, rather than replace, human capabilities, and that their design should integrate ethical principles from the initial stages of development [43].

In digital marketing, AI algorithms analyze browsing behaviors, purchase preferences, and interaction patterns to build highly detailed psychological and consumer profiles [44][45][46]. This intelligent segmentation enables personalized experiences and advertising messages tailored to the user's individual profile [49].

However, the use of socio-behavioral profiles raises significant ethical concerns regarding privacy, informed consent, and the risk of manipulation. Micro-targeting, although powerful as a personalization tool, can affect user autonomy in the absence of regulatory frameworks that guarantee its responsible use [43][51].

Natural language processing in human-machine interaction (RQ3)

Natural language processing (NLP) has advanced significantly, transforming the way intelligent systems understand and generate human language. The reviewed studies highlight that the Transformer architecture and its derivatives, such as BERT and GPT, represent a turning point in models' ability to capture semantic context in depth and generate coherent text with high accuracy [22][23][24].

These technologies are applied in a wide variety of contexts, from the production of academic and journalistic content to the automation of tasks in business environments. In scientific research, NLP tools facilitate the search, classification, and synthesis of large volumes of specialized literature [22][23][24].

Despite these advances, studies identify a critical phenomenon known as "hallucinations," in which language models generate information that appears plausible but is factually incorrect. To address this problem, strategies such as Retrieval-Augmented Generation (RAG) systems have been developed, which combine text generation with querying verified knowledge bases [23][50].

Furthermore, it is acknowledged that NLP models can reflect biases present in training data, potentially perpetuating stereotypes or generating discriminatory responses. This reinforces the need to implement auditing and continuous evaluation processes for natural language-based systems [51][54].

Predictive Modeling and Social Impact of Converging Technologies (RQ4)

AI-based predictive modeling represents one of the most powerful tools for anticipating behaviors and trends in social and economic contexts. The studies reviewed show that machine learning and deep learning models allow predictions to be made with an unprecedented level of granularity, ranging from individual behavior to large-scale collective patterns [26][27][28].

In the financial domain, predictive models have demonstrated a superior ability to assess credit risk compared with traditional statistical methods. The application of techniques such as artificial neural networks and decision trees enables the identification of hidden patterns in large volumes of transactional data [26][27][37].

In the military and security sector, predictive AI is used to anticipate threats, optimize logistics, and support strategic decision-making. However, its use in this context also gives rise to debates concerning the ethics of autonomous combat and the limits of human intervention in critical decisions [28][29].

In the field of social sciences and communication, predictive models make it possible to analyze trends in digital media, detect patterns of disinformation, and anticipate behaviors in online communities [30][52]. However, the quality and representativeness of the training data are decisive for the reliability of these models, with algorithmic biases being one of the main challenges to overcome [43][54].

Strategies for equity in access to AI-based technologies (RQ5)

Equity in access to AI-based technologies is one of the most urgent challenges in the context of digital transformation. The studies reviewed show that the digital divide is not only an infrastructure problem, but also includes multiple dimensions: access to devices, connectivity, digital skills, language, and regulatory frameworks [12][43][54].

One of the most prominent strategies in the literature is the development of explainable AI (XAI) systems, which seeks to make intelligent models understandable to non-specialized users. Algorithmic transparency not only contributes to trust in AI systems, but also facilitates their adoption in contexts where technological distrust is high [43][51].

Another relevant line of action is the design of inclusive and accessible interfaces that consider the needs of populations with low digital literacy, linguistic diversity, or physical limitations. Studies such as that of Hidalgo Suarez et al. propose the use of computer-supported collaborative learning (CSCL) to bridge the gap in digital competencies necessary to take advantage of AI-based technologies[40].

AI-based conversational agents (RQ6)

AI-based conversational agents represent one of the most visible interfaces of digital transformation in the daily interaction between users and digital platforms. Based on NLP and deep learning techniques, these systems have evolved from simple command execution to contextual understanding, intent inference, and the generation of personalized responses [25][47].

In education, chatbots and virtual assistants integrated into online learning platforms can provide immediate feedback, guide students in their learning process, and adapt content to their learning profile [40][41]. In digital health, conversational agents facilitate initial patient triage, appointment management, and treatment follow-up, reducing the burden on clinical staff [12][47].

In marketing and customer service, AI-based chatbots transform information search by integrating advertising in a conversational and highly relevant manner, progressively displacing traditional methods[41]. Affective computing, which enables agents to interpret and respond to user emotions through the analysis of language and tone, opens new possibilities for a more empathetic and closer interaction [47].

However, the implementation of conversational agents poses challenges related to data privacy, the veracity of the information generated, and the risk of creating technological dependence among users [54][55]. Transparency regarding the artificial nature of the agent and informed consent mechanisms emerge as fundamental ethical requirements [43][51].

DISCUSSION

The excerpts obtained from the systematic review confirm that AI plays a relevant role in digital transformation, manifesting itself comprehensively and in an articulated manner across technological and social dimensions. From the automation of processes in fundamental sectors, such as energy, industry, and health, to user experience design measured through behavioral algorithms, AI erases the dividing line between human and computational thought.

Regarding process automation, the review showed that the most important advances are concentrated in industries with abundant organized information, where deep learning models have achieved performance levels equal to or higher than those of human experts in specific tasks. However, automation does not advance equally in all sectors, because inequality exists: where digitalization is low, the potential of AI is not fully leveraged or exploited.

For the design of interaction systems, studies show a conflict between the personalization of systems as a tool to improve user experience and how they can influence human behavior. Micro-targeting and psychological profiling offer powerful possibilities for interfaces to adapt to users, but they require ethical frameworks that protect the internet user's freedom to decide. The HCAI approach emerges as a proposal for designing technology in which human well-being is paramount.

Regarding NLP, advances in AI models such as Transformer have enabled better understanding of language and the writing of more coherent texts. However, studies point to a critical phenomenon of "hallucinations" in this type of model, in which the generated information sounds correct but is false, which suggests data validation and verification strategies such as RAG systems.

In relation to predictive modeling, these systems are used to anticipate what is likely to occur and stand out for how advanced they are, as they can make fairly detailed predictions. They not only analyze general trends but can also focus on small groups or even specific individuals. However, their effectiveness depends to a large extent on the quality and representativeness of the data with which they are trained. Therefore, it is essential to pay attention to possible biases in those data, as they can directly influence the results generated.

In reference to technological equity, the review confirms that inequalities in access to AI are diverse and cannot be resolved with a single measure. On the contrary, they require coordinated actions, such as the development of more inclusive and intuitive technologies, together with the implementation of public policies aimed at digital literacy. In this context, explainable AI (XAI) systems are positioned as key tools, since they facilitate the understanding of the knowledge generated by these systems and contribute to making it more accessible to a broad audience.

Lastly, regarding conventional agents, the review shows that the use of these systems in educational, commercial, and healthcare settings contributes importantly to making services better tailored to each person's needs. However, these systems also entail risks and complications, as dependence on these technologies, the dissemination of false information, and harm to privacy require measures to be taken to regulate and control their implementation.

CONCLUSIONS

AI is among the most relevant, significant, and transformative technology phenomena of recent times, since its great capacity to learn from data, reason, and act has redefined production

models, service provision, and the dynamics of social interaction in different contexts. Understanding the scope of this digital transformation is a necessity for public and private entities or professionals seeking to operate in a digital environment.

This systematic literature review has made it possible to identify and organize the main findings that artificial intelligence has in digital transformation, addressing the six thematic axes that integrate the technological, interactive and social contexts of this phenomenon.

The findings of the first question demonstrate that AI can effectively automate complex processes in important and large-scale sectors such as energy, health, industry, and finance, helping to reduce money, time, and error margins.

Question two demonstrates that the analysis of socio-behavioral profiles is important for designing interaction systems, although it entails ethical risks that must be managed through appropriate and trustworthy AI frameworks.

In question three, advances in NLP are noted, emphasizing Transformer architectures and RAG systems, which have progressively and broadly improved the naturalness and accuracy of human-machine interaction, although, despite this, challenges persist regarding the veracity of the generated information.

Question 4 confirms the potential of the predictive model to predict social and economic behaviors, with applications ranging from financial risk management to the detection of alterations in digital communities. Question 5 states that gaps in access to technology are multidimensional and requires the inclusion of inclusive design, explainable AI, and digital literacy in public policies.

Finally, question 6 confirms that regular agents improve the accessibility and personalization of services in education, health, and commerce, but they require regulatory frameworks for information security, technological dependence, and misinformation.

Overall, the studies analyzed present a landscape in which AI offers various transformative opportunities, but also poses challenges that require technical, ethical, and social perspectives. This article represents a solid foundation for future research aimed at strengthening development frameworks and implementing AI systems that are both efficient and inclusive.

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