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## **IMPORTANCE OF ARTIFICIAL INTELLIGENCE (AI) IN THE ECONOMY**

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*Esther Figueroa Hernández*

Bachelor's degree in economics, Centro Universitario UAEM Texcoco, Universidad Autónoma del Estado de México. Texcoco, Estado de México  
<https://orcid.org/0000-0001-9680-8984>

*Yedid Erandini Niño Membrillo*

Bachelor's Degree in Administrative Informatics, Centro Universitario UAEM Texcoco, Universidad Autónoma del Estado de México  
Texcoco, Estado de México  
<http://orcid.org/0000-0003-4484-1162>

*Rosa María Rodríguez Aguilar*

Centro Universitario UAEM Netzahualcóyotl, Universidad Autónoma del Estado de Mexico  
<http://orcid.org/0000-0002-2124-4763>

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**Abstract:** Artificial Intelligence (AI) is applied in various sectors and areas, both at a personal and business level, everything behind AI and how they are part of common activities in daily life, is transparent to those who use it and in Most of the cases do not know that behind making a purchase, listening to music, using social networks or browsing the web, to mention a few examples, there is AI behind it. However, it deals with technologies that are still far from Latin American reality, such as autonomous cars and smart cities, but it is also part of the most daily actions. As a consequence, companies have adopted emerging technologies that use AI tools and techniques to be more efficient and competitive, impacting the economy not only at the business level but also at the country level.

**Keywords:** Artificial Intelligence, economic sectors, economic growth.

## INTRODUCTION

According to the World Economic Forum, we are living in a fourth industrial revolution that “represents completely new ways in which technology is integrated into societies and even into our human bodies.” This would be driven by a group of diverse technologies such as genome editing, AI, innovative materials, and the blockchain. Although this interpretation of the current time is attractive, understanding what is currently happening requires reassessing the relevance of the (first) Industrial Revolution, on the one hand, and of artificial intelligence, on the other (Gómez Alatorre, 2022).

AI is a technology with the potential to change the economy in a more profound way than other current technologies, because it is a general-purpose technology that has many uses and because it allows machines to replace the intellectual work of humans. For this reason, the current era could be considered

the second machine age and would have the potential to radically change the way the economy works, figure 1 (Gómez Alatorre, 2022).

## THE RISE OF ARTIFICIAL INTELLIGENCE

AI is the ability of machines to think in a similar way to humans, allowing them to understand human behavior, analyze the environment, reason, learn and make decisions autonomously, without human intervention. For this reason, they need to receive and analyze large volumes of data, expand their knowledge and make their actions more intelligent (Ribeiro, 2021).

AI has ventured into various sectors, impacting the growth and competitiveness of companies by including it in their processes, products and services, evolving the way in which humans carry out their activities. An example is the use of the BOT, a software designed to perform repetitive tasks over the Internet without human help, such as making a restaurant reservation. The most common model is the chatbot, which simulates a conversation with a person (Joyanes, 2019), such as ChatGTP, a free tool that has generated debates on the meaning of being human along with the disruptions generated by the unknown in the educational field, labor, ethical and legal (de Leo, 2023). This tool has potential in the financial sector because it allows extracting relevant information to make decisions, analyze trends and opinions regarding companies and the sector. However, the content it generates may be incorrect (What is ChatGTP and what it can and cannot do (as of today, 2023).

The use of automatic learning or Machine Learning (ML), detects patterns to make better business decisions from a set of data and algorithms, improving performance and predicting behaviors and trends. It is used

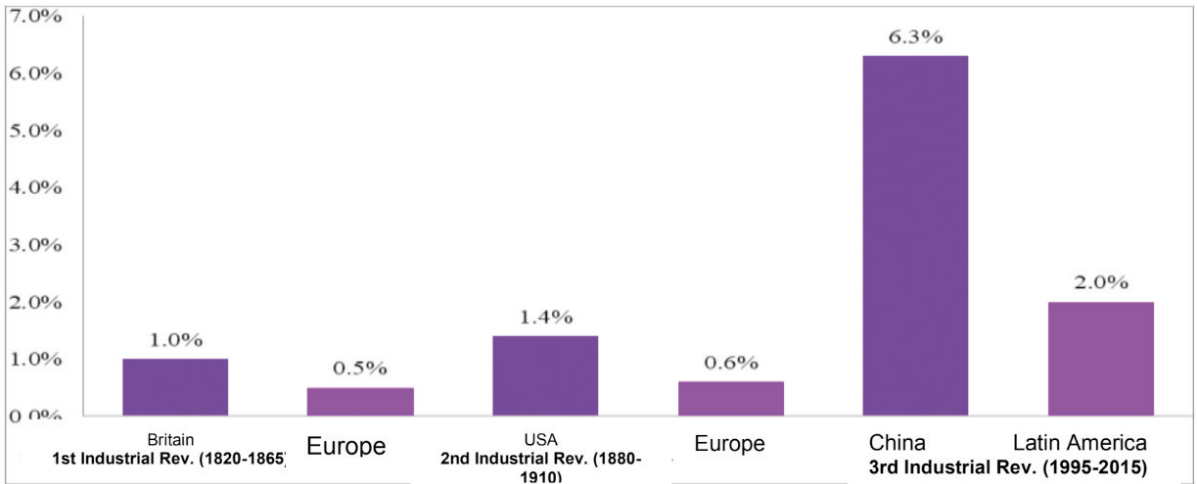


Figure 1. Average annual GDP per capita growth in industrial revolutions

Source: Prepared with data from Albrieu et al., 2018.

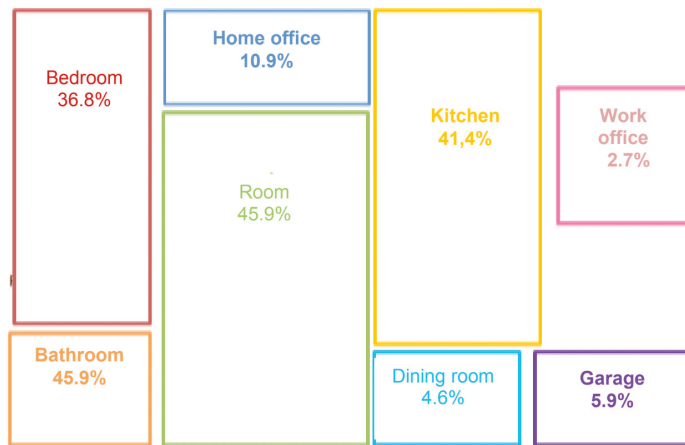


Figure 2. Primary home location for smart speakers, 2018

Source: Prepared from Voicebot.ai Smart Speaker Consumption Adoption Report

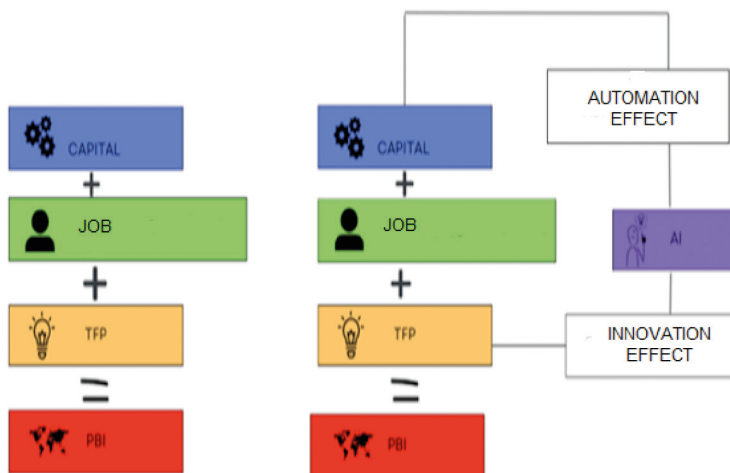


Figure 3. Links between artificial intelligence and growth

Source: Prepared with information from Albrieu et al., 2018.

by companies to prevent financial fraud by detecting suspicious transactions and behavior such as fraudulent transactions, money laundering, money, identity theft and other potential risk areas. When combined with Big Data, a large amount of data can be processed, generating proactive strategies to prevent or mitigate risk (Frackiewicz, 2023). Part of ML is deep learning or Deep Learning (DL) that powers various AI services and applications by improving the automation of analytical and physical tasks without human intervention. DL resides in many everyday products and services, such as voice-enabled TV controls. But, it can be used for health care through image recognition applications that analyze and evaluate images in less time, supporting the diagnosis of specialists (What is Deep learning?, 2023).

The Internet of Things (IoT) is becoming increasingly popular, due to how consumer goods are part of this new technology, for example, modern household appliances, technological clothing or smart cars; they interact and act autonomously and appropriately within the real world, due to the sensors integrated into their construction and design (Barrio, 2021). This heyday already transcends in the industrial, business, governmental and economic sectors; This is carried out through the protocols and infrastructures of the open Internet or the Internet of administration and control (Bonilla-Fabela et. al., 2016). In the fusion of IoT with AI (Artificial Intelligence of Things (AIoT)), the IoT receives data and the AI deciphers it having greater precision in the data to make more informed decisions, such as manufacturing robots that contain sensors and AI algorithms to improve the manufacturing process (Artificial Intelligence and IoT combined: what is it and why is it important?, 2023). Cloud computing or Cloud Computing is a model based on a set of computer services

that are shared and dynamically managed, through the Internet (Mell, 2011), rented in the cloud, work through sensors, networks and analysis. of data, promoting sustainable use (Kallio et al., 2018). This technology is based on a business model that includes the creation of components, which integrate and optimize large-scale manufacturing resources and capabilities (Wang, 2013); allowing infinite uses in the economy, ranging from the supply chain to the integration of financial information flows, among other applications (Novais, 2019).

Natural Language Processing (NLP) is the ability of machines to communicate with people in a human language. That is, it approaches linguistics to understand expressions, idioms, jargons, syntactic rules, semantic relationships, and everyday errors that make human language unstructured. Since computers use structured language, they need algorithms and systems to give answers using natural language.

With the public knowledge of AI, along with the rush towards digital transformation among companies, its integration into platforms, applications and the formation of technologies has accelerated. Apps like Google Maps use voice commands to interact with drivers on a daily basis; Amazon Alexa has become a way of life for many Americans, especially now that “nearly one in five US adults today has access to a smart speaker” (Figure 2), according to new research. provided by Voicebot.ai., that number is not expected to decrease either (Noelle, 2019).

For Sriram Raghavan, vice president of AI at IBM, a transformation is taking place just as important as the one that occurred in the Industrial Revolution, AI will be one of those in charge of transforming society and the economy. According to the executive's estimates, this technology will generate an impact on the global economy of 30 trillion

dollars (bdd) in just over 10 years and this amount will be divided based on how much businesses decide to invest (Valle Vargas, 2019). That is why there is an important relationship between AI and economic growth, see Figure 3.

Automation and algorithms will continue, so you need to understand their economic impact. AI has the potential to drive economic growth. According to a KPMG report, global investment in AI reached 12.5 billion dollars in 2018, but this figure is expected to rise to 232 billion dollars in 2025 (Clarín, 2019).

### **EXAMPLES OF AI ADOPTION IN DIFFERENT PRODUCTIVE SECTORS FINANCIAL SERVICES**

Banco de Crédito del Perú: Developed Arturito BCP, a BOT that operates with AI via Facebook Messenger to personalize the interaction between the client and the company. Thanks to his technology, he possesses cognitive abilities that allow him not only to answer the questions for which he has been trained, but also to understand them and automatically seek an answer. Thus, customers can make inquiries and resolve doubts about accounts and cards without having to be assisted by bank personnel in a branch or by phone call (Albrieu et al., 2018). The financial and retail sectors are the institutions that maximize the potential of AI. It is used by the financial industry in fraud investigation and analysis, credit risk assessment, advisory/recommender systems, and threat prevention. Retail companies use it mainly in the areas of distribution and logistics, replenishment and inventory or intelligent workforce planning (IMEF, 2021).

AI provides opportunities in retail and contributes to making better purchasing decisions. So much so that, according to studies, 85.0% of consumer relationships with companies will be managed without human

mediation. He

Online commerce is taking advantage of AI technologies to increase sales by improving the customer experience and offering personalization styles that can benefit both the consumer and the business (Darlington, 2020).

AI is one of the main elements of Industry 4.0, which is also marked by IoT, Big Data, Cloud Computing, among others. For this reason, companies are undergoing a digital transformation, placing technology at the center of their strategies and promoting digitization and process automation, to create smarter products and services, to be more competitive (Ribeiro, 2021). Improvements in ML techniques have contributed to the development and popularization of recommendation engines that use analytics techniques to find, recommend, and provide suggestions to consumers for products and services of interest to them, such as books, movies, or music, based on to their purchase histories or the preferences of other customers, both implicit in their previous purchases, and explicit in their ratings and online comments. Amazon and Netflix were among the first companies to start developing this type of system. Service companies have incorporated these systems into their pages, such as LinkedIn, which recommends people to connect with (Darlington, 2020).

Covid-19 hastened the adoption of technology in the world in recent years and in companies it was no exception. During this period, many companies included AI in their operations; 40.0% of these in Mexico accelerated their use. However, it was not the only economy in Latin America where this phenomenon occurred; According to a global study by the Institute for Business Value (IBM), the country that presented the highest adoption of AI was Colombia (50.0%), in second place, Peru (49.0%), Argentina

and Brazil in third place (41.0%), and Chile (39.0%). Also, it supports farmers to make decisions on how to allocate and cultivate land based on data; clinicians and researchers to better understand complex neurological diseases; to retailers, to ensure that the required products are in stock on time and in the right place. In the financial services industry, it will make it possible to predict customer behavior and provide greater personalization of offers, automation of compliance tasks, and transaction protection, among others. According to a study by the Inter-American Development Bank (IDB), in Latin America and the Caribbean (LAC) people consider that the benefits of AI ethical issues are reflected in the privacy and security of personal data with 56.0%; the reliability and security of the system, 37.0%, and transparency, with 33.0% (Noguez, 2022).

## **MAIN ARTIFICIAL INTELLIGENCE TECHNOLOGIES FOR MARKETING**

### **10 PRACTICAL APPLICATIONS AND EXAMPLES OF ARTIFICIAL INTELLIGENCE IN COMPANIES**

#### **1. Recommendation of Spotify and Netflix products and services**

The two platforms seek to understand the habits and interests of users to make suggestions. Both work with Big Data, and the fact is that the large volume of internal and external data is used to feed the algorithms, which improve their knowledge and make better recommendations, making their catalogs more interesting for users (Ribeiro, 2021). On Spotify, the highlight is the “Discoveries of the Week” playlist whose personalized suggestion is 30 songs based on a cross between three models:

-Collaborative filtering models: they process data on user behavior in relation to

other users of similar platforms.

-Natural language processing models: they process data about what Internet users say about the Spotify catalog.

-Audio templates: render raw audio files from the Spotify catalog. On Netflix, users interact with the platform’s recommendations. Their strategy is to suggest titles that are of interest and encourage them to explore and browse the catalogue. To do this, the home page classifies the movies and series by genres or subgenres, the order of the titles considers the interests of the user in relation to other similar users. The algorithms learn from the interaction with the home page, understand the way in which the user uses its contents and reorder titles to create specific pages for each user (Ribeiro, 2021).

#### **2. Service automation through chatbots**

Chatbots are one of the main references of AI by companies. For robot-customer interactions to be relevant, machines need to understand what people are talking about and provide answers and solutions. It is important to mention that many companies are investing in this type of application to optimize customer service. Among them, banks stand out in the power of investing in technology, with AI assistants that interact with customers, clarify doubts, report balances and carry out transactions. Furthermore, the more users interact with the chatbot, the more they learn about them and even anticipate their needs (Ribeiro, 2021).

#### **3. Speech recognition**

Amazon’s Alexa and Apple’s Siri are not only virtual assistants that can be asked for the weather forecast, but can also learn the interests of users and make the conversation much deeper, since both platforms are interfaces of voice user, using conversational AI technology. Thus, the systems of Amazon

and Apple are based on the PLN, which not only understands what people say, but also responds, interacts and learns more and more, understands what we say, how we say it and allows us to capture emotional nuances. of a speech (Ribeiro, 2021).

Voice devices have impacted cell phones, computers, smart watches, cars, and even homes for smart home security like Vivint. Today, speech recognition is embedded in finance, human resources, marketing, crime, and even public transportation with the goal of reducing business costs, simplifying processes, improving the user experience, and increasing overall efficiency. As technology advances in the areas of cloud computing, data science, and ML, speech recognition technology will only improve and change business models in increasingly competitive markets (Noelle, 2019).

According to Gartner, “70.0% of white-collar workers will interact with chat platforms daily by 2022.” Intentional AI is becoming imperative to serve a broader range of demographics, along with the demand for positive user experiences. In order to be more inclusive, technologists and scientists have begun to improve AI by recognizing a diverse range of accents and dialects (Noelle, 2019).

The industry is saturated with companies experimenting with integrating AI into their products and services with digital voice assistants. One of the biggest industries affected by technology is entertainment, with augmented reality games exploding onto the scene (hello, Pokémon Go). Virtual reality and biofeedback in voice-controlled video games are becoming more popular. In addition, the advertising industry will respond and have to adapt as it becomes increasingly difficult to make money from display ads, causing revenue to be diverted from advertising to subscription models. Social media platforms like Snapchat and TikTok are already

leveraging voice in their ads (Noelle, 2019).

#### **4. Image recognition**

AI is present in the recognition of images in Google Photos, for this purpose computer vision is used to train the computer to recognize color patterns and shapes in images. Also, machines are closer to human vision and can make decisions based on what they see. This way, Google Photos can organize and group the photos you save, so that you can find them with a simple search (Ribeiro, 2021).

#### **5. Prices of products**

Dynamic pricing, based on the demand and supply of a product, is another possibility for the practical application of ML. For example, when a lot of people leave a soccer game, Uber fares go up, but after the event is over, fares return to normal, often cheaper than a taxi. The same goes for Airbnb, which offers the Smart Pricing feature for hosts who want to adopt it. Thus, prices vary according to the demand for accommodation, location, accommodation classification season, proximity to check-in, among other factors. Dynamic pricing isn't new; hotels and airlines have been using this strategy for years (Ribeiro, 2021).

#### **6. Audience segmentation**

Audience segmentation is one of the most traditional Marketing activities to guide your strategies based on consumer behavior, to provide them with the right offers. Netflix uses ML to understand the behavior of its subscribers and segment them according to their actions. However, segmentation can become much more precise and personalized as algorithms understand each user's profile to make the best segmentation decisions (Ribeiro, 2021).

## 7. Digital campaigns

Paid media campaigns can be made much more efficient with AI. Even major ad platforms are working with ML to improve ad performance. Google Ads, for example, offers the smart bidding model to improve conversions and conversion value in each ad auction. In YouTube ads, for example, this strategy is used to automatically adjust bids at auction time (Ribeiro, 2021).

Algorithms identify the people who are most likely to consider the brand after viewing a video ad and automatically set their bids to increase the chances of reaching that audience. Google, in turn, analyzes the behavior of users, the device they use and the search context to provide them with the best version of the ad. This way, it improves the results of advertisers and the user experience. According to the search engine, advertisers using this feature get up to 15.0% more clicks.

## 8. Product customization

In recent years, the sports brand Nike has invested in the acquisition of startups and digital technologies to improve the customer experience and engage consumers. Nike in 2018 acquired a computer vision company (Invertex) and, in 2019, a predictive analytics company (Celect). Launched the Nike Maker Experience project with the purpose of allowing customers to customize colors and graphics that they want to add to the shoe, all with voice commands, the system uses AI, object tracking and projections to create a custom product, and in less than two hours, the shoes are ready, so the brand collects a large amount of customer data. This project was launched in 2018 in specific stores. But today, on the Nike By You website, it is possible to fully customize the products and receive the shoes from 2 to 5 weeks and share your creation with the world (Ribeiro, 2021).

Another Nike project that uses AI is the

Nike Fit application, its goal is to recommend the perfect shoe for each person. The app uses augmented reality technology to scan clients' feet and capture measurement, morphology, and anatomy data. Computer vision processes this data, cross-references it with product information, and generates a personalized recommendation. In addition, Nike uses this data to increase precision in product design and manufacturing. And, Nike Fit can be integrated with Nike By You (Ribeiro, 2021).

## 9. Content curation

The amount of content produced and consumed on the Internet is limitless. On social media especially, the timeline is contested by posts from friends, family and brands, making it hard to pay attention to everything, which is why platforms like Twitter and Pinterest are investing in AI to make better decisions and recommendations for users. The intention is to present the content that the user loves the most and make the experience more relevant. For its part, on Twitter, Deep learning and NLP technologies are used to improve knowledge about each user and order the timeline according to their interests. AI is also an ally in the fight against extremism, bullying, fake news and other violations. In 2017, the platform suspended more than 300,000 accounts linked to terrorism through AI technologies (Ribeiro, 2021).

The robots need to identify patterns in the images to make recommendations aligned with research and tastes and interests, Deep learning is used on the use of each user on each platform. The intention is not only to recommend photos of bedroom cabinets when searching for "bedroom cabinets", but also to bring inspiration to decorate a room according to the style of each person. Therefore, the experience becomes much more valuable (Ribeiro, 2021).



## 10. Custom searches

The web search experience has changed in recent years. Before Google, many search engines sorted results alphabetically. It was Google and its algorithms that began to rank the results in order of relevance for each user, thanks to Deep learning. But to bring relevant results, it is also necessary to understand the search intentions of the users and the content of the web pages as BERT does, which is one of the main updates of Google in recent years. This is a PLN algorithm that unravels what people type in searches and what sites contain, identifies words, understands their meaning, how they are related, and what intentions are behind them. Also, combine other page ranking factors to understand which ones offer the best experience. Thus, Google manages to offer the best results for each person and each search in the first places (Ribeiro, 2021).

### TANGIBLE BENEFITS IN ALL SECTORS

Apart from the logical disparity in the advancement of the deployment of AI by activity sectors, companies clearly glimpse how AI technologies can transform their businesses (Microsoft, 2019): Service sector: It makes available to employees more precise tools for the performance of their tasks, for example, through the improvement of the allocation of resources and skills. Health Sciences: Direct transformation of products and services through the use of internal and external data to accelerate the process of drug discovery, the prediction of diseases, the improvement of diagnostic techniques and an accelerated transition to precision medicine. Retail: Use of cognitive tools that also break down language barriers to offer customers personalized offers, add intelligence to the stock control chain, and exhaustively monitor customer perception of brands. Industry

and Infrastructure: The great attention paid to equipment, complex supply chains and materials means that there is ample scope for smarter optimization. Technology and Telecom: Focuses on helping create seamless experiences across devices, predicting churn, and automating customer service capabilities to solve industry challenges while reducing costs. Financial services: The application of AI in the financial sector makes it possible to directly provide the customer with a higher quality service, faster and at a lower cost thanks to the use of ML technologies for fraud detection, evaluation of risk and the automation of tasks.

### CONCLUSION

According to some estimates, AI has the potential to generate an economic growth equivalent to 7 trillion dollars, which corresponds to an annual growth of 1.5% of global GDP in the span of 10 years.

Accounting firms and banks now need less time to handle bill payment, financial reporting, and other accounting tasks. This saving of time does not imply the dismissal of the workers of the companies, but in many cases it seeks to train existing workers to deal with more strategic tasks. This means that the power of data and automation can unlock new talent and skills. Another example, more and more hospitals and health centers are concerned with automating tasks related to previous registration, such as entering the health history of new patients. As a result, the productivity of these centers can increase by 60.0% while errors are reduced. Research firm Markets and Markets estimated that the AI market grew from \$420 million in 2014 to \$5.05 billion in 2020, thanks to the increasing adoption of “machine learning” and natural language technologies in the media, advertising, retail, finance and health industries (AQUAe Foundation, 2021).

There are currently 1,031 start-ups listed on AngelList, an American portal specializing in startups, with an average valuation of \$5.2 million (equivalent to almost \$5.4 billion in venture capital investments). The three companies Next on that list are Autonomous robotics company, maker of team productivity software Crux and the AI Zero Slant social news aggregator. On the other hand, some

sectors are especially inclined to adopt this type of technology. The reason for an increase in investment in AI is in the great economic impact. In the major economies of Asia and the Pacific, it is estimated that by 2030, AI could generate a 16.0% increase in production. This translates into a net return of 13,000 million euros (AQUAe Foundation, 2021).

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