



The Impact of AI Technologies on E-Business

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Definition: The outbreak of COVID-19 has entirely changed how consumers behave, due to an over-reliance on online shopping. With the global pandemic demanding people to stay home, multiple companies had to find innovative strategies to remain competitive and adapt to these rapid changes. However, the pandemic has also propelled the development of technologies, such as artificial intelligence (AI). AI concerns the engineering of machines and programs to make them intelligent, make decisions on their own or provide humans with information that will aid them in the decision-making process. Artificial intelligence software can be programmed according to an organization's needs and performance goals. Although AI offers e-businesses multiple advantages, in order to differentiate themselves from their competitors, it is still a relatively new technology. A lack of understanding of its implementation will hinder organizations from reaping the full benefits of this technology. Moreover, multiple disputes regarding AI's ethicality and privacy concerns have led to further research focused on making these systems more reliable and ethical.

Keywords: machine learning; deep learning; recommendation engine; marketing; customer service; big data; cloud computing; ethical concerns

1. Introduction

With the rise of technologies, such as the Internet of Things (IoT), big data, artificial intelligence, and blockchain, society currently find itself at the dawn of the Fourth Industrial Revolution [1,2]. Although some of these technologies have existed for over two decades, a lack of high-performance computing, cloud computing, less transparency in code sharing, and a lesser availability of open-source software has made advancements challenging. Nonetheless, the scene has entirely changed in the past couple of years [1].

Nowadays, we find these technologies in every field, healthcare, finance, education, sports, agriculture, management, etc. This clearly demonstrates the popularity of the technology, as well as its diverse applications. Nevertheless, although technologies, such as artificial intelligence, heavily influence our internet usage, only 63% of users are aware that they have been exposed to it [3]. With the vast amount of data generated in different platforms, manually assessing and analyzing it would take years for a person to complete. Thus, AI can assist businesses in their decision-making process, as this technology can analyze large sums of data in seconds, and there is a lesser possibility of human error [4,5]. Business-wise, some of the advantages that AI offers include the fast unveiling of patterns in large sums of data, the visualization of analytics, insights into your market and competitors, etc. These characteristics can result in increased revenues, improved cost structures, and efficiency, enabling businesses to automate their processes and improve their connectivity [1].

Moreover, massive corporations, such as Amazon, Alibaba, and Rakuten, utilize AI for comment mining, the development of other AI technologies, such as chatbots and recommendation engines, and big data processing [6]. Retail stores that fail to investigate and adapt to new methods to deliver what their customers want, when they demand it, will quickly fall behind the competition and the advancements in AI. Nevertheless, AI



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Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). technologies still find themselves in their initial stages of development, leaving ample room for improvement in these systems' accuracy, fairness, and ethicality. In addition, managers and organizations need to acquire more knowledge about the implementation of AI software as a lack of understanding of their functionality will not show the organization the true potential and power of these systems.

The continuous development of AI and an increased necessity for businesses to implement this technology into their daily activities have led to an exploration of how AI functions, its advantages for e-businesses, and possible ethical concerns that arise with this technology.

2. E-Business

The term "e-business" describes the operation and management of a business through electronic means, particularly the internet [7]. Still, the definition of e-business is utilized in various contexts. On the one hand, e-business is referred to as technology to improve external and internal communications, particularly for companies that do not run all of their activities online [8]. On the other hand, e-business is a model where companies mainly operate online, and there is little to no physical interaction [7,9]. According to Beynon-Davies and Jones [10], global markets are affected by two interdependent trends: an increased centrality of information and an increased dependency on electronic networks. This means that technological changes, caused by augmented access to information and communication technologies, simplify how businesses produce, distribute, and consume their products [10]. Below are some of the most common e-commerce/e-business models:

- Business-to-Business (B2B): Exchange of services and products between businesses.
- Business-to-Consumer (B2C): Selling services and products to consumers by a business.
- Consumer-to-Business (C2B): A consumer provides services and products for a business.
- Peer-to-Peer (P2P): Interaction of two individuals without the intermediation of other parties.
- Government-to-Business (G2B): Government agencies provide services and products for a business.
- Government-to-Citizen (G2C): Interaction between governments and citizens.

Various business models can be implemented; however, firms must ensure that the technology applied will enable them to fulfill their goals [11]. Additionally, businesses must consider any risks, limitations, and opportunities. In addition, the global pandemic has created significant shifts in the online business environment. Restrictions upon gathering in groups and social distancing rules led to a worldwide digitalization trend, with many businesses moving a portion, if not all, of their activities online [12]. This has resulted in a stream of newcomers into the e-business world and increased competition between newcomers and already established e-businesses [12].

Although expanding a business into the online environment can provide an organization with multiple benefits [13], companies must be clear regarding their organizational goals to ensure that they are allocating their resources properly [14]. For example, some organizations may have the goal of replicating the in-store experience and reduce any frustrations consumers may face when searching, discovering, or purchasing a product, whereas other corporations may want to optimize their delivery routes or increase their customer satisfaction [15].

Furthermore, to maximize the chances of successfully operating an e-business, organizations must consider whether they are capable of operating successfully in this environment; factors to consider include financial, technological, and human resources [14]. It is also considered that further investments in IT, superior technical expertise, and support towards the implementation of new technologies will lead corporations to decrease their costs, increase their efficiency, and improve their customer service [14].

Moreover, an organization must possess two essential resources: organizational performance and competitive advantage [12]. Both aspects can either be improved or enhanced with the introduction of AI applications; in contrast to humans, who are far more likely to make a mistake or overlook data [12] businesses can now rely on technology to create and manage information. The usage of technology to increase an organization's performance will vary depending on the company and its target audiences [11]. As markets have become more competitive, businesses utilize e-commerce as a strategy to expand their audiences abroad, mainly because e-commerce does not require companies to have a physical presence in that region [11].

3. Artificial Intelligence

Artificial Intelligence, also known as AI, is the engineering of intelligent machines and computer programs [16]. The first works in this field can be traced back to the early 1940s, with the proposed model of artificial neurons from Gururaj [17]. Nonetheless, the term 'artificial intelligence' was first adopted in 1956 by the Computer Science Professor at Stanford University, John McCarthy, at the world-renowned Dartmouth Conference [17,18]. He expression referred to those systems that will evolve to possess human-like intelligence [18]. By 1973, Firschein and Coles had published a study with 21 hypothetical products [18]. Due to a lack of technological progress at the time, their hypothesis would not become a reality then. However, some of their proposed products have become a reality in the present, e.g., automatic language translators, automatic identification systems, industrial robots, etc. [18].

Although AI emphasizes computation, it is also capable of reasoning, perceiving, and acting [16]. In other words, AI technology consists of intelligent machines or software capable of thinking like a human [16]. Nowadays, AI is utilized in multiple fields, such as education, marketing, the analysis of consumer behavior, data recording of past purchases, appraisal of competitors, etc. [5].

Moreover, there are two forms of AI, strong and weak artificial intelligence [16,17]. On the one hand, weak AI consists of artificial intelligence that is not capable of thinking independently [17]. In other words, weak AI is programmed to solve complex tasks; however, it cannot provide solutions on its own and requires a human to intervene. On the other hand, strong AI can have a human-like consciousness and, therefore, provide solutions independently without any human intervention [19]. This form of AI can learn from various situations and is intelligent enough to act accordingly [17].

4. Machine and Deep Learning

AI can take multiple forms, including machine and deep learning [3]. Machine learning consists of algorithms that improve their ability to perform a specific task as they become more experienced doing it; they do not need to be continuously programmed [20]. In other words, machine learning can learn a task without pre-existing code [21]. The main types of machine learning include supervised, unsupervised, semi-supervised, and reinforcement learning [22]. Supervised learning makes use of labeled data to conclude (classification), whereas unsupervised learning utilizes unlabeled data to recognize hidden patterns (clustering) [22]. Currently, data scientists and programmers are working toward developing a general-purpose algorithm that allows machines to learn more than a single task [21].

Similarly, deep learning learns from large amounts of data by utilizing multilayered neural networks [3]. Machine learning, deep learning, and natural language processing are the three technologies responsible for training machines, handling big data, and developing market intelligence [21]. This enables AI to remember past experiences, analyze the variances in the results under different scenarios, and decide based on these factors [3].

As previously stated, deep learning works on the principle of neural networks. These networks are developed within math and computer science philosophies to imitate how the human brain works [21]. Continually, neural networks comprise three layers: an input layer, a hidden layer, and an output layer [21]. These layers can consist of thousands, and in some cases, up to a million nodes; this is what enables AI to think like a human and act

according to the situation [21]. According to Pallathadka et al. (2021) [22], artificial neural networks (ANN) work as follows:

The foundation of ANN is a biological neural network. Since ANN is comprised of connected nodes and directed links, it is also referred to as a connectionist system. Every linked connection is given a weight and is accountable for transmitting a signal between nodes. When a node receives a signal, it analyses it and then forwards it to another node. In conventional ANN implementations, the signal at the connection between artificial neurons is a real number, and the output of each neuron is dictated by a nonlinear function of the sum of its inputs. As learning proceeds, the signal intensity either decreases or increases due to the weights and connections of artificial neurons.

An Intelligent Agent (IA) drives AI applications; they are categorized into machine agents, such as home robots and self-driving cars, or software agents, such as chatbots or recommendation engines [1]. IA interacts with the environment through a process of Sense–Think–Act, which consists of the collection of data, e.g., images, video, audio, text, etc. [1]. The data is then analyzed by implementing AI algorithms which then complete the task by offering AI-powered solutions [1].

In a nutshell, machine learning algorithms are commonly used to help e-businesses analyze their data, while they also offer solutions to problems they may face. Hence, this product is incredibly beneficial in resolving economic concerns, such as detecting inconsistencies in their prices or products [4]. Continually, this model can assist e-businesses in keeping track of their inventory or even increasing the website's ranking. In addition, it assists online companies in identifying the best marketing strategies through a better understanding of their customer's targets, and it can improve the delivery of products [4].

In the past, a lack of access to data made it challenging to make any progress in the development of AI [1]. Aside from a past limitation of available data, computing performance and corporate boundaries also hindered progress in AI development [23]. However, the increased affordability of technology and easier access to the internet has resulted in a higher number of online users; by 2019, the number of global users stood at 3.7 billion [24]. This, then, results in substantial volumes of data, also known as big data [25]. According to Osman [25], big data is defined by the four V's, which stand for:

- Volume: Refers to the amount of data in terabytes, petabytes, or more, needed to compute personalized recommendations.
- Variety: Refers to the multiple forms of data and the various sources extracted from it. The format can be structured, semi-structured, or unstructured.
- Velocity: This concerns the speed at which users generate data, e.g., the number of users leaving reviews on a product.
- Veracity: Discusses the trustworthiness and reliability of data, as reviews, feedback, etc., and can be influenced and funded by the personal interests of competitors. Performing text analysis with the aid of supervised learning facilitates an assessment of veracity by AI.

Raw data can be collected from online surveys, review sites, actual retail sales, census databases, smoke sensors, motion sensors, global positioning systems (GPS), etc. They are used to train IA and AI technologies [1]. This is beneficial because when IA is trained, they can train other IA, reducing the amount of time humans need to invest in teaching machines [1].

Soni and Sharma [1] state that 2.5 quintillion bytes are generated daily. To put the amount of data created into perspective, within a single minute, a website, such as Google, receives 3,877,140 search queries, Facebook users upload 2,460,000 posts, YouTube creators upload 72 new hours of video, Twitter users send 473,400 tweets, and Instagram users publish 49,380 photos. This means that big data is more easily accessible, which thus enables a faster progression in AI learning.

While AI has been around for over 60 years, AI did not gain popularity until the past couple of years. The term 'AI' had not made it to the top 100 searched terms on Gartner.com. Still, by May 2017, 'AI' had become the seventh most searched term. Similarly,

Soni and Sharma [1] state that research on the popularity of 'AI', from 2008 to 2017, has shown a spike in the mentions of the term in business news and online searches since 2016. This serves as a small indicator of the fast growth of this technology [3]. Nevertheless, continuous processes in this technology have demonstrated the many advantages that AI brings to the consumer and the business.

5. Gaining Advantage through AI and Its Real-World Applications

AI technologies can offer multiple advantages, ranging from planning activities to administrative operations within the value chain [26]. Extensive data-generating tools have made it crucial for businesses to implement new strategies and techniques that will provide quick and accurate information to aid managers in decision-making [26]. AI can automate processes, gain insights from past data, and provide the user with consumer or market insights through program-based algorithms that help managers in their decision-making processes [21]. In addition, AI can offer benefits that are non-related to the substitution of labor [27]. Some of these include predictive maintenance tools, optimizing documentation, analyzing how weather can affect the supply line, etc. [27]. Still, businesses must keep in mind that, when transitioning into a fully functioning automated process, in most cases, major transformations may have to happen, rather than just changing individual parts of the process [27].

On the other hand, throughout October 2020, North American and European executives were surveyed on whether they considered AI to be helpful to their businesses for 2021. In total, 70% of the people surveyed considered AI to be the most beneficial tool in creating a personalized experience [28]. Additionally, 52% of e-business executives thought that AI assists in the forecast of a product's demand [28]. Other areas where AI showed potential were in the development of pricing and marketing strategies, the improvement of customer services and improvements to customer satisfaction, AI-based routing software for speedier deliveries, etc. [28].

The graph clearly demonstrates that personalization is viewed as AI's most valuable feature. AI-powered systems can sort through large amounts of data and find consumer behavior patterns. This gives decision-makers more accurate information regarding the market's needs and demands. Continually, AI can be altered and customized according to the needs of the business. For example, AI software can assist businesses in the development of targeted marketing campaigns by providing their customers with accurate suggestions, as this technology analyzes the past patterns of the consumer, such as products they have searched, purchased, or added to their carts. Figure 1 presents the color scales graph of the Future areas in which AI will help e-commerce businesses, according to decision makers in North America and Europe in 2021 [28].

Personalization
Site Search
Forecasting
Marketing
Pricing
Customer Service
Sales
Fraud Prevention
Product Assortment
Delivery
Order Management
I do not believe AI will help our company
Other

Figure 1. Future areas in which AI will help e-commerce businesses, according to decision makers in North America and Europe in 2021. Data source: [28].

However, as shown in Figure 2, the most common application of AI technology is in the customer care sector, which stands at 48% [29]. This number is closely followed by its quality control and inventory management implementation, which stand at 47% [29]. To continue, this type of technology enables retailers worldwide to personalize the content available to their consumers and change their pricing strategy, according to their customers' patterns. Lastly, firms can increase their online security by using AI as a fraud detection system.



Figure 2. AI use cases in consumer goods and retail industry worldwide as of 2020. Data source: [29].

5.1. Marketing

Academicians have concluded that AI will considerably change the future of marketing [30]. Access to big data has resulted in businesses gathering a considerable amount of marketing-related information, allowing them to section their consumers based on their demographic and behavior [31]. According to Huang et al. (2020) [31], marketing research, driven by big data, focuses on five different aspects:

- Assessing the preferences of consumers
- Predicting the consumer's next purchase
- Providing targeted advertising
- Discovering consumer's perception of the brand
- Obtaining market intelligence to aid in decision-making.

At present, a wide variety of real-life applications demonstrate the potential of this technology. For example, Replika is an AI-powered personal chatbot companion; their machine learning-based chatbot imitates the communication style of consumers, and therefore, has the capacity to provide them with emotional support [30].

In addition, AI can analyze a consumer's habits, purchases, likes, and dislikes [32]. Customer Relationship Management (CRM) software, chatbots, and other technologies have significantly benefited from AI [21]. These benefits improve the experiences of customers, as well as increase the value of a business [21].

5.2. Recommendation Engine

Recommendation engines have existed since the mid-1990s and are primarily used in the entertainment industry by companies such as Netflix, Spotify, YouTube, Amazon Prime, etc. [25,33]. Nevertheless, other forms of e-businesses can also benefit from this system. These systems were developed out of the necessity to filter large volumes of data and to provide users with a personalized suggestion (of their interest) when searching for a product or service within a large dataset [25].

Recommendation engines analyze a customer's past data and focus on the consumer's choice and behavior [22]. They can also analyze search requests, clicks, previous purchases, and shopping carts [17]. These systems focus on multiple factors to provide users with a balanced recommendation. These factors include stability, accuracy, disparity, and novelty [25]. This information allows the AI-powered software to predict the consumer's behavior and

provide them with suggestions or recommendations on a product to assist them effectively through their shopping or selection process [17,22]. These systems tackle the issue of information overload by providing consumers with personalized suggestions that, therefore, aid them in the search and decision-making process [34]. As a result, e-businesses can increase their sales and customer satisfaction.

Various companies have integrated recommendation systems to increase sales and convert their targeted suggestions into purchases. For example, Netflix indicates that over 80% of its users watch movies suggested by the recommendation engine; this results in up to USD 1 billion in revenue [25]. Similarly, studies on Amazon demonstrate that 30% of the website's views are a direct result of recommendation engines [25]. Moreover, in 2010, YouTube reported that 60% of their homepage clicks were recommended videos.

Continually, recommendation engines are made up of machine learning algorithms. Machine learning consists of automated data analysis, the identification of patterns, and decision-making, all of which require minimal human involvement. As Sorbán [33] stated, machine learning algorithms, utilized for recommendation engines, are categorized depending on their filtering method; these include the following:

- Content-based filtering: This method assigns descriptors to every item in the database and profiles the users based on their contributions. This system does not require an extensive database; however, its benefits are limited, as only items with similar properties will be recommended.
- Collaborative-based filtering: This system provides users with recommendations by analyzing resemblances and associations between users and detecting how users interact with items managed by the system [34]. This method was the go-to recommendation strategy implemented by businesses.
- Knowledge-based filtering: Modern recommendation systems do not stick to a single version of the above-mentioned filtering methods. Instead, they use a combination of different techniques and filtering schemes; they are popularly known as hybrid recommendation engines [33].

5.3. AI Assistants (Chatbots)

AI assistants, such as chatbots, automatically respond to simple consumer inquiries with e-voice commands and provide users with suggestions, using natural language processing. Chatbots are based on machine learning algorithms and can behave like humans [6,22]. Chatbots can greatly impact the customer service of e-business; they are capable of running 24/7, help consumers to find products, have access to the latest information on the supply chain, can compare multiple items, and guide consumers on how to pay. Furthermore, the addition of this software can reduce labor costs, as employees will no longer have to dedicate time to repeated inquiries; instead, the chatbot can handle simple interactions, and for more complex situations, the chatbot will assist the customer in contacting the corresponding personnel [6,17]. However, chatbots do not understand human emotions in interaction and are likely to provide wrong answers and lead to unsatisfied customers. In addition, chatbots start the process by asking the customer for personal information and this may create the feeling of a cyber threat for customers, specifically if they are poor in performance [35].

5.4. Intelligent Logistics

Aside from enhanced customer experiences, AI can assist enterprises in improving their managing processes and efficiency [36]. For example, forecasting and inventory management have become more challenging tasks in demanding and rapidly changing markets. Notwithstanding, AI algorithms can facilitate this process by analyzing past sales. Intelligent logistics provide managers with some of the following data: monthly sales, shopping frequency, accepted price range, etc. [36]; AI software examines this and considers any factors that may affect turnover, and according to these, it provides administrators

with information to manage their inventory more effectively and marketing campaigns, among others [22].

5.5. Intelligent Scheduling System

This system aims to reduce the amount of empty driving mileage per courier and order, and provide customers with real-time information regarding their packages' delivery status by utilizing intelligent dispatching and path planning [6]. It can fulfill business functions, such as courier and merchant management, scheduling detection, and distribution monitoring; the distribution network can also be corrected in real time and supervised. Using this technology, delivery time was decreased and the error rate was dropped by 3% [6].

5.6. Intelligent Translation

With more saturated and competitive local markets, cross-border e-commerce has become significantly appealing to organizations, mainly if the venture focuses on emerging markets [36]. Nevertheless, language barriers are among the most common issues in cross-border e-commerce. Intelligent translation enables consumers to quickly access and search for a product and its information. It also facilitates communication between trading partners and decreases transaction costs [36].

6. Limitations

Many developers have run into an issue with collaborative filtering: the new user coldstart problem [34]. Osman [25] agrees that cold-start and data sparseness are the two biggest challenges in the further progression of recommendation engines. Cold-start happens when a new user registers to the system, but due to a lack of entries generated from the user, recommendation engines cannot provide consumers with relevant and personalized suggestions. Like cold-start, data sparseness relates to a user having insufficient interactions with an item, resulting in an inferior recommendation quality [25]. Nonetheless, a research paper by Fernández-Tobías and Braunhofer [34] aims to find a solution to this problem by bringing three innovative solutions to the table; these include the following:

- Personality-based collaborative filtering: Improves recommendations by integrating the user's personality information.
- Personality-based active learning: Uses personality information to identify additional data or helpful information related to the users' preferences.
- Personality-based cross-domain recommendation: Uses personality information from auxiliary domains to offset a lack of data on the user on the target domain.

Their approach focuses on the user's personality, because past research has shown that people with similar traits will have similar likings. On the other hand, as stated throughout the paper, marketing is one of the areas in e-commerce that AI is significantly impacting. The extreme personalization of advertisements with the backup of AI technologies can influence the consumer's demand and purchasing behavior [4]. Although AI provides decision-makers with the necessary data to overview areas of strength or deficiency, the perceived usefulness and perceived areas of use may mislead marketers and cause unreal expectations. Continually, as this sector continues to attract investors, AI systems are being developed to be more powerful, refined, and ubiquitous; however, the procedures for the troubleshooting and supervision of these systems are falling behind their implementation [19].

Additionally, the data used by AI systems to analyze the behavior of consumers is one-directional, as it is mainly based on clicks and customer feedback. Khrais and Azizi [4] state that this type of data is shallow and non-dynamic; therefore, it does not provide the user with a general understanding of their consumer's behavior.

Although the challenge of understanding and justifying predictions made by AI systems have existed since the mid-1970s, the development of AI technologies has emphasized creating algorithms and models that will result in more accurate predictions [37]. However, the justification of these systems' predictions has not been of significant concern until recently. The high complexity of AI systems and their ability to make autonomous decisions enable them to acquire a life of their own and make decisions with little to no human authorization [38]. This is a straight consequence of the relentless penetration of AI systems, particularly machine learning. Due to this, the research field of Explainable Artificial Intelligence (XAI) has seen a reemergence; it aims to make AI results more comprehendible to humans as the current systems in place do not offer detailed information regarding how these models achieve their results, predictions, or suggestions. According to Adabi and Berrada [37] the need for XAI stems from the following four reasons:

- Need to Justify: AI systems are not perfect and have previously provided users with discriminatory or biased results. By introducing XAI systems, users can justify unpredictable results from the machine, or it can guarantee that there is a method to verify that the algorithmic decision was fair and unbiased.
- Need to Control: Having enhanced control of the system assists in the prevention of unfair decisions. When the user understands how the system functions, identifying vulnerabilities or flaws is smoother, and the user can quickly recognize mistakes and correct them.
- Need to Improve: Like the previous point, users with better knowledge on the system can pinpoint areas of weakness. Thus, XAI promotes ongoing improvements to AI systems.
- Need to Discover: Demanding AI systems to be more understandable to humans can enable its users to gather new facts and therefore create new knowledge. In the future, these systems may be smart enough to further our knowledge in other sciences, e.g., physics, biology, etc.

Aside from these reasons, XAI will implement AI technologies in more beneficial ways, as it will be more user-friendly, and its users will have the opportunity to better control the machine. Additionally, it tackles current ethical concerns, as the current systems in place learn from all sorts of data and are likely to lead to incorrect decisions; XAI aims to resolve this issue. Therefore, further research in the field of XAI can lead to systems that are more understandable, trustworthy, and easier to manage [37].

In recent years, the number of organizations adopting AI has grown by over 250% [39]. Nevertheless, many organizations have not seen the true potential of AI, due to a lack of understanding regarding the complementary resources needed to boost the performance of these systems. According to Mikalef and Gupta [39], organizations are primarily struggling with incompetency in regard to incorporating the system with the data, and the use of the relevant data to train AI. Furthermore, for organizations to reap the advantages of automation, they are required to understand that the entire procedure needs to be redesigned; indeed, the automation of individual steps will not suffice to make these systems beneficial for the business [12].

Moreover, Mikalef and Gupta [39] define AI Capability as "the ability of a firm to select, orchestrate, and leverage its AI-specific resources." In addition, they state that AI Capability can be divided into three AI-specific resource categories, each with its own subcategories:

- Tangible
 - a. Data: The quality of the data fed to an AI machine can greatly impact their predictions or decision-making. In broad terms, firms have access to internal data (accounting, sales, human resources, etc.) and external data (data not directly related to the firm's operations). This means that companies must keep filtering the information they feed to these systems to ensure that it works per the business's goals.
 - b. Technology: Technological infrastructure is one of the main challenges for businesses adopting AI. Companies must invest in scalable data storage capable of handling extensive volumes of data in various formats. In addition, an organization must have the computational power to go rapidly over large

volumes of data and process complex algorithms. Organizations often choose to use GPU-intensive clusters, parallel computing, or cloud computing to reach the necessary processing power.

- c. Basic Resources: Firms must provide time and financial resources for AI projects to deliver the expected performance results.
- Human
 - d. Technical Skills: Businesses must have a team of AI developers who possess the knowledge and skills to implement and create AI algorithms, manage the systems infrastructure, and ensure that system development is on track and meeting the company's objectives.
 - e. Business Skills: Aside from being technically knowledgeable on AI applications, weak leadership is ranked as the top reason for an unsuccessful adoption of AI. Leaders must have a great understanding of the future opportunities for this technology and be able to lead a team through change successfully.
- Intangible
 - f. Inter-departmental coordination: Inter-departmental coordination has been demonstrated to boost innovation within a firm. As a result, teamwork, mutual goals, and vision are significant steps to successfully deploying AI applications.
 - g. Organizational Change Capacity: This factor centers on resolving potential issues that may arise when failing to transition from an old procedure into a new one.
 - h. Risk Proclivity: With AI being a fairly new technology, many organizations may be hesitant to adopt these systems. However, those willing to take on more risk are also more likely to reap the benefits of AI far before any of their competitors do, while also giving them a competitive advantage.

These categories pinpoint the areas of weakness for many organizations that have adopted or plan to adopt AI applications. Nevertheless, it also highlights the importance of complementary resources in the successful adoption of AI and how emphasizing these areas is likely to result in organizations having a superior performance after employing AI technologies. Still, business leaders must be aware of the technologies their competitors are adopting, as disruptive technology can make a business model outdated [12].

7. Privacy and Ethical Concerns

As previously stated, corporate boundaries were a limiting factor in AI learning. However, now that there is an overload of information, AI can learn from all sorts of data, and it is no longer constrained by organizational barriers or proprietary datasets [23]. Access to big data has also resulted in AI systems being exposed to biased datasets during AI training [40]. Pedreschi and Miliou [40] stated that AI systems must have the following moral values:

- Fairness: This will ensure that unfair or discriminatory decisions are not made.
- Accuracy: This will increase the system's capability of providing reliable information
- Confidentiality: This will certify that people's privacy is being protected.
- Transparency: This means all participants must understand the systems and the decisions it makes.

According to Puntoni and Reczek [41], consumers intentionally 'share' data when they know who and how their data will be used. Contrarily, consumers 'surrender' data when there is uncertainty about their data usage or are oblivious regarding the data they leave behind. This raises managerial issues, such as privacy and trust concerns [23]. This is because the methods used to acquire data are becoming far more invasive and unavoidable. Additionally, there are legal and guardianship problems related to intellectual property rights, security, and governance [23].

Furthermore, with only 6.6% of countries investing in the development of AI technologies, we must acknowledge that there is an 'AI-divide' emerging [1]. Continuous growth

in AI-enabled countries and the nonparticipation of others will only widen this gap. The result is an increased economic, social, and cultural divide with a substantial effect on people's income, living standards, education, etc. [1].

In addition, AI algorithms have a BlackBox nature, which means that the inner mechanisms of an electronic device are either concealed or unknown to the user, which at times results in incomprehensible but great solutions [4]. Nonetheless, this means that if the user cannot explain the system's predictions, challenges will arise whenever an unfitting suggestion has been made. Consequently, there is an increased chance for companies to be exposed to biased data, improper decision-making, and incorrect modeling practices in the algorithm [4].

It is essential for organizations to emphasize the ethicality of their AI systems, not only because there are laws that mandate this, but because being aware of the ethicality of their systems can prevent a firm from being sued or gaining negative media attention [38]. In addition, as previously stated, the high complexity of AI makes it challenging for the user to understand the reasoning behind the decision-making of these systems. However, managers must ensure that the data fed into these machines has been labeled and moderated to prevent their systems from making discriminatory or biased decisions. An example of this is the Tay chatbot, launched by Microsoft in 2016. This AI application was trained via data produced from Twitter users, which resulted in the chatbot becoming racist [38]. Once again, this stresses the importance of training AI with ethical, moderated data. This will diminish the likelihood of the system making unethical decisions, e.g., minimizing the opportunities for minority groups to be interviewed by HR [38]. This means that, by increasing the ethicality of AI technologies, we can also see an increase in the public's trust when using this software.

Another area of concern is the loss of jobs because of automation. Unlike humans, technologies such as AI are faster, can work 24/7, and do not need health benefits or vacation, making the technology cheaper than human labor [27]. While some academicians fear that many people will lose their jobs and source of income, others believe that new jobs will develop [27]. Still, with more people losing their jobs, P2P business models are gaining more popularity.

8. Future Opportunities for AI

In 2011, the total investment in AI technologies worldwide stood at USD 25.8 million, and it consisted of only seven start-ups [18]. This figure grew from 2011 to 2016 by 71.13%, standing at USD 1866.6 million, and comprised 64 start-ups [18]. Currently, the U.S. is the leading country in total investment in artificial intelligence [18].

There is a growing demand for AI to be utilized for the personalization of services, resulting in businesses thinking about developing and implementing AI technologies in their fields; this is because making intelligent products and services will aid to differentiate themselves from their competitors. By 2018 business lines, such as marketing, commerce, CRM, and sales, had received a combined investment of USD 753 million [18].

Figure 3 shows the forecasted global revenue created solely from AI software from 2018 to 2025. Various AI applications were mentioned throughout the paper, including machine learning, deep learning, natural language processing, etc. With several tech companies investing large sums of money to fund the research and development of AI projects or the acquisition of AI software, the AI market is forecasted to grow exponentially [42]. As the graphs show, the market for AI software is estimated to reach up to USD 126 billion; this means that the market is projected to increase by up to USD 115.9 billion in seven years.



Figure 3. Revenues from the artificial intelligence (AI) market worldwide from 2018 to 2025. Data source: [42].

Nonetheless, the global outbreak of COVID-19 has disrupted businesses, changed consumer patterns, and accelerated structural changes within the technological sector [43]. The pandemic caused most people to quarantine and remain in their households; this increased online sales as people could no longer go to malls or stores as part of other activities. Consequently, the pandemic affected consumer channels, B2B relationships, and how companies engage with suppliers, wholesalers, and distributors [43].

Furthermore, Ritu Jyoti, the program vice-president of AI Research at IDC, claims that the pandemic has resulted in AI software being one of the most sought-after technologies; this is due to advancements in machine learning, conversation AI, natural language processing, etc. This enables the optimization of IT processes, recommendations, and predictions [44]. Therefore, businesses can offer an improved experience to both customers and employees.

According to the International Data Corporation (2021), the global market for AI is expected to grow up to 16.4% and reach a market value of USD 327.5 billion by 2021. By 2024, the market is forecasted to grow by 17.5% and achieve profits of USD 554.3 billion [44]. Although AI software involved 88% of the total earnings for this market, it had the slowest growth rate, at 17.3%. AI software platforms will have the most substantial growth rate, at 32.5% [44].

9. Conclusions

To conclude, artificial intelligence is an extensive term that can take various forms, and it is used to make applications or software intelligent. Over the last couple of years, there has been an exponential increase in the available amount of data on the internet; this has resulted in the faster development of AI, as it now has access to a vast amount of information that it can learn from. Furthermore, the global pandemic has entirely changed how businesses interact with each other and consumers. Increased digitalization and interest in e-commerce has enabled companies to integrate innovative tools into their everyday decision-making processes, such as forecasting future sales, inventory tracking, and delivery path mapping. Additionally, AI technologies, such as chatbots and recommendation engines, allow companies to learn about the consumption patterns of the client base. Therefore, they can provide customers with personalized suggestions for a product and targeted marketing based on their online behavior, e.g., clicks, shopping cart, and previous purchases, thus improving their customer service. Organizations will not realize the full potential of AI systems unless they commit to completely redesigning their procedures from manual to automated. This includes educating employees in these technologies, as well as the formation of a human–machine relationship; here, humans do not only provide AI with the necessary information to make decisions, but also act as moderators and intervene or adapt the solutions offered by AI, per all legal and ethical matters and the organization's needs. Thus, corporations can tackle the ethical concerns that arise with the use of this technology, such as how AI has still not been developed to recognize data that includes unfair biases. Consequently, research fields, such as XAI, have started to remerge, as their objective is to make AI systems more understandable to the user. Therefore, the user can recognize any flaws, and can correct or understand why unexpected decisions were made.

With only a few countries working on the development of AI, the technological gap is only expected to grow, further increasing the economic, social, and cultural divide.

Lastly, the global pandemic has sped up development within the technology industry. Many businesses relied on e-commerce to survive, with more people staying at home and avoiding public outings. However, the pandemic also resulted in a higher interest in AI technologies, increasing investments in this sector. As of 2021, it is expected that this industry will grow by 16.4% and reach total revenues of USD 554.3 billion by 2024.

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