A Review of Artificial Intelligence and its Application in Business

Fauziya Njeru
Master of Business Administration, Faculty of Business and Management Sciences, University of Nairobi, Kenya.
njeruf@hotmail.com

Correspondence should be addressed to Fauziya Njeru: njeruf@hotmail.com

Article Info
Journal of Enterprise and Business Intelligence (https://anapub.co.ke/journals/jebi/jebi.html)
Doi: https://doi.org/10.53759/5181/JEBI202303005
Received 22 June 2022; Revised from 30 July 2022; Accepted 20 September 2022.
Available online 05 January 2023.

Abstract – In recent years, there has been a noticeable rise in the proliferation of services and intelligent products, accompanied by their widespread consequential socioeconomic implications and commercial availability. This development prompts an inquiry into whether the current emergence of artificial intelligence (AI) is merely a transient trend or possesses genuine transformative potential for the global landscape. This study explores the extensive implications of AI and provides a comprehensive analysis of its positive and negative effects on the business sector. AI has shown significant use in the administration of complex systems, as well as providing assistance to people across many operations. AI is often used in the business sector to provide help for the decision-making process. It is utilized to create various simulations and serves as a foundation for building a competitive edge for organizations. By integrating AI systems throughout many departments within a company, there exists the potential to enhance the efficiency and effectiveness of business operations, hence leading to heightened satisfaction with the services or goods offered by these firms. Several applications of AI in the business domain include marketing, research and development, manufacturing, and quality management.

Keywords – Industry 4.0, Artificial Intelligence, Machine Learning, Internet of Things, Customer Relationship Management, Big Data and Marketing.

I. INTRODUCTION

Throughout history, innovation has consistently served as the primary catalyst for enhancing the quality of life. Nevertheless, the process of innovation may have a significant disruptive impact by rendering existing outdated technology [1]. Cloud computing, IoT, big data, AI, blockchain, and data science are technologies that are emerging have the capability to generate both positive and negative outcomes on a global scale. Several of these technologies have been in existence for at least twenty-five years, but they were not widely adopted or considered feasible for business use. Nevertheless, there has been a significant shift in recent years, as the current landscape now reflects widespread use of these technologies across several industries. Several causes contribute to this phenomenon, such as the progress made in computer technology, namely in the areas of high speed computing, grid computing, and cloud computing.

Additionally, the rise in transparency has played a significant role, facilitated by the availability of code sharing platforms like GitHub, GitLab, and BitBucket. Furthermore, the abundance of open source software has also played a crucial part in this development. Currently, the extensive applications of these technologies in many domains like automotive industry, healthcare, banking, gaming, security, environmental monitoring, energy management, sports, agricultureand more are significantly transforming the lifestyle, work patterns, and entertainment preferences of individuals. The continued progress of these technologies has the potential to facilitate the improvement of hyper-connectivity and hyper-automation, therefore ushering in the 4thIndustrial Revolution, often called Industry 4.0.

The data shown in **Fig 1** is derived from a comprehensive survey conducted among a substantial sample of around 12,800 individuals who are actively engaged in the fields of digital marketing and e-commerce. The participants in this research were categorized into two main groups: those representing the client-side, accounting for 60% of the respondents, and those representing the supply-side, comprising the remaining 40%. Geographically, the majority of the survey respondents were situated in Europe, constituting 44% of the total sample, followed by Asia with 21%, North America with 16%, and other countries accounting for the remaining portion [2]. Top-performing organizations are characterized by their ability to surpass their business objectives and maintain a perception of superiority over their competition. A notable

proportion of these enterprises, around 28%, have reported their current use of AI, in contrast to a comparatively lower percentage of 12% among "mainstream companies."

In general, a majority of the top-performing organizations, around 57%, have either implemented or have intentions to use AI during the next year. In contrast, less than half of the "mainstream" enterprises share the same perspective. According to data published in the previous year by Salesforce, there was an observed increase in the use of AI. Among the several technologies mentioned, AI was found to be the least accepted; nonetheless, around 51% of respondents indicated using AI into their marketing endeavors. Approximately half of the survey sample across various areas identified data analysis as the primary use of AI, as shown by the findings of this recent research. The use of AI for purposes other than its primary function is mostly of secondary importance. Approximately one-quarter of users employ AI for on-site customization, while the utilization for optimization and testing varies between one-fifth and one-quarter, contingent upon the geographical location.

One of the most widely used applications of AI is in the field of healthcare, particularly in the domain of diagnostic procedures, where AI has shown notable efficacy. Moreover, AI has the potential to be used in other fields such as civil engineering and commerce, among others. The advancement of AI systems has led to the emergence of risks associated with the potential substitution of humans and the potential for abuse of AI systems in many contexts. Consequently, there exists a must to formulate diverse rules and ethical guidelines pertaining to the utilization of AI in addressing routine challenges and facilitating the decision-making procedure. Moreover, the advancement of AI in the next years will lead to a reevaluation of the need for certain occupations and the potential replacement of human labor in some industries. It is important to emphasize that AI has particular relevance inside business organizations, since it enables organizational management to make more accurate judgments by using simulations. In essence, the integration of AI technology will facilitate the restructuring of many departments and educational systems inside corporations.

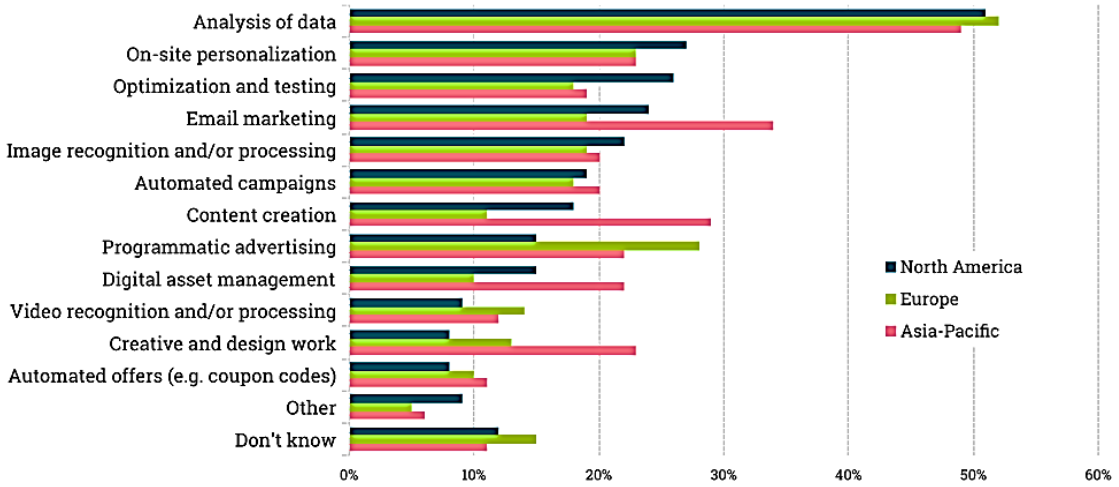

Fig 1. How Businesses are Using AI

The article is grounded on a comprehensive analysis of existing secondary research. The primary objective of this study is to demonstrate the practicality and benefits of using AI in routine business operations, as well as its use in organizational quality management. The present paper is structured in the following manner:Section II presents a review of artificial intelligence; its definition, and areas of AI application. Section III presents a discussion of the applications of AI in business. These applications include risk management, sales and marketing, CRM, and systems based on knowledge. Section IV presents general discussion about the research. Section V draws a conclusion to the research.

II. ARTIFICIAL INTELLIGENCE

Introduction to Artificial Intelligence

Artificial intelligence (AI) refers to the interdisciplinary field that aims to replicate human cognitive abilities inside computational systems [3]. The pinnacle accomplishment within this domain would be the development of a computer capable of emulating or surpassing human cognitive capacities, including faculties such as logical deduction, comprehension, imaginative thinking, sensory perception, pattern recognition, inventive ideation, and affective responses. Although much progress has been made, we are still far from attaining this goal. Nonetheless, notable accomplishments have been realized. Moreover, it is worth noting that the pursuit of these modest achievements in the field of artificial intelligence has yielded a range of very valuable computational tools.

These techniques have facilitated the resolution of a variety of challenges that were previously deemed arduous, and have enhanced the effectiveness in addressing several additional difficulties. From a pragmatic perspective, the inherent qualities of these entities make them intriguing and valuable. The tools used in the field of artificial intelligence may be categorized into many overarching types: CI (computational intelligence) and KBSs (knowledge-based systems).

Knowledge-based systems include the use of explicit models that use words and symbols. On the other hand, computational intelligence involves implicit modeling using numerical methods. Additionally, there are hybrid models that combine elements from both approaches. The first group encompasses many strategies, including case-based, frame-based, model-based, and rule-basedreasoning.

The explicit representation of information using words and symbols enables comprehension by human beings. Despite the undeniable achievements of symbolic approaches within their specific areas, their inherent limitations lie in their capacity to handle just those scenarios that have been clearly represented in their models. While some systems may possess the capability to enhance their model via experience, symbolic models often exhibit limited proficiency in handling novel situations. Computational intelligence partially addresses these challenges by empowering the computer to construct its own model via the use of observations and experiential knowledge. In this context, the information is not overtly articulated but rather quantitatively represented via numerical values that are iteratively refined as the system improves its precision. This area encompasses several computational methods, including neural networks, evolutionary algorithms, and other optimization algorithms. Additionally, it includes approaches designed to address ambiguity, such as fuzzy logic. Determining the precise origins of research in the field of artificial intelligence is a challenge. Chawla [3] made significant contributions to the mathematical study of cognitive processes. Many of his theories continue to be influential in the area of artificial intelligence. Nevertheless, due to his lack of access to a computer, the aforementioned criteria seemingly exclude him from being recognized as the progenitor of artificial intelligence.

The roots of AI have been a subject of divergent interpretations among historians from both sides of the Atlantic, much as the differing perspectives on the attribution of the first programmed computer.It is important to emphasize that various forms of intelligence mutually enhance one another. If a system possesses only one form of intelligence, its functioning remains incomplete. Consequently, the system will be unable to fully adjust to environmental conditions or effectively address identified problems. One of the issues found in AI-based systems is the absence of a means to integrate emotional intelligence with other forms of intelligence, such as cognitive intelligence, among others. This challenge leads to the AI system's inability to respond appropriately to specific stimuli from the environment, which can give rise to issues involving emotional components. For instance, if the AI system is utilized in medical applications or to assist medical personnel during procedures, an incorrect movement by the AI system may cause the patient to experience pain. Despite the inherent problems associated with the creation of AI systems, there is a discernible increase in the potential shown by AI in several domains, including but not limited to business, healthcare, and logistics systems. The sub-section below provides a description of the potential use of AI.

Areas of AI Application

One of the key concepts is the penetration effect, which refers to the incorporation of a specific new technology into different sectors of the economy and society, including all facets of production and daily life. This enables the direct use of AI in the productive activities of human civilization. In contrast to conventional technical advancements, the integration of AI exhibits the distinguishing feature of "intelligence." This implies that AI has the capacity to mimic human behavior and infiltrate many sectors and facets of the economy and society, hence facilitating the attainment of intelligent automation inside enterprises. Boundary extension is a phenomenon whereby the introduction of a technology breakthrough, together with economic and social integration, leads to the expansion of the limits of social work activities and the equalization of these tasks. AI has a persistent influence across several domains, enabling innovators to continually advance novel innovations rooted in AI technology. Simultaneously, some conventional sectors will undergo elimination in order to facilitate the advancement and enhancement of traditional industries, as well as the transformation and enhancement of the economic framework. The many domains in which AI is used are shown in **Fig 2**.

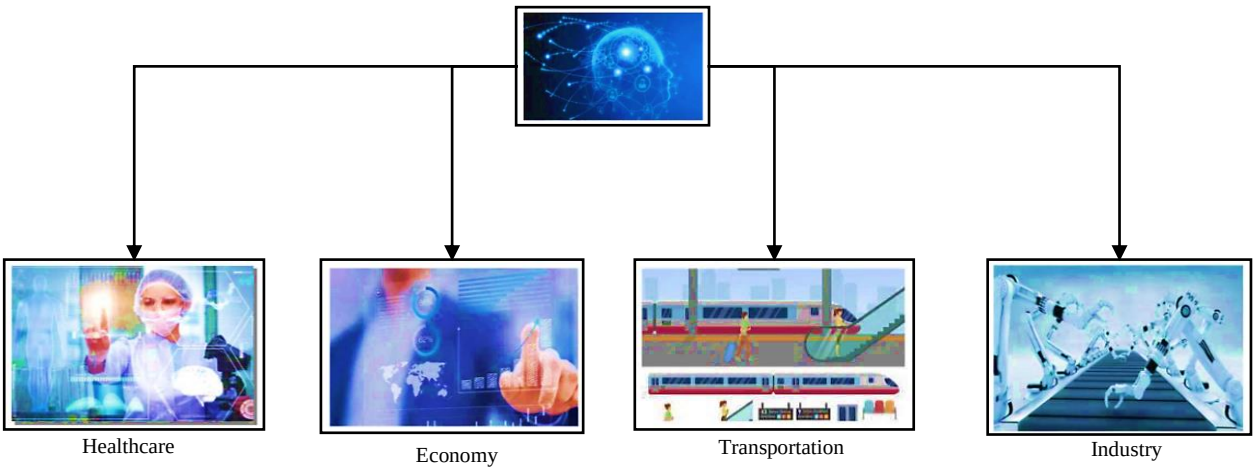

Fig 2. Areas of Application of Artificial Intelligence

The knowledge creation impact refers to the capacity of technical innovation to facilitate the generation of scientific knowledge. The advent of AI has consistently enhanced the knowledge production process, surpassing the knowledge generation impact of conventional technical advancements. Furthermore, this development ushered in a new era of knowledge generation, including not only the scientific sciences but also the social sciences. The self-deepening effect refers to the capacity of AI to engage in ongoing learning processes and attain enhanced levels of self-improvement and self-deepening. The advancement of big data and cloud computing has facilitated the development of AI technology, enabling access to extensive learning data. Consequently, this has reduced the reliance of AI on human programmers and allowed for the achievement of self-learning and self-renewal capabilities to a certain degree. AI perpetually enhances its capabilities via the use of machine learning and deep learning techniques.

Moreover, in light of the emergence of the Smart City paradigm and the growing emphasis on urban safety, AI has found particular utility in monitoring various indicators pertaining to the well-being of urban residents and the security of traffic systems. Conversely, many researchers have shown that 30% of the firms ranked among the top 30 most successful worldwide use some kind of artificial intelligence. Moreover, it is evident from current trends that by the year 2030, about half of the most prosperous organizations would include machine learning techniques to enhance their internal company operations. In addition to the benefits, there are also potential risks associated with the misuse of AI. Furthermore, there is a concern that AI may reach the conclusion that human involvement is superfluous for the proper functioning of certain components within a system. The use and integration of AI may lead to enhanced operational efficiency and effectiveness inside a corporation, as well as improved system management. In addition, the use of AI may lead to the displacement of people in tasks associated with danger, as well as the potential for AI to autonomously assume control over system management.

When considering the efficacy of the AI system, it is important to acknowledge that its performance is contingent upon the technical and technological proficiency of the company. Technical competence refers to the proficiency in operating and understanding machinery and gadgets, while technical competence pertains to the ability to effectively use AI systems for various activities inside an organization.The use of AI in corporate operations is contingent upon the process of digital transformation. This transformative process encompasses the integration of technical and technological advances, which have the potential to enhance the organizational efficacy and competitiveness.

In contrast, strong AI is associated with the capacity for proactive thinking and autonomous decision-making, qualities that are inherent to human beings. However, as technology advances, there is also a corresponding advancement in what is known as superior AI, which has the capability to surpass humans in terms of cognitive abilities and decision-making processes. In the context of weak AI, the use of a weak AI system is distinguished by its ability to accomplish certain objectives that are inherently straightforward to attain. Therefore, these systems possess the capability to address straightforward issues without necessitating an examination of alternate solutions. Sheril and Aulina [5] provide examples of systems that demonstrate the ability to recognize various languages and symbols. The practical implementation and utilization of weak AI is constrained, since it mostly pertains to systems that possess a singular purpose that is inherently straightforward to manage. In contrast, it has been observed that robust AI systems has the capability to effectively address intricate issues that need logical and structural reasoning, which are inherent to human cognition.

The aforementioned kind of intelligence has the potential to be seen as a danger to the human race due to its capacity to attain self-sufficiency, therefore becoming detached from human control. Moreover, the advancement of such intelligence might be seen as an avenue for addressing challenges that beyond human capabilities, as well as facilitating effective organizational management. AI systems possess the capacity and attributes necessary for the acquisition of knowledge. The effectiveness of AI learning is contingent upon both the categorization of the AI system and its underlying architecture. There are distinct forms of learning that are inherent to both weak AI systems and strong AI systems. AI learning may be categorized into three main branches: machine learning, deep learning, and neural networks. Learning is contingent upon the optimal operation of AI and concurrently provides a prospect for the organization to generate novel knowledge and employ it in the management of said company.

Machine Learning

Machine learning is a computational process that has similarities to human learning. Machine learning is a process through which AI acquires information and stores it via the collection of empirical data obtained from its experiences in the surrounding world. With each subsequent learning cycle, the AI becomes more proficient and successful in solving problems. Machine learning is a frequently used concept in internet search engines, falling under the classification of weak artificial intelligence systems. Machine learning is focused on the identification and understanding of patterns that serve as the foundation for the development of algorithms. Algorithms have been developed to facilitate the system's ability to perceive and adapt its actions based on the recognized context. This kind of learning is often used to simulate traffic at crossings with a high volume of cars that are constantly moving through the intersection. According to Bilotta and Nesi [6], the use of AI in discerning patterns of cars enables the development of an algorithm that can be employed for the purpose of predicting future traffic patterns and effectively controlling traffic flow at junctions. These types of systems are often used in statistical analysis and for the development of artificial intelligence systems.

Throughout history, the field of management has consistently relied on statistics as a means of generating valuable information for the purpose of gaining insights. Primarily in the context of commercial information systems. This

phenomenon is not novel. Over time, there has been a shift in the corporate strategy from intuition-based decision-making to a more evidence-based and data-driven approach. The implementation of this novel decision-making approach necessitates a setting that has the capacity to harness the capabilities of machine learning and AI. Automated Machine Learning (AutoML) is a significant initial advancement that has the potential to progressively develop and expand into a comprehensive automated decision-making system. The use of machine learning solutions has the potential to foster a more equitable environment by democratizing access to such solutions across many industries and business sectors. Despite the evidence shown in this research, which demonstrates that AutoML currently falls short of surpassing meticulous human engineering in terms of model tuning, it may nevertheless contribute to the facilitation of ML solution implementation by addressing the scarcity of skilled professionals in the field. Furthermore, providing assistance to proficient data scientists via rapid prototyping and benchmarking might result in expedited development cycles and early implementation. The results of this research provide compelling evidence that the cost-effectiveness and user-friendliness of AI/ML solutions are expected to increase in the future. This progress may be attributed to ongoing innovation within the sector, as well as advancements in APIs, software, hardware, and user interfaces.

As the progression of these advancements persists, the cultivation and application of subject matter expertise and domain knowledge are expected to become more crucial in the creation and execution of comprehensive AI solutions, surpassing the significance of experience alone in machine learning. In [7], Dalal, Shekelle, Hempel, Newberry, Motala, and Shettybelieve that although domain knowledge cannot be commoditized, machine learning as a versatile technology for making decision has the potential to be commoditized in several ways. Predicting the duration of this process is challenging; nonetheless, the commencement of commoditization in AI/ML solutions is now evident and observable in practical contexts. Major providers of cloud like as MS Azure, AWS, and Google Cloudconsistently enhance their platforms as ML/AI, which are readily available for purchase via the model of SaaS (software as a service).

The implementation of fully automated machine learning systems has the potential to analytics democratize in many sectors and corporate activities, resulting in significant value improvements. Nevertheless, a challenge that arises in the implementation of improved analytics models and big data in the corporate sector pertains to decision-makers who exhibit a proclivity towards prioritizing tangible business outcomes and a need for conspicuous commercial value. In order to foster a data-driven culture inside organizations, it is essential to prioritize effective communication that emphasizes the realization of value. However, it should be noted that AutoML still lacks the capability to autonomously preprocess intricate datasets, a crucial and labor-intensive stage within the field of data science. Similarly, there is a need to transition from only providing prediction outputs to offering practical and implementable measures in the realm of prescriptive analytics. Corporations are compelled to depend on the recruitment of data science professionals or external consultants in order to facilitate the ongoing digital transformation projects, as long as the last stages of a comprehensive end-to-end process remain unresolved.

Furthermore, advancements in the realm of AI and automation have instilled apprehension among several workers about the potential replacement of their roles by AI technology. Consequently, this concern has led to a reluctance among employees to use such technology. It is important to acknowledge that there is a desire among workers for more autonomy in their job and the ability to exercise independent decision-making. Therefore, a shift towards an augmented workforce, in which contemporary analytics technologies facilitate human decision-making, is more advantageous. It is imperative to envision and endeavor towards a prospective scenario whereby people collaborate with highly capable intelligent systems to engage in co-creation. This collaborative effort has the potential to enhance empowerment of human, particularly in a swiftly evolving world that is increasingly characterized by automation and digitization.

Deep Learning

Deep learning may be seen as a variant of machine learning, distinguished by the fact that AI constructs neural networks throughout the learning process. In addition, the implementation of deep learning necessitates the involvement of a human operator, since the human serves as a model for artificial intelligence in understanding problem-solving approaches. This kind of learning is often used in multi-layered learning and is frequently used in the improvement of systems that are intricate intended to address complicated challenges. When discussing deep learning, it is important to emphasize its frequent use in data abstraction, which serves as the foundation for developing various degrees of learning and presenting data that forms the basis for AI-driven learning. Deep learning has been applied in various AI systems, encompassing domains such as speech recognition, image recognition, drug testing, toxicological diagnostics, and problem-solving assistance. Given the potential implications stemming from the use of deep learning, it may be utilized for several objectives, including enhancing safety via the identification of individuals posing a threat.

Neuron Networks

Neural networks have similarities to the structure and functioning of the human brain. This kind of AI learning has many interconnected aspects that facilitate learning via example-based methods. Neural networks are composed of several nodes, each assigned with specific tasks to facilitate the desired result for which the network was designed. According to Molina-Vilaplana, Feliu-Batlle, and López-Coronado [8], this kind of network has the potential to be used for the supervision and enhancement of intricate systems and processes. Organisms possess the ability to adjust to environmental conditions and may further enhance their development by assimilating a growing quantity of data present in their surroundings. In

practical applications, neural networks are used for the purpose of discovering solutions to non-linear issues. Therefore, issues that need thorough examination and the pursuit of resolutions. The fundamental components responsible for the proper operation of the neuronal network are nodes, which are assigned the roles of facilitating network connectivity and establishing communication with the surrounding environment.Moreover, each node inside a neural network performs a specific function, whereby input is processed and transformed into output according to the node's function.

The utilization of neural networks has become particularly relevant in the context of the emergence of Industry 4.0, as well as the advancements in big data and the storage of vast quantities of diverse data in databases. These databases serve as the foundation for leveraging the collected data for various purposes, which is contingent upon the design or structure of the neural networks. Furthermore, one of the primary applications of neural networks is decision-making. Neural network analysis is often used to generate decisions based on the completed analysis. The use of neural networks is often employed in the development of robust intelligent systems due to its resemblance to human learning processes. In essence, this system facilitates the use of AI to generate and enhance knowledge pertaining to a particular context, leveraging the data that has been gathered. Consequently, this system has the potential to allow the future development of decision-making capabilities, drawing upon the accumulated data.

III. APPLICATION OF AI IN BUSINESS

There are several advantages associated with the use of AI in the business sector. Furthermore, as the industry progresses towards the 4thindustrial revolution (Industry 4.0) and witnesses a growing adoption of AI, further benefits are emerging. By amassing and generating substantial volumes of data, companies have the capacity to use AI to undertake diverse simulations. These simulations facilitate the identification of forthcoming trends and the discernment of stakeholders' requirements within the organizational context. On the contrary, AI has the potential to be used for the purpose of performing risk assessments and giving simulations of potential risk-reducing strategies. It is critical to emphasize that the potential applications of AI are contingent upon organizational competency, as well as crucial technical and technological expertise. In addition, it is essential for the corporation to undertake a digital transformation of its business processes in order to effectively use artificial intelligence. The objective of modern transformation is to modify the existing model of business, so altering the conventional methods of doing business and transitioning the firm into the virtual realm. In addition to business alteration paradigm, the company has made substantial improvements in the efficiency and efficacy of its procedures.

Customer Relation Management

The need of customer relationship management (CRM) [9] stems from the recognition that effectively managing relationships with customers may provide many benefits, including enhanced customer loyalty and the ability to detect and meet consumer needs. In addition, prioritizing customer satisfaction is a key component of the quality management system outlined in the ISO 9001:2015 standard. AI is used in the context of responding to inquiries submitted by customers to the firm. The responses may be derived from the identification of client demands and the identification of issues faced by customers. In addition, AI may also be used for automated responses to consumer inquiries and requests. One example is the act of responding to telephone calls, as well as addressing inquiries on social networking platforms. These systems rely on machine learning techniques, and the primary objective for organizations using such systems is to enhance the efficiency and effectiveness of their operations.

Machine learning has led to a reduction in the response time for customers, as well as the ability to gather different kinds of customer-related information for further analysis. This data can be used to generate conclusions and create a virtual assistant. According to Reeves [10], using such an assistant has the potential to replace the need for human labor and thereby save expenses. In practical application, several firms choose to develop a virtual assistant as a means of engaging in connection with their clientele. According to Nikandrou and Papalexandris [11], these firms have seen a reduction of 30% in employee burden, resulting in the ability of workers to allocate their attention towards various activities.The reduction in burden is particularly evident in contact centers, where AI is capable of routing calls that cannot be handled by AI to human operators, while also addressing calls that can be handled by AI. AI has the capability to provide responses to queries that are regularly repeated or commonly asked. Moreover, the use of AI in contact centers may lead to the automated generation of data that can be subjected to analysis and employed for subsequent endeavors. Within the realm of literary study, Israel and Amer [12] have seen a discernible pattern whereby scholars engage in the creation and use of diverse virtual aides, often taking the shape of avatars.

Customers have the ability to pose inquiries, and an avatar will respond by drawing off past interactions with both other customers and prior queries.Typically, AI systems used for customer interactions rely on keywords and pre-established patterns. In essence, via the analysis of consumer behavior, AI acquires information about customers and may then use this knowledge to address future challenges. Despite the potential benefits, organizations may face issues associated with product replacement if their customers do not embrace new ideas and technology, such as AI.

Marketing and Sales

Digital marketing is a significantly impacted aspect of the AI revolution. Van Esch and Stewart Black [13] conducted a study on the domains within modern marketing that have already encountered the influence of AI and the subsequent

transformation it has brought to the digital marketing realm. In their study, Keegan, Canhoto, and Yen [14] sought to investigate the determinants influencing the adoption of AI within the field of marketing. The field of marketing has seen significant advancements due to the emergence of many applications of AI. Sultana, Turkina, and Cohendet [15] have provided a comprehensive analysis of the ecosystem of AI and the underlying technologies that support these marketing practices. In the realm of current marketing, the extensive scope and influence of online advertising have been subject to examination by Diwanji, Lee, and Cortese [16], who investigated the effects of artificial intelligence on programmatic advertising. Additionally, Drummond, O'Toole, and McGrath [17] conducted research proposing actionable steps to enhance digital marketing tactics.

Several recent studies have endeavored to investigate the influence of AI on the field of modern marketing, focusing on several study settings, including customer experienceand marketing academia. Sharma, Kalra, and Sharma [18] conducted an examination of specific modern applications, including the Amazon Collaborative Filtering and Amazon Flywheel Approach, with a focus on customer service and customer experience. In contrast, Brown [19] employed an interview-based methodology to gain insights into the factors influencing student interest in AI within marketing courses. A study conducted by Ljepava [20] examined the effects of AI-enabled digital marketing initiatives on financially disadvantaged consumers, representing a very selective investigation in this field. The study highlights the need of human connections to attain optimal consumer engagement and experience. Furthermore, it offers a theoretical framework that may serve as a vital conduit between financial services sector marketers and consumers who are at risk of financial hardship—an aspect of the business that has received little attention.

The field of social media marketing has seen significant changes as a result of advancements in AI. Several studies have been conducted to investigate the relationship between individuals' experience and their degree of understanding about the practicality of machine learning techniques in this domain. Chen, Xie, Dong, and Wang [21] proposed the possible applications of AI-based software within the context of programmatic advertising. The investigation of machine learning supervised methodologies applied to Twitter information has also been a subject of scholarly inquiry by Thakur, Gupta, Bhardwaj, and Verma [22]. Nadanyiova, Majerova, and Gajanova [23] conducted a study that is qualitative that employed comparative analysis of fuzzy-sets to classify the emerging causal configurations of AI-enabled software in marketing social media within the domain of digital marketing agencies. The study identified three distinct categories, namely image, sentiment analysis, and audience.

Risk Management

The primary premise of the quality management system is characterized by a risk-based approach. This pertains to the need of identifying hazards and establishing methods to mitigate its likelihood and impact. AI plays a significant role in the risk management process by analyzing various factors and providing recommendations on high-risk regions. This enables organizational management to proactively mitigate potential risks in those identified areas. For instance, by use of analysis, artificial intelligence has the capability to detect loans, credits, and other assets that pose a significant level of danger to the firm.

One notable use of AI may be seen within the insurance industry.These organizations have a crucial objective of mitigating risk associated with insurance policy issuance, as well as doing other forms of predictive analysis aimed at risk reduction. It is worth emphasizing that AI may be used in the assessment of credit loan approvals and the identification of credit risk for individual clients. In the field of history, insurance and credit firms have traditionally relied on professionals to do assessments. However, the emergence of AI technology has led to the substitution of these roles with AI systems. The primary benefit of using AI in relation to human experts is in its ability to reduce the time required for analysis and enhance the accuracy of the performed analysis. AI has shown a distinct capacity for effectively addressing risk management inside the supply chain, mostly due to the intricate nature of this system. Within the context of the supply chain, each business is confronted with inherent hazards, hence posing a formidable obstacle in the comprehensive analysis of risk across all entities within the supply chain.

The significance of incorporating risk analysis and risk management practices within the supply chain arises from the recognition that any delays in the availability of resources may lead to disruptions in the overall operational efficiency of the whole chain of supply. The use of AI in risk analysis within the chain of supply is seeing a reduction in complexity due to advancements in Industry 4.0 and technologies like big data and sensors. These technologies have the potential to gather targeted data and evaluate it in order to forecast future danger scenarios. It is important to emphasize that risk management is equally relevant to the field of AI. This is due to the potential for AI to pose risks to both people and systems, particularly when the AI system is built upon powerful AI. These systems have the potential to achieve self-sufficiency and may determine that human involvement is unnecessary for their regular operation. Consequently, this might lead to a decline in the need for human labor.

System Based on Knowledge

Knowledge-based systems, also known as expert systems, are used by organizational management to facilitate the decision-making process and address particular problems inside the company.This kind of system operates by gathering expertise from several professionals in a certain field. The use of specialized information serves as the input for AI. Once a knowledge base is established, AI may employ this knowledge to provide suggestions or assist in resolving particular

problems. The use of expert systems has particular relevance in the context of quality management, since it enables organizations to make informed choices based on the gathered factual information. Moreover, expert systems are often used inside the healthcare system to assist medical personnel in generating and searching for solutions to particular medical conditions. According to [24], the use of such a system in analysis may lead to a substantial improvement in the quality of the treatment being described by medical professionals. In addition, the use of an expert system extends to the generation and design of goods, as well as the assessment of the current functioning of those items. It is essential to emphasize that in order to ensure the proper operation of an expert system, a company must establish a knowledge base that serves as the foundation for performing various types of analyses.

IV. DISCUSSION

The field of modern marketing is progressively characterized by a reliance on data analysis, automation, and advanced cognitive capabilities. The concentrated and targeted strategy used in contemporary marketing has had a direct impact on the results of marketing efforts. The development of marketing has been significantly influenced by technological breakthroughs, leading to long-term changes. It has been firmly proven that marketing may effectively collaborate with AI to have a meaningful impact.

Based on prior scholarly investigations, [25] assert that when technology effectively engages individuals on a personal level, it fosters a strong emotional connection with users. Consequently, marketers that successfully use this relationship have the opportunity to generate substantial consumer value. According to [26], AI-powered marketing solutions that are advanced and inventive possess the ability to swiftly adjust to the evolving requirements of organizations. These solutions are capable of generating communication strategies and solution packages that are essential and profitable for the parties involved. In a publication by Nance [27], the Chief Executive Officer (CEO) of the Marketing Institute of AI introduced a novel paradigm for the marketing mix. This framework, often referred to as the 5Ps, encompasses Performance, Planning, Promotion, Personalization, and Production.

The issue of marketing AI-powered has gained raising importance and garnered increased interest among academics worldwide, in light of the significant potential that presently exists in the industry. A considerable body of existing literature exists about the independent assessment of the impact of AI on certain marketing activities. To far, there has been a lack of comprehensive research that systematically examines the impact analysis technique in the context of marketing, specifically in terms of identifying functional themes and sub-activity levers. Hence, it is essential to address this deficiency by a targeted investigation led by specific use cases.

The advent of artificial intelligence has significantly transformed the contemporary corporate landscape. The integration of AI offers several benefits to companies, enabling them to enhance their effectiveness and efficiency. However, this advantage comes at the cost of substantial financial investments required to establish the necessary infrastructure for the seamless operation of such a system. Moreover, in order to operationalize AI, it is necessary for each firm to undertake a process of digital transformation that pertains to the modifications in the operational procedures of various organizational units.Modern transformation is the process of converting conventional company practices into a system that is virtual, specifically using cloud technology. AI has the potential to greatly influence organizational performance due to its ability to undertake many types of analysis and aid in the decision-making process. The foundation for quality management inside an organization is in the decision-making process that is informed by recorded facts.

Moreover, with the use of predictive analysis facilitated by artificial intelligence, organizational management has the capability to simulate the potential impact of a given action on various segments inside the company. In the context of AI and quality management, it is worth noting that AI may be effectively used for the purposes of risk management and risk assessment, which aligns with the stipulations of the quality management system. Customer interactions is considered to be a crucial aspect of AI. The ISO 9001:2015 standard [28] emphasizes the notion of customer attention. In light of this, AI may be used in marketing and sales to gather diverse customer-related data. The data may be subjected to analysis, and the findings derived from this analysis can be used to enhance the quality of goods and services offered by the business, therefore contributing to its competitiveness in the market. The use of AI in marketing and sales has the potential to enhance customer satisfaction. This is mostly due to the capability of AI systems to promptly address client inquiries by providing comprehensive responses. The AI system has the ability to gather and analyze all inquiries posed by customers. This enables the business to generate organizational knowledge, which can be used in the future for problem-solving and enhancing goods and services.

Moreover, in the context of nonconformities, AI may be leveraged to address particular issues by drawing upon accumulated knowledge on problem-solving strategies. The feasibility of this proposition arises from the use of several forms of learning within the sector of AI, including deep learning, machine learning, and others. In the context of organizational knowledge and AI, the process of digital transformation and the integration of sensors, as well as the generation of large datasets, facilitate the ability of AI systems to extract information using various approaches of knowledge mining. Once organizational information is identified, it may be used for various purposes and preserved inside a knowledge base. This knowledge base can serve as a foundation for the development of long-term competitive advantages. Moreover, several firms exhibit varying levels of maturity in their AI systems and overall digital transformation efforts. In order to attain a heightened degree of maturity, it is essential for the business to prioritize the adequate education of its personnel, as well as foster technical and technological competence across the whole

organization. During the course of digital transformation and the integration of AI inside enterprises, several problems may arise, particularly pertaining to opposition from both workers and management within the firm. In order to effectively undertake digital transformation and apply AI, it is essential for a business to strategically design and execute initiatives that progressively integrate AI technologies.

Additionally, it is important to establish effective communication channels to disseminate information to all workers on the rationale for the organization's adoption of AI and the key benefits associated with its implementation within the organizational context. In the conducted research, Jung,Lee, and Hwang [29] have discovered a correlation between the quality management system and AI. This connection is evident through the implementation of AI in customer relationship management, resulting in enhanced satisfaction with products and services. Additionally, the utilization of AI in problem-solving and the identification of root causes facilitates the creation of improvements that can prevent future nonconformities. Moreover, AI has the potential to greatly influence the operational effectiveness of an organization by enabling predictive analysis and subsequent decision-making based on the outcomes of such analysis.

V. CONCLUSION

The fundamental principle underlying Industry 4.0 revolves around the integration of cutting-edge information technologies, with a particular emphasis on developing technologies like IoT, 6G and 5G networks, cloud computing, data analytics and management, blockchain, AI, and cloud computing. This integration aims to facilitate a comprehensive enhancement and transformation of the manufacturing sector, while simultaneously reshaping the value chain of both industry and society. There is a growing body of study that centers on the integration of governance of the industry, modern integration, industrialization and informatization, as well as the examination of particular technological and operational aspects. The emergence of Industry 4.0 has necessitated the pursuit of enhanced efficiency and effectiveness in business operations.Consequently, there is a growing need for the development of novel AI-based systems. The deployment of such technologies has resulted in changes in the paradigm of doing business, since it significantly impacts the routine running of organizations. Moreover, the introduction of automated technologies also leads to an escalation in the overall complexity of the organization, particularly in terms of management. Due to the inherent limitations of human ability, there exists a corresponding constraint in effectively managing complex systems. Consequently, the application of AI becomes important. AI has the potential to be used across several departments within a company, and may be effectively integrated into a wide range of organizational activities.

In essence, it may be used in the domains of marketing, customer relationship management, and risk management, among others. It is imperative to emphasize the need of upholding ethical standards while using AI due to the potential for misuse, which might pose a significant danger to the overall well-being of humanity.AI demonstrates its use in performing intricate data analysis tasks that often require humans much more time to complete in comparison to AI systems. Moreover, AI is used in performing predictive analysis, which has the potential to enhance the effectiveness of quality management. The implementation of AI inside an enterprise has the inherent danger of diminishing the need for human labor. However, it also presents the potential for generating novel job opportunities that are tailored to the unique requirements of AI, such as the development of specialized programs and software. Based on the findings of the study done, scholars of this article have determined that AI presents significant opportunities for all types of businesses. Moreover, it is observed that many firms in the present day have already used AI systems. The integration of AI inside businesses is not only important but also presents a viable opportunity for enterprises to get a competitive edge.

Data Availability

No data was used to support this study.

Conflicts of Interests

The author(s) declare(s) that they have no conflicts of interest.

Funding

No funding was received to assist with the preparation of this manuscript.

Ethics Approval and Consent to Participate

The research has consent for Ethical Approval and Consent to participate.

Competing Interests

There are no competing interests.

References

[1]. R. Engberg and P. Altmann, “Regulation and Technology Innovation: A Comparison of Stated and Formal Regulatory Barriers throughout the Technology Innovation Process,” Journal of technology management & innovation, vol. 10, no. 3, pp. 85–91, Oct. 2015, doi: 10.4067/s0718-27242015000300010.

[2]. R. Jallouli and S. Kaabi, “Mapping Top Strategic E-commerce Technologies in the Digital Marketing Literature,” Journal of Telecommunications and the Digital Economy, vol. 10, no. 3, pp. 149–164, Sep. 2022, doi: 10.18080/jtde.v10n3.554.

[3]. S. K. Srivastava, "Artificial Intelligence: Way Forward for India," IAES International Journal of Artificial Intelligence (IJ-AI), vol. 7, no. 1, p. 19, Mar. 2018, doi: 10.11591/ijai.v7.i1.pp19-32.

[4]. D. Chawla, "Who's the most influential biomedical scientist? Computer program guided by artificial intelligence says it knows," Science, Oct. 2017, Published, doi: 10.1126/science.aar2436.

[5]. C. G. Sheril and C. N. Aulina, "Improving The Ability To Recognize Number Symbols Through The Manipulative Numbers Dice Game In Children Ages 3 – 4 Years," Academia Open, vol. 5, Aug. 2021, doi: 10.21070/acopen.5.2021.2222.

[6]. S. Bilotta and P. Nesi, "Traffic flow reconstruction by solving indeterminacy on traffic distribution at junctions," Future Generation Computer Systems, vol. 114, pp. 649–660, Jan. 2021, doi: 10.1016/j.future.2020.08.017.

[7]. A. K. Sangaiah, A. Javadpour, C.-C. Hsu, A. Haldorai, and A. Zeynivand, "Investigating Routing in the VANET Network: Review and Classification of Approaches," Algorithms, vol. 16, no. 8, p. 381, Aug. 2023, doi: 10.3390/a16080381.

[8]. J. Molina-Vilaplana, J. Feliu-Batlle, and J. López-Coronado, "A modular neural network architecture for step-wise learning of grasping tasks," Neural Networks, vol. 20, no. 5, pp. 631–645, Jul. 2007, doi: 10.1016/j.neunet.2007.02.003.

[9]. S. Murugan and Anandakumar H., "Study of Efficient Hybrid Wireless Networks Using QoS-Oriented Distributed Routing Protocol," Cognitive Social Mining Applications In Data Analytics And Forensics, Pp. 213–235, 2019, Doi: 10.4018/978-1-5225-7522-1.Ch011.

[10]. T. Reeves, "The Need for a Human Capital (Education-Labor) Sector," SSRN Electronic Journal, 2021, Published, doi: 10.2139/ssrn.3927722.

[11]. I. Nikandrou and N. Papalexandris, "Employee responses to acquisitions: evidence from Greek firms," Employee Relations, vol. 30, no. 2, pp. 104–120, Jan. 2008, doi: 10.1108/01425450810843311.

[12]. M. J. Israel and A. Amer, "Rethinking data infrastructure and its ethical implications in the face of automated digital content generation," AI and Ethics, vol. 3, no. 2, pp. 427–439, May 2022, doi: 10.1007/s43681-022-00169-1.

[13]. P. van Esch and J. Stewart Black, "Artificial Intelligence (AI): Revolutionizing Digital Marketing," Australasian Marketing Journal, vol. 29, no. 3, pp. 199–203, Aug. 2021, doi: 10.1177/18393349211037684.

[14]. B. J. Keegan, A. I. Canhoto, and D. A. Yen, "Power negotiation on the tango dancefloor: The adoption of AI in B2B marketing," Industrial Marketing Management, vol. 100, pp. 36–48, Jan. 2022, doi: 10.1016/j.indmarman.2021.11.001.

[15]. N. Sultana, E. Turkina, and P. Cohendet, "The mechanisms underlying the emergence of innovation ecosystems: the case of the AI ecosystem in Montreal," European Planning Studies, vol. 31, no. 7, pp. 1443–1465, Mar. 2023, doi: 10.1080/09654313.2023.2185502.

[16]. V. S. Diwanji, J. Lee, and J. Cortese, "Deconstructing the role of artificial intelligence in programmatic advertising: at the intersection of automation and transparency," Journal of Strategic Marketing, pp. 1–18, Nov. 2022, doi: 10.1080/0965254x.2022.2148269.

[17]. C. Drummond, T. O'Toole, and H. McGrath, "Digital engagement strategies and tactics in social media marketing," European Journal of Marketing, vol. 54, no. 6, pp. 1247–1280, Mar. 2020, doi: 10.1108/ejm-02-2019-0183.

[18]. S. Sharma, M. Kalra, and A. Sharma, "Amazon customer service: Big data analytics," Model Assisted Statistics and Applications, vol. 17, no. 4, pp. 231–237, Dec. 2022, doi: 10.3233/mas-220403.

[19]. R. C. Brown, "A Relational Model of Factors Influencing Methodology in Professional Services Marketing," Journal of Professional Services Marketing, vol. 1, no. 1–2, pp. 35–39, Sep. 1985, doi: 10.1300/j090v01n01_06.

[20]. N. Ljepava, "AI-Enabled Marketing Solutions in Marketing Decision Making: AI Application in Different Stages of Marketing Process," TEM Journal, pp. 1308–1315, Aug. 2022, doi: 10.18421/tem113-40.

[21]. G. Chen, P. Xie, J. Dong, and T. Wang, "Understanding Programmatic Creative: The Role of AI," Journal of Advertising, vol. 48, no. 4, pp. 347–355, Aug. 2019, doi: 10.1080/00913367.2019.1654421.

[22]. H. K. Thakur, A. Gupta, A. Bhardwaj, and D. Verma, "Rumor Detection on Twitter Using a Supervised Machine Learning Framework," International Journal of Information Retrieval Research, vol. 8, no. 3, pp. 1–13, Jul. 2018, doi: 10.4018/ijirr.2018070101.

[23]. M. Nadanyiova, J. Majerova, and L. Gajanova, "Digital marketing, competitive advantage, marketing communication, social media, consumers," Marketing and Management of Innovations, vol. 5, no. 4, pp. 92–103, 2021, doi: 10.21272/mmi.2021.4-08.

[24]. A. Haldorai and K. K, "An Analysis of Software Defined Networks and Possibilities of Network Attacks," Journal of Machine and Computing, pp. 42–52, Jan. 2022, doi: 10.53759/7669/jmc202202006.

[25]. R. Subha and A. Haldorai, "An Efficient Identification of Security Threats in Requirement Engineering Methodology," Computational Intelligence and Neuroscience, vol. 2022, pp. 1–14, Aug. 2022, doi: 10.1155/2022/1872079.

[26]. S. K. Pawar and S. A. Vispute, "Exploring international students' adoption of AI-enabled voice assistants in enrolment decision making: a grounded theory approach," Journal of Marketing for Higher Education, pp. 1–20, Jul. 2023, doi: 10.1080/08841241.2023.2239720.

[27]. J. J. Nance, "The Chief Executive Officer (CEO) and Communications," ABCA Bulletin, vol. 43, no. 4, pp. 3–4, Dec. 1980, doi: 10.1177/108056998004300403.

[28]. A. Szkiel, "Customer Focus in the Requirements of ISO 9001:2015 Standard," Marketing iZarządzanie, vol. 44, pp. 83–93, 2016, doi: 10.18276/miz.2016.44-07.

[29]. I. H. Jung, J. M. Lee, and K. Hwang, "Smart Parking Management System Using AI," Webology, vol. 19, no. 1, pp. 4629–4638, Jan. 2022, doi: 10.14704/web/v19i1/web19307.