

The Effects of AI on Companies: AI-driven Research and Innovation to AI-driven Market Deployment and Future Business Model Changes

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ABSTRACT

This study examines the transformational impacts of Artificial Intelligence (AI) on enterprises, including research and innovation, market implementation, and alterations in business structures. This report examines breakthroughs in AI technology and their incorporation into strategic operations, revealing how prominent firms and start-ups use AI to enhance growth, efficiency, and consumer engagement. A three-dimensional framework centred on AI research and innovation, automation-induced organisational transformations, and AI-affected business environments directs the examination. The advancement of AI is instigating significant transformations in business models, including the proliferation of AI-driven personalised services, the automation of essential operations, and the advent of novel income sources like AI-as-a-Service platforms. These transformations need that firms reevaluate value generation, customer connections, and operational strategies to maintain competitiveness in an AI-driven market. Utilising secondary data from 2023–2024, the research assesses worldwide patterns, sector-specific effects, financing dynamics, and the regional distribution of AI development. Research indicates that while AI facilitates substantial productivity improvements and market innovation, it concurrently presents problems like algorithmic bias, transparency concerns, and geographical inequalities in access. The research finds that inclusive policies, ethical norms, and education are vital for achieving fair and sustainable advancement in AI.

KEYWORDS: - Artificial intelligence (AI), business value, digital transformation, impact, business strategy.

1. INTRODUCTION

The internet of things (IoT), data science, big data, cloud computing, artificial intelligence (AI), and block chain are some of the new technologies that are contributing to a transformation in the ways in which people live, work, and consume entertainment. The further development of these technologies has the potential to contribute to the development of hyper automation and hyper connection, which would lead us to the beginning of the Fourth Industrial Revolution, often known as Industry 4.0 [1]. In the first place, the development of artificial intelligence is the driving force behind the improved performance of all other technologies as well as the progression of Industry 4.0. This technical progress, which may be ascribed to artificial intelligence, would make it easier for humans to engage with machines, alter the

logic of business models, and bring about a transformation in the way people live their lives and the standards of living they have. [2]

The use of artificial intelligence is leading to a world that is more intelligent and inventive. There are many instances of artificial intelligence technical advances that are simplifying our lives. Some examples include the mapping of routes and traffic by Google Maps, the assessment of trip prices by Uber and Lyft, the suggestion of friends' tags on Facebook, spam filters found in our email, recommendations for online shopping, and the identification of disease. The rapid rate at which artificial intelligence is making its way into every industry is compelling businesses to compete with one another in order to transform their organisation into an AI firm. [4] As a result of this, businesspeople, strategists, pioneers, entrepreneurs, and investigators are being compelled to employ artificial intelligence in order to devise new strategies and develop new sources of commercial value. Andrew Ng, who is a co-founder of Google Brain, a former vice president and chief scientist of Baidu, a co-chairman and co-founder of Coursera, and an adjunct professor at Stanford University, made this statement in 2017 at the Stanford MSx (Master of Science in Management for Experienced Leaders) Program [5].

"Just like electricity revolutionised nearly every industry a century ago, I'm finding it difficult to imagine a sector that AI won't shake up in the coming years."

One of the six most influential minds in the fields of artificial intelligence and machine learning, Professor Ng is not only a well-known computer scientist and AI entrepreneur, but he is also one of the six top thinkers in these fields. As a result, it is essential to give serious consideration to the far-reaching consequences that artificial intelligence will have on countries, neighborhoods, enterprises, and individuals. The purpose of this article is to explore the influence that artificial intelligence has had on the global market and the aims of organisational strategy, as well as its role in the transformation of corporate environments. Academic achievements and developments in artificial intelligence will also be taken into consideration. [6]

The role that research plays in the development of new technologies and discoveries is becoming more important. The process of research and innovation helps to the expansion of the economy by encouraging the development of new markets and the improvement of existing ones. According to Neo-Schumpeterian Economics, a new school of thought in growth economics [7], the dynamics of the economy are driven by three primary factors: innovation, knowledge, and entrepreneurialism. Neo-Schumpeterian economics is characterised by its focus on novelty and uncertainty, with innovation serving as a notable example of the former. This is one of the distinguishing characteristics of the economic theory. Therefore, innovation, and more especially, technological innovation, is the primary force that drives the dynamics of the economy.

the fact that information, and more specifically scientific knowledge, is regarded to be the second most important driving force of economic dynamics, Neo Schumpeterian Economics is based on the idea that learning and searching experimentally in contexts that are always changing form its foundation. The role of an entrepreneur, which is defined as an economic operator who initiates economic progress by bringing innovations, has been accorded substantial importance. The formation of new industries is driven by innovation, supported by knowledge, and tested by entrepreneurial activity, as stated by Neo-Schumpeterian Economics. Therefore, innovation, knowledge, and entrepreneurial action are the three fundamental driving factors of economic dynamics, according to Neo-Schumpeterian Economics.

Learning and exploring experimentally in contexts that are constantly changing form the basis of Neo Schumpeter Economics. This is due to the fact that information, and especially scientific knowledge, is

seen as the second most important force driving economic dynamics. There has been a lot of focus on the entrepreneur's function, which is defined as an economic actor who starts economic growth by introducing innovations. According to Neo-Schumpeterian economics, new industries are created by invention, which is backed by knowledge, and tested through entrepreneurial activity. Neo-Schumpeterian economics postulates that innovation, knowledge, and entrepreneurial activity constitute the trifecta of essential forces propelling economic dynamics. [8]

As the core focus of our inquiry, we have chosen to focus on the theory and algorithms that underpin AI-driven systems. We needed information on recent developments in data processing and production, learning algorithms, and efficient applications of artificial intelligence in order to do this. In order to collect this information, we went through a large number of research articles that were published in reputable publications and conferences over the course of the past fifteen years (2003-2018). Additionally, we investigated various datasets and the businesses that provide them, and we found intelligent equipment and services that are currently available for purchase. There is a technical revolution taking place throughout the whole market as a consequence of the buzz and success that are generated by AI algorithms.

This change is creating a deluge of AI-based start-ups while simultaneously compelling many established businesses to adopt AI. As a result, we were able to pinpoint the AI-driven strategic ambitions of major corporations in the second dimension, allowing them to expand more rapidly by using cutting-edge AI technology. We analysed the finances of major players in the artificial intelligence (AI) industry, including Google, Apple, Amazon, Microsoft, and IBM. All of these firms, with the exception of IBM, have emerged as market leaders in the previous forty years. We expanded our study to include leading AI start-ups in 2023 and 2024 to have a deeper grasp of how AI will affect enterprises. [9]

In order to choose the aforementioned artificial intelligence firms (and start-ups) and carry out their investigation, we combed through a huge number of research blogs, recent reputable conferences, their sponsors, AI start-up acquisitions, market intelligence reports, stock market websites, corporate websites, and official blogs. The incorporation of artificial intelligence technology into business processes leads to the transformation of the business environment. As a consequence, we investigated the impact that AI has on business contexts in the third dimension.

The necessary data were taken from many sources, including corporate news announcements, annual reports of the firms, innovation trend studies, and research papers that were published by organisations that provide market intelligence, such as Gartner, Forrester, and IDC, amongst others. According to the findings of our investigation, there are three business contexts that are significantly impacted as a result of the implementation of AI-driven systems. These contexts are Customer Interaction, Sales Platform, and Employee Skill Set respective.

1.1 The Importance of AI in Advertising

Artificial intelligence (AI) is a fascinating and cutting-edge technology that has the potential to improve the content strategy that an organisation currently employs. Under this umbrella term, a wide variety of different sorts of technology are covered, such as machine learning, computer vision, deep learning, natural language processing, and a great deal more. The effect that machine learning has on the landscape of digital marketing is significant because of the data-analysis skills and analytical tools that it has. Consequently, it makes it easier for marketing teams to conduct assessments depending on customer demands. Through the automation of processes that are repetitive, organisations have the opportunity to

allocate additional resources to other aspects of digital marketing. There will be repercussions that are far-reaching as a result of the huge and ongoing technological advancement that is artificial intelligence. In light of this, artificial intelligence should be used by digital marketers in order to enhance productivity and foster innovation in the years to come [10].

It is feasible that artificial intelligence (AI) may assist marketers in gaining a deeper understanding of their customers, identifying them with more precision, and directing them to the subsequent stage of their journey in order to provide them with the best possible experience. Marketers have the potential to increase return on investment (ROI) without squandering money on activities that are fruitless if they investigate consumer data and get a grasp of the demands and requirements of customers. It is also possible that they would avoid advertisements that are obtrusive and that consumers find bothersome [11, 12].

Because of AI, marketing will be customised in a number of different ways. The use of artificial intelligence (AI) to personalise different types of information, including websites, emails, social media posts, videos, and more, is already being used by a number of businesses in order to better satisfy the needs and desires of their clients. The automation of activities that formerly needed the intellect of humans is one of the primary goals of artificial intelligence (AI). When the amount of labour resources required to finish a project is decreased, or when the amount of time a person spends on activities that are repetitive, significant efficiency improvements are attainable [13, 14].

2. OBJECTIVES

1. To investigate how AI is changing product development cycles and strategic innovation processes in various industries.
2. To study the worldwide patterns of AI implementation and determine which nations and companies are spearheading the AI transformation.
3. To assess how incorporating AI will change company structures, how markets will change, and how future business models will develop.

3. RESEARCH METHODOLOGY

3.1 Data Collection

This research used secondary data from a variety of reliable and up-to-date sources from 2023 to 2024 to assure dependability and validity. The strategic implementation of AI was revealed by Google, Amazon, Microsoft, IBM, and Tesla studies. IEEE, ACM, Nature AI, and Elsevier peer-reviewed research publications provided academic depth. Technology news sites including MIT Technology Review, Wired, Forbes Tech, and TechCrunch covered current events. Gartner, McKinsey, PwC, and Statista publications examined market dynamics and investment patterns. The US, China, India, UK, and Canada examined their AI policies and financing projects. Business performance data and news releases from Bloomberg, Nasdaq, and company announcements were supplemented with expert conversations and technological white papers from GitHub, Reddit AI, and Kaggle.

3.2 Time Frame

Artificial intelligence (AI) saw significant commercial momentum during the years 2023 and 2024 as a result of breakthroughs in machine learning, deep learning, big data analytics, and improvements in computational infrastructure (such as graphics processing units (GPUs), centralised processing units (CPUs), and cloud computing). This is the reason why the time period selected for data collection is 202

3 to 2024.

3.3 Current AI State: Datasets, Algorithms, and Products

The field of "Artificial intelligence" [15] was formed in 1956 by John McCarthy, who had previously worked as a professor of computer science at Stanford University and had since resigned. It was during the early stages of artificial intelligence (AI) that he was the driving force behind the now-famous Dartmouth conference, which was held at Dartmouth College in Hanover. He was of the idea that there will be processes that contribute to the development of intelligence on par with that of the human race. Firschein and Coles [16] made a prediction that by the 1990s, there would be twenty-one different things that may be introduced as a result of improvements in artificial intelligence. There are some of the products that they anticipated that have already been realised, and they are included in Table 1. You may see how far artificial intelligence has evolved in the last 48 years by looking at this table.

Table 1. Definitions of AI technology and their current state

S. No.	Products postulated	Abilities proposed	Today's Reality
1.	Automatic language translator	"A language translation tool that can accurately translate written information from one language to another, whether it is academic or business-related."	Google Translator, Bing Microsoft Translator
2.	Automatic identification system	"Automated method of identifying a person using biometric data (fingerprints, voice, face, etc.)"	Apple Face ID, Mastercard Identity Check with NuData Security.
3.	Automatic diagnostician	"A medical diagnostic system that can evaluate biological tests, ask the patient questions, and provide an interactive or automated diagnosis based on all of this information."	Qualcomm Tricorder, Medtronic Sugar. IQ Cognitive App in collaboration with IBM Watson.
4.	Industrial robots	"An industrial robot that can work independently in an automated setting, use its vision and manipulation abilities to check and assemble products."	Kiva warehouse robots, FANUC intelligent robots, Mitsubishi Robots
5.	Robot chauffeur	"Automated vehicles equipped with optical sensors that can navigate typical urban and rural roadways"	Google Waymo, MercedesBenz E-Class, Volvo XC60
6.	Universal game player	The ability to manage the system's degree of expertise in a variety of games, including chess, checkers, go, bridge, scrabble, monopoly, and more."	AlphaGo, Deep Blue

After the initial euphoria, there were budget cutbacks, which are sometimes referred to as "AI winters." Artificial intelligence has not had an easy ride. This is despite the fact that 'deep learning' neural networks, which consist of numerous hidden layers, have pushed artificial intelligence back into the limelight. The development of artificial intelligence may be attributed, in large part, to two essential

factors: the availability of enormous quantities of data (also known as "big data") and hardware accelerators (also known as "GPUs" and "TPUs") [17].

An intelligent agent, often known as an IA, is the engine that allows all of the practical applications that are stated in table 1 to function. A cyclical cycle of detecting, thinking, and action governs its response to the environment in which it finds itself. Big data is analysed in order to discover suitable representations on several levels, understand connections, extract characteristics, and discover similarities. This is accomplished by delving into the incoming data. Previously, artificial intelligence (AI) was hampered by a deficiency in both data and technology that was both effective and efficient. In recent years, there has been a profusion of affordable sensors that are efficient with power, which has led to an explosion in the collection of data. An analysis of a provider directory is carried out in order to shed light on the number, diversity, and accessibility of datasets that are based on the internet.

Support vector machines (SVMs), decision trees, Bayesian methods, deep learning networks (DLNs), and ensemble configurations are some of the machine learning and artificial intelligence technologies that are needed for the next step: exploring the input data. In recent years, DLNs have emerged as the most common method among these options. However, due to a lack of data and processing speed, these DLNs remained in theory and practice since 1943. Graphics processing units (GPUs) from NVIDIA made it possible for researchers to train neural networks at a rate ten to twenty times quicker [18] than with traditional computers. Several DLNs have shown performance that is superior to that of humans on certain tasks. Machine vision, voice recognition, text analysis, and video games are the four main categories into which the most effective AI applications fall [19, 20].

Table 2 summarizes a brief description of each DL area, their successful applications and the DL algorithms preferred for each area.

Broad areas	Description	Applications	Deep learning algorithm
Computer Vision	speech-to-text translation A voice search and phone call	Recognition of faces, reconstruction of images, computer-assisted diagnosis (CADx), tally of people, identification of gestures and iris patterns, detection of product defects	Convolutional Neural Networks (CNNs)
Text Analysis	Extracting useful knowledge from text data is the main emphasis here.	Data mining, Responding to questions (Q/A), Platforms for online search, Processing of Queries, Service Suggestion/Customization, Personality assessment, Synopsis of documents, Prevention of fraud, Forecasting demand, Positioning in product search results, Translation	Gated-Recurrent Neural Networks (RNNs) (both Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU))

Speech Recognition	Machines that can understand and carry out spoken commands are the focus of this field.	text-to-speech conversion Dialling and voice search	CNNs, RNNs, and their combination
Game playing	Machines that can compete in games against both humans and other AIs are the focus of this field.	Go, Chess, Atari	Policy Gradient Reinforcement Learning, Deep Autoencoder, Deep QNetworks.

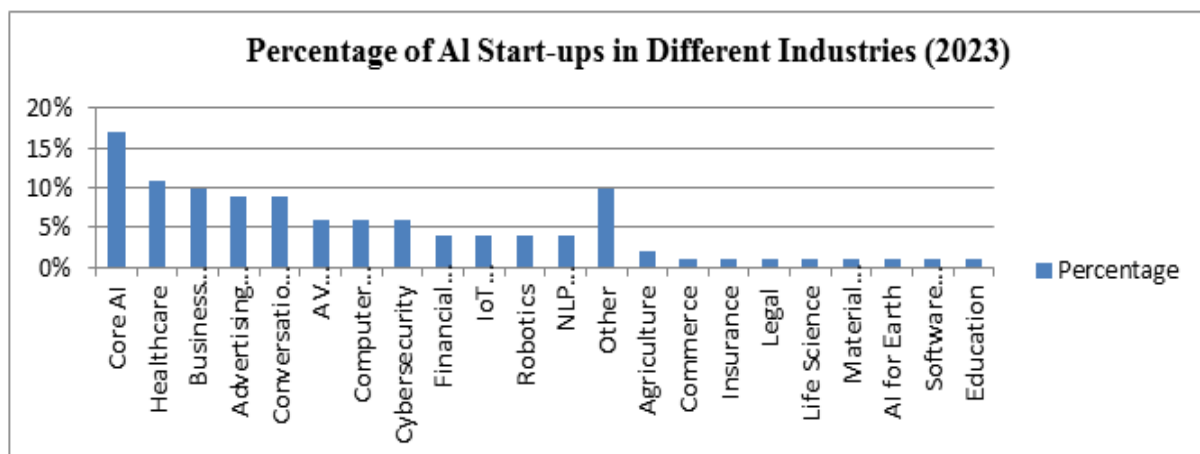
Many established businesses have shifted their focus to artificial intelligence (AI) because to the recent success and excitement around DLNs, and a dizzying array of new AI-focused startups have emerged. The next part delves into an analysis of the top 200 AI start-ups, examining the steps taken by investors and entrepreneurs to provide AI-based services to both established and emerging sectors.

4. RESULT

Researching the revolutionary effects of AI on companies can benefit greatly from studying start-ups, which are seen as the engine of economic development and innovation in a knowledge-based society. Two top-100 AI startup lists compiled using CB Insights' Mosaic methodology are taken into account. According to the algorithm, the best AI startups are determined by looking at metrics such as profile, mosaic score, funding history, investor quality, business model, funding history, etc. The lists were made accessible after the Mosaic method was used to investigate over 1600 and over 2000 worldwide start-ups, respectively. Following this, the list of AI startups for 2023 will be referred to as AI23, and for 2024, it will be referred to as AI24.

4.1. Sectors and Industries

AI start-ups globally are classified into 22 distinct sectors, including autonomous cars, business intelligence, and healthcare. Figure 1. Illustrates the proportion of 200 AI start-ups (AI23 and AI24) throughout all sectors, including all domains where AI is exerting its influence. The proliferation of AI is seen across several sectors, including education, healthcare, domestic environments, and industry; its use and exploration are ubiquitous.



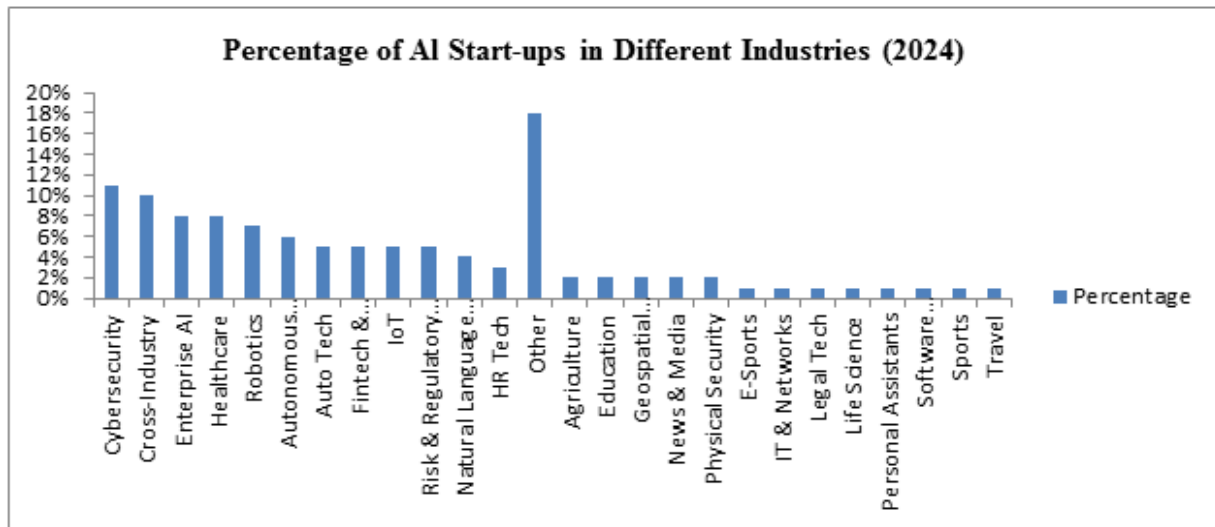


Fig. 1 Percentage of AI start-ups in different industries for (a) 2023 (b) 2024

In AI23, Core AI received the most focus, and in AI24, cybersecurity reaped the most benefits from AI. This is shown in Fig. 1. Cybersecurity, healthcare, enterprise AI, core AI, business intelligence, and cross-industry were the top six AI23 and AI24 industrial sectors, according to the data analysis.

Technology and process-oriented improvements are being developed by these leading AI start-ups, which will soon lead to efficiency benefits and new commercial prospects. We take a look at a few of the processes that fall within the aforementioned top six industrial sectors, which are likely to cause technical shifts in the international market. Personalised product search and suggestion, automated manufacturing, consumer segmentation, cyber-attack prediction, virtual nurses, robotic surgery, medical image analysis, and drug development are some of the processes involved.

4.2. Financial Support

Investment in artificial intelligence (AI) startups throughout the world has skyrocketed in recent years, going from a relatively small sum to several billion dollars. This upsurge exemplifies how investors are becoming more and more convinced about AI's promise. The United States has attracted the lion's share of investments in the AI revolution, positioning itself as a worldwide leader. During this time, there has been a noticeable pattern of uneven financing across different industries. One such business is the news and media, which had the largest investment share of 25.22% while only accounting for 2% of AI start-ups. This shows that investors are paying attention to key industries with high impact potential, even if there are fewer active start-ups in these sectors.

Sound Hound Inc. of California and Byte Dance of Beijing, both of which are start-ups, have reaped a large share of the worldwide investment boom. Their primary goal is to streamline interactions between humans and machines by using cutting-edge AI. With its Hound and Sound Hound devices, which use artificial intelligence for music and voice recognition, Sound Hound Inc. makes it possible to use smartphones without using your hands. Toutiao, developed by ByteDance, has over 120 million unique users each day and uses artificial intelligence to tailor news distribution and identify bogus news. This is just a few instances of how AI is changing our digital lives and improving our daily interactions with technology.

4.3. Geospatial Examination

Presented below are key takeaways from the analysis of AI23 and AI24's distribution throughout differe-

nt regions. In Fig. 2, we can see the global distribution of AI23 and AI24 start-ups. Among the most striking findings from the data study was the fact that just 13 out of 195 countries have top AI start-ups; this amounts to 6.6% of the world's nations. About three quarters of all start-ups are based in the United States, with the vast majority of them in Silicon Valley, California, the global epicenter of artificial intelligence. America is therefore at the forefront of this transformation.

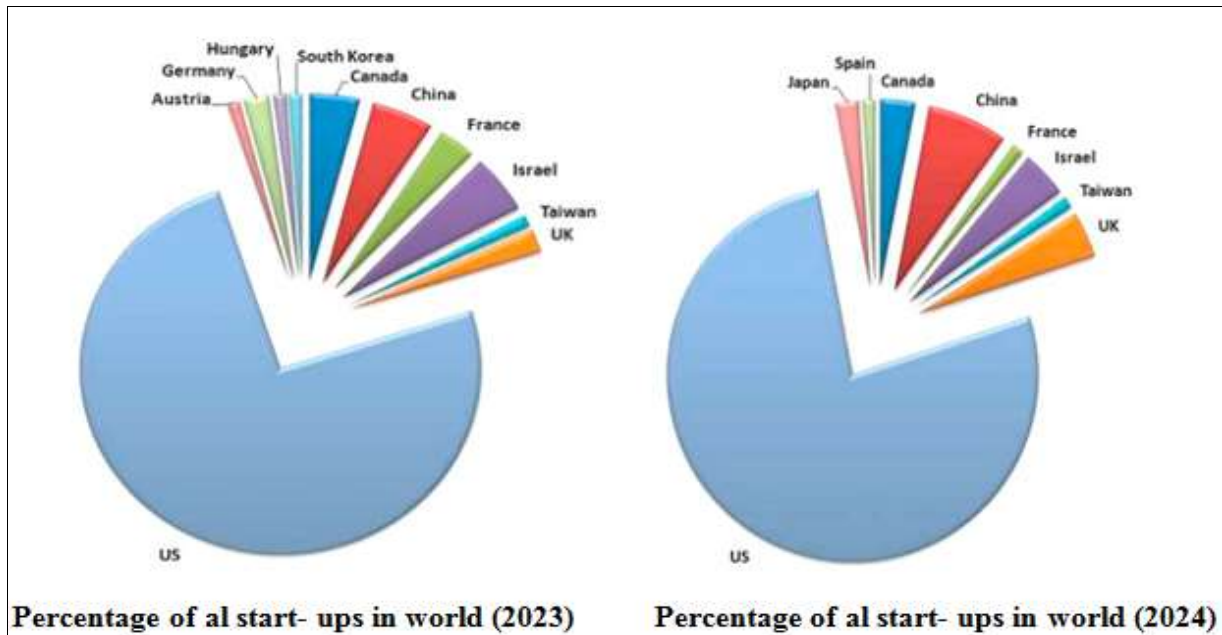


Fig. 2 Percentage of AI23 and AI24 in different parts of the world

5. DISCUSSION

This study traces the development of artificial intelligence (AI) from its infancy as a set of theoretical concepts to its current state as a marketable technology, highlighting important turning points and technical advances along the way. Two enabling elements, the availability of sophisticated processing units like GPUs and TPUs, and the abundance of massive data, have primarily propelled the exponential rise of AI. With the help of chosen algorithms and practical applications, four primary areas of deep learning—computer vision, natural language processing, voice recognition, and reinforcement/game learning—have grown into game-changing fields, often outperforming human accuracy. Contributing to the democratisation of AI research and development, the study also offers a curated collection of open-access datasets.

An examination of the 200 most prominent AI start-ups demonstrates the causal relationship between state-of-the-art AI research and its effect on international marketplaces. There has been a dramatic uptick in investment in artificial intelligence solutions over the last six years, and these initiatives are indicative of that. Opportunities and threats are most concentrated in some critical areas, including healthcare, business intelligence, cybersecurity, core AI infrastructure, sales and marketing, and core AI infrastructure. Using data analytics, cognitive technologies, and AI-powered automation, businesses are seeing real benefits including increased productivity, quicker decision-making, lower costs, and a better customer experience.

Important problems are also highlighted by the study. An "AI divide" has emerged as a result of the present regional concentration of AI development; this trend, like the digital divide before it, threatens to

accentuate existing socioeconomic and cultural disparities. There are trust and dependability issues with software-based AI systems being the most popular. Despite their impressive capacity, deep learning models aren't always transparent, interpretable, or reproducible, which might cause systemic weaknesses and unexpected results. The responsible and secure implementation of AI systems is already challenging enough without having to contend with ethical concerns, algorithmic prejudice, and the worldwide scarcity of trained AI experts.

6. CONCLUSION

The purpose of this research is to provide light on the revolutionary effects that Artificial Intelligence (AI) will have on corporate operations, innovation cycles, and future concepts for business models. It sheds light on the ways in which artificial intelligence-driven technologies are redefining businesses by increasing efficiency, automating processes, and more effectively engaging customers. These technologies are producing new income streams and modifying old business tactics. The findings of this study demonstrate that artificial intelligence is a fundamental factor in the developing digital economy. This is shown by the analysis of global trends, investment patterns, and sector-specific changes. However, in order to effectively capitalise on its advantages, it is necessary to address the issues associated with algorithmic bias, uneven access, and lack of transparency. This may be accomplished by the implementation of inclusive policies, ethical frameworks, and ongoing education.

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