

Analysis of the Economic Impact of Artificial Intelligence in The United States

Xintong Zhou *

School of Shanghai, Qibaodwight high school, Shanghai, 201100, China

* Corresponding Author Email: xtzhou_monica@qibaodwight.org

Abstract. This paper aims to thoroughly analyze the economic impact of artificial intelligence (AI) in the United States, considering its rapid development and the country's position as a global leader in scientific and technological advancements. The primary focus of this article revolves around the domains of AI, profitability and investments, and market and industries. Undoubtedly, the economic impact of AI is significant, yet it remains largely unprecedented. The AI market exhibits immense potential, as evidenced by the increasing trends in investments and profitability. The continuous growth in these areas signifies the rising interest and confidence in AI technologies. Moreover, the overall economic landscape is experiencing an upward trajectory, driven by the competitive spirit and collaboration among industries. The innovative applications of AI have revolutionized various sectors, providing substantial assistance to workers across diverse fields. However, it is important to acknowledge that the rapid evolution of AI may also lead to a reduction in job opportunities. As AI continues to advance, certain tasks traditionally performed by humans may become automated, potentially impacting employment prospects. Consequently, the future of AI development remains uncertain, with both promising opportunities and potential challenges lying ahead. Nonetheless, the economic impact of AI cannot be underestimated.

Keywords: Artificial intelligence; profit; employment.

1. Introduction

Artificial intelligence is the new background of most countries nowadays, especially for some technology advanced countries. The idea about artificial intelligence was first being created since 1950s when a journal article was published by Alan Turing [1], and the article proposed an idea called limitation Game. At the beginning, these are only based on very basic code and the utility of key words. Through the development of technology, an important part of artificial intelligence was developed, which is called machine learning. This idea is a process of self-learning, which means that the machine learns different kinds of knowledge and information by itself and began to realize the fundamental communication between artificial intelligence and people. In 2010, an area in the artificial intelligence appeared, that is artificial neural networks. The idea was applied in Microsoft and also based on certain patterns for final application. However, the field of text is based on the system called recurrent neural network which needs a change of system so that the texting area could be better developed. After Google proposed the idea of transformer, the field of text in artificial intelligence was greatly improved as it can self-learn loads of words at the same time. The company called openAI was established after the investment of many well-known investors, from then on the field of artificial intelligence gradually became part of the world with stronger algorithms and better economic support. Till now, Generative artificial intelligence (AI) is leading the market which means it possess even creativity [2].

With rapid growth of technology, artificial intelligence's potential in the market is rapidly developing, the innovation of artificial intelligence will have impact on the characteristic products, raise industries productivity and cause changes in the demand and supply of these products related to the technique of artificial intelligence. Although the field of artificial intelligence might cause expansion in the market and economic volume, but there are also other factors that needs to be considered including the outlook of artificial intelligence such as employment rate and so on. The field of artificial intelligence is closely connected with the society. United States possess major companies such as Microsoft, Google and so on that put AI into application. US is one of the leading

countries in artificial intelligence development and can also be seen as an identical country in AI field so the analysis of economic impact will be focus in the country broader. The analysis of economic impact of artificial intelligence in the United States is the main focus of the article. From the perspective of profit, market scale, industries, policies and outlook. Various factors will lead to various results of the development of artificial intelligence field. The article will begin with discussing the research and development of this area, analyse the profit and innovation that AI brought to the United States. Then came to the part of economic benefit, which was separated in to three modules, which is the appropriation of funds, the cost and expenditure and the revenue. After that, the market scale of AI is discussed which is also separated into regional market, US market in international market and global influences three modules. Next is the industries in United States that focus on artificial intelligence development. This can be dispersed in two modules which are the innovation system in the industry and the profit gained through competition between industries. Perspective of policies in US towards artificial intelligence is listed first and then analyze the impact it made towards AI economic development. Finally, the article is concluded with main ideas above and discussed about the outlook or the future of the development of artificial intelligence field that includes the potential of this field, and the unemployment rate AI might be brought to the US and global societies. Whether the utility of AI is useful, or people have not been ready to open the new market entirely yet is worth finding out.

2. Research and Development

2.1. Research of Profit and Factors

Search for United States GDP, AI investment from several companies, model improvement of each type of artificial intelligence, application of models, test rating, parameter scale development and accuracy improvement's information and data to prepare for the analyze afterwards.

2.2. Development Caused by the Innovation

With strong investments put into the field of artificial intelligence providing algorithms for general AI which is used in the searching area and is able to handle official business, then with the application of models and its improvement in each type of artificial intelligence, generative AI is applicated in the society providing many possibilities. Such as the combination of ChatGPT and search engine, face recognition system, image generation and so on. With the growth of parameter scale development and accuracy improvement, the innovation from the new technology is becoming more and more detailed. While comparing United States GDP to the development of AI market, people can see the trend and relation between the two data. Take the development of ChatGPT for example [3], the first version of the ChatGPT can only do basic communication with low accuracy and the system behind is code typed by people, with the rapid development, the new version gradually not only pass the test of Turing but also have inevitable utility in many industries and fields.

3. Economic Benefit

3.1. The Appropriation of Funds

From 2016 to 2020 the funding investment for AI is gradually growing, the trend is moving upward. In the third quarter of 2020, funding for artificial intelligence dominant companies reached 4.7 billion U.S. dollars in the United States. This quarter's funding was the second largest over this four-year time period. That shows from the perspective of the investors, artificial intelligence is a field that everyone is looking forward to and expect AI market to have large potential. The funding investments is especially high in 2019 but lower afterwards. The factors that lead to this result is because of the economic uncertainty COVID-19 brought to the market, worries over data security and privacy or trade tensions between major economies [4].

3.2. The Cost and Expenditure

The cost and expenditure's trend in AI in US will also move upwards due to the level up of innovation development and research, as well as specialized hardware and software developed. In additionally, the cost and expenditure of artificial intelligence could be very different due to the specific application, use case and industries. Some of the company's focus more on generative AI which is images while others pay more attention to the accuracy of research and working functions. However, the potential benefits of AI, such as increased productivity and efficiency can often surpass the costs in the long run. With precise estimate and much information, the cost factors including imports, taxes and the expenditure factors including exports is considered in this module.

3.3. The Revenue

The revenue depends on three factors which is demand, market for stocks and supply. Artificial intelligence is a potential field and many of the innovation cope with people's likes and preferences as a symbol of new era. As a result, the revenue will increase along with the increase of demand. Secondly, the market for stocks has the same trend as people's demand, the field of artificial intelligence prospect is positive will encourage the stock price to rise and provide incentives for the market of AI. The last factor is the supply. The quantity of supply is closely related with the productivity and incentives of a company. The increase in productivity and efficiency will cause an increase in supply. When supply and demand reach the equilibrium prices or varies, the revenue will change along with the three factors.

4. Market Scale

4.1. Regional

Take a look at the artificial intelligence market scale from the perspective of regional market. California, New York, and Massachusetts are the three main regions that focus on artificial intelligence market expansion. According to a report by Tractica, the AI market in California was estimated at \$7.6 billion in 2018 and reach \$9.7 billion by 2021 [5]. What's more, it is supposed to attain \$72.9 billion by the time of 2025. Which shows that the market scale trend is continuing increasing. Due to the NYC AI Strategy [6] based on previous work on AI in NYC by the New York City, The AI market in New York is currently valued at around \$11.1 billion. Also showing an increasing trend. Meanwhile, the AI market in Massachusetts was estimated to be worth \$11.8 billion in 2019 according to a report by the Massachusetts Technology Leadership Council [7].

4.2. International

The process of expanding the business of AI outside the countries geographical limits in US and in other multiple countries represent its international market expansion. According to a report by Grand View Research, the international AI market in the US was valued at \$9.5 billion in 2020 and is expected to reach \$197.5 billion by 2028, growing at a CAGR of 38.4% from 2021 to 2028.[8] With industries expansion and corporation, artificial intelligence is needed more around the world and also build up a strong economy.

4.3. Global

Global marketing of AI began in US and gradually expand the ideas to the whole world. The market of artificial intelligence is bigger as it's accepted all around the world with higher demand, lower production cost and need from customers, meanwhile it also follows the strategy of single marketing approach. With the gradual development of technology, "Its value of nearly 100 billion U.S. dollars is expected to grow twentyfold by 2030, up to nearly two trillion U.S. dollars. The AI market covers a vast number of industries." [9] In global artificial intelligence market size from 2021 to 2030.

5. Industry

5.1. Major Industries and Their Innovation

The major AI industries in US include finance, healthcare, retail and manufacturing. For Finance industry can be applied in artificial intelligence in many ways. For example, first of all, fraud detection in financial transactions by careful observing of patterns and detecting differences. Secondly, investment management can be better with stronger algorithms and analyze of stronger data. Thirdly, there are AI-powered chatbots which is being used by financial institutions to help customers with their need and provide personalized advice and recommendations. From the perspective of healthcare, this innovation can be used in people's daily life such as medical imaging, for AI technology can analyze image and use scanning, X-rays to assist doctors while identifying abnormal conditions and so on techniques. In retail area, strong and efficient algorithms in AI will help analyze customers data and suggest suitable products for them. In addition, optimize inventory management by ensuring that the right products are available at the right period of time and predicting demand. Overall, AI is improving the customer experience and assist retailers to simplify their operation process. The manufacturing industry's AI implementation includes improved quality control by reducing the risk of defects coming into the market. Also, the Predictive Maintenance is needed on the capital goods for it can improve the overall productivity and reduce downtime. AI also help the manufacturing industry to save costs and provide a safer working environment for the industry.

5.2. Competition

The development of industries will lead to competition between industries. On one hand, competition increasing can lead to an increase in the incentives of workers and promote them to work harder. Therefore, there will be more efficient production, more innovation and investments. Also leading to more job opportunities. On the other hand, intense competition will cause large scale of cut costs to increase efficiency, have less job opportunity.

6. US Government Policies

The American AI Initiative calls for federal agencies to allocate high-performance and cloud computing resources to AI-related applications and research and development (R&D) [10].

6.1. AI Economic Development

Most of the policies stated by federal, state and local levels focus more on personal privacy, job displacement and bias which is important for people, because the policy appearance is due to the question that whether people are ready for the coming of generative AI. Because the AI is still evolving, the government stated policy to help the artificial intelligence adapt into the society. Through providing guidelines and rules, gradually adjusting the utility limits of AI and protect people from certain harms.

7. Conclusion

Overall, the economic impact of artificial intelligence is significant but still need observing. The artificial intelligence market has great potential and the investment and profit proved that the trend is increasing continually. The overall economic trend is increasing along with the competition and corporation of industries and companies. The innovation from artificial intelligence various from different utility and implementation that represents a big help to the workers from various field. However, as AI is evolving and already have the ability of self-studying, government and federal stated policies from different perspectives to control artificial intelligence and help it adapt to the median society. According to the present situation, with the overall upgoing trend the artificial

intelligence economic impact seemed to be positive with the AI still under control. From the long-term perspective when people look into the future, the rate of unemployment will become a big problem in the future as more and more AI are developing, with stronger logarithms and more investments, the things that artificial intelligence can achieve and realize are rapidly increasing. Then the job opportunity might decrease as AI can already replace them and even finish their work with higher accuracy. Till now, the work that have regularity are becoming more and more risky. Due to the reason that generative artificial intelligence can study the patterns carefully and self-learn the regularity inside these data. This kind of work might be the first one that will be replace. What's more, people may not be ready for the coming of AI. During the pandemic, students are forced to stay at home and study, some schools figured out that AI can change the way students' study and school may no longer be needed if students only target is to learn knowledge from there. But for now, it's not an ideal thought. As a result, artificial intelligence future is unfathomable.

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