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Research on the Impact of Artificial Intelligence Technology on Regional Industrial Structure Transformation

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Abstract: *As a revolutionary application technology, artificial intelligence (AI) has brought profound changes to the production and life of the entire human society. As one of the themes of the development of the times, it has permeated all levels and links of political, economic, cultural, and social development. Since the 20th century, the time allocation of human labor between market production, family production, and family leisure has undergone a significant structural transformation process, which is an important factor affecting the evolution of labor participation rate and labor supply. As a strategic technology for a new round of technological revolution and industrial transformation, the AI technology revolution not only occurs in market production, but also profoundly changes the capital deepening and technological progress process of household production. Today, although AI has not been involved in many fields or its application is not mature, the trend of its integration and collaborative development with industry cannot be denied. Technological progress will have a certain impact on industrial structures, and AI, as a high-tech combined with its own characteristics, will also have a different impact on industrial structures than in the past. This article analyzes the impact of AI on China's industrial structure, expounds the impact of AI on the industrial structure from both the overall and specific industries, points out the shortcomings of AI, and puts forward suggestions.*

Keywords: *Artificial intelligence technology; Regional industries; Structural transformation*

1. Introduction

Currently, a new round of technological revolution and industrial transformation is emerging around the world, and AI is one of the strategic leading technologies in this industrial transformation. AI is a strategic technology that leads the new round of technological revolution and industrial transformation. Accelerating the development of the new generation of AI is a strategic issue related to whether China can seize the opportunities of the new round of technological revolution and industrial transformation [1]. The optimization of industrial structure is an important way to promote economic development. How to promote the optimization of industrial structure has attracted the attention and research of governments, enterprises, and academia from different perspectives and levels. China is currently in the stage of industrial transformation and upgrading. With its irreplaceable technological advantages, AI is promoting the development of various industries, affecting changes in industrial structure, and becoming a powerful driving force for promoting China's industrial upgrading [2].

In 2017, the state first used the expression "AI" in the government work report, and China's intelligent manufacturing began. The country has successively formulated relevant policies to promote the development of AI, hoping to apply AI to various fields such as medical treatment, manufacturing, agriculture, and so on. World renowned companies such as Microsoft and Alibaba have also actively invested in the development and research of AI. In recent years, many industries have been faced with slowing domestic demand growth, overcapacity, intensified environmental constraints, and industrial restructuring. The pressure to change production methods and upgrade production technology has gradually increased [3]. The changes in production methods and the upgrading of production technologies are largely reflected in the matching changes between investment and labor input, as well as the adjustment of investment preferences for labor skills. The amount of investment, labor demand, and skill structure in various industries are changing. Changes in factor inputs within the industry reflect its own upgrading trend, while the summary screen of changes in factor inputs between industries reflects the overall transformation of China's industrial structure [4]. The creation and destruction of jobs accompanied by industrial transformation is an important issue of policy concern. The distribution of the speed of such creation and destruction in different industries and the

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heterogeneity between different skilled jobs provide direction for policy focus.

A new round of technological and industrial revolution centered on the Internet is poised to emerge, and new technologies such as AI and virtual reality are changing rapidly. The combination of virtual economy and real economy will bring revolutionary changes to people's production and lifestyle, which also provides important technical support for the transformation and upgrading of China's current industrial structure, namely, enabling industrial upgrading with AI to create a reasonable and coordinated regional industrial structure [5]. The adjustment and upgrading of industrial structure is not an overnight process, but a long-term process. Accurately predicting the impact of AI development on the transformation and upgrading of industrial structure has important practical significance for promoting high-quality development of China's economy, which is also the issue of this article.

2. The Impact of AI on Industrial Structure

2.1. Impact on Overall Industrial Factor Upgrading and Distribution Mechanism

According to economic theory, under the premise of a certain level of technology, a certain amount of products can be produced according to different combinations of capital and labor, and the trajectory of all possible combinations is an equal production line. Technological progress has driven iso-production lines to move towards the origin, and every industrial revolution will cause qualitative changes in the movement process. "AI+" has become a new business form after "Internet plus", which will reshape the core competitiveness of the industry and overturn the industrial structure [6]. The popularization of AI will promote relevant technological innovation in multiple industries, improve total factor productivity, open up new economic growth space, and ultimately achieve the transformation from investment driven growth to innovation driven growth, achieving an intelligent industrial structure.

AI has created a new virtual labor force that can solve complex tasks that require adaptability and agility, freeing humans from the simple labor of repetitive machines. In the era of knowledge economy, the contribution of AI to industrial upgrading is realized through market means and modern information means. After the emergence of AI, in the energy field, new clean energy such as solar energy and bioenergy will eventually replace traditional polluting energy, and promote the transformation of limited resources into unlimited resources. The industry will also rely mainly on resource regeneration to achieve growth [7]. The development of AI can improve the design of target products and projects, improve the utilization rate of corresponding materials, shorten the manufacturing cycle of products, improve labor productivity, and ultimately achieve economic growth with low investment, low consumption, high output, and high efficiency.

2.2. Impact on the Secondary and Tertiary Industries

Based on the new generation of information technology, intelligent manufacturing can dynamically adapt to changes in specific manufacturing environments and achieve optimization of manufacturing objectives. Intelligent machines have higher computational intelligence than humans, and in places that require a lot of computation but do not require knowledge reasoning, machines can provide the optimal solution faster than humans based on empirical judgment. Intelligent optimization technology helps promote the transformation of intelligent manufacturing equipment to intelligent workshops, intelligent enterprises, intelligent supply chains, and then to intelligent manufacturing ecosystems, leading to high-end manufacturing, improving design and production efficiency, reducing costs, and improving labor productivity. Intelligent machines have a higher ability to actively perceive and automatically control manufacturing conditions than humans. The application of intelligent sensor control technology can timely perceive and analyze changes in manufacturing conditions, promoting the improvement of manufacturing quality [8]. With the help of "cloud computing" technology, manufacturing enterprises can obtain and possess rich product lifecycle data, and can also promote the application of industrial big data such as product innovation and supply chain optimization through intelligent analysis of big data.

The application of AI, machine learning, and other technologies to the research and development of service robots will have a great market demand. By combining AI technology with traditional service industries, some inefficiencies caused by information asymmetry and bias will be significantly improved. The impact of AI on the banking industry is mainly reflected in intelligent services and intelligent payments. AI is profoundly affecting the household industry. In recent years, many large

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traditional home appliance companies in Europe and the United States have developed intelligent products and services with extreme experience based on Internet thinking. In the stage of higher education, it is possible to further popularize the information based teaching mode, and strive to improve the coverage of digital educational resources in teaching sites, jointly build and share high-quality educational resources, build a public service platform for educational resources, and build an educational management information system. Summarize and integrate the above impact contents, as shown in Figure 1.

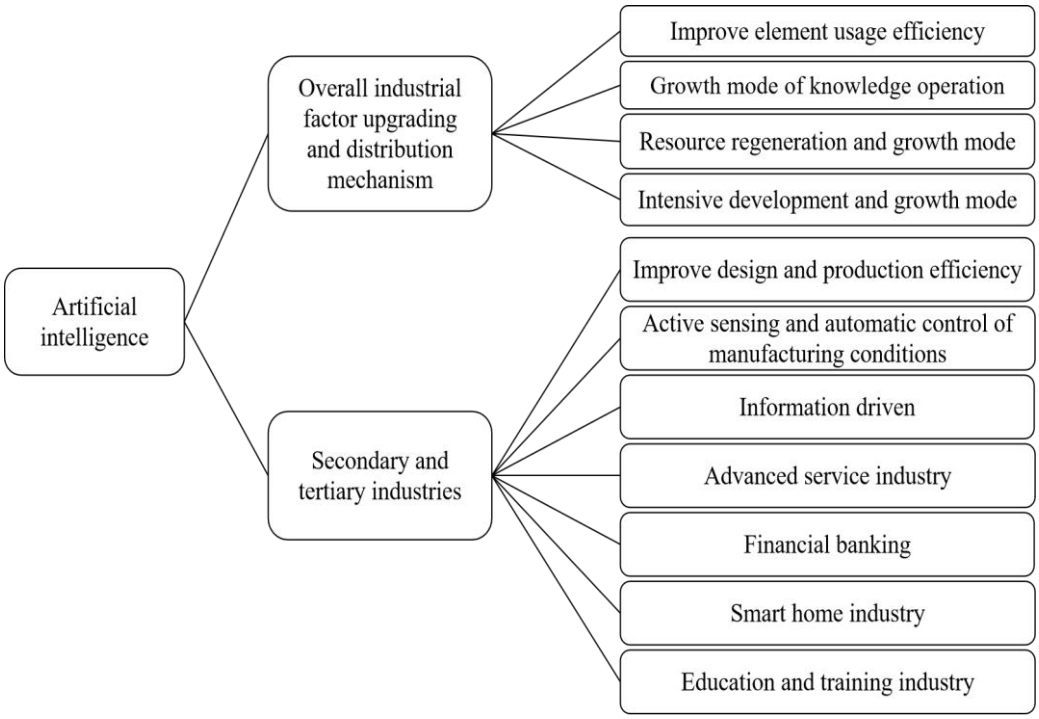

Figure 1: Impact of AI on industrial structure

3. The Shortcomings and Suggestions of AI in Industrial Application

3.1. Deficiencies in AI

The role of AI in various industries cannot be ignored, but due to its immature application, there are also some shortcomings in practical applications. Due to the lack of data circulation laws and regulations in the data support link of the infrastructure layer, it is difficult to effectively utilize high-value data. However, there is a lack of a central control system with high integration and unified perception coordination in the sensing link. At the technology research and development level, the progress achieved is still in the initial stage, and strong AI has not yet achieved key technological breakthroughs, and there has been no significant breakthrough in higher levels of artificial awareness and emotional perception.

The industry's requirements and expectations for AI technology are extremely low cost. If AI technology is to achieve large-scale application in the industrial industry, one of the key issues that need to be addressed is the cost issue. The application layer's intelligent hardware platform, with various capabilities constrained by the primary development level of AI [9]. Relevant talent reserves will become an important factor restricting the development of AI in China. According to the LinkedIn report, in the first quarter of 2017, there were more than 50000 AI practitioners in China, accounting for about one seventh of the number in the United States and one third of that in India. The shortage of talents will become an important factor restricting the development of AI.

Summarize and integrate the above shortcomings, as shown in Figure 2.

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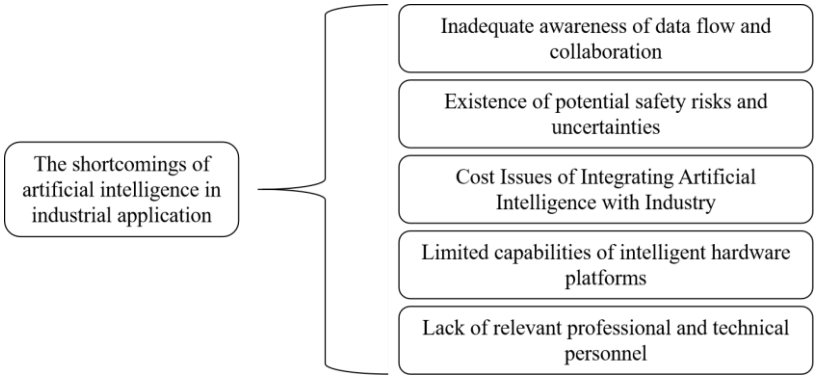

Figure 2: Deficiencies of AI

3.2. Suggestions

The development of the AI industry not only requires the support of the government, but also requires the public to understand and tolerate the shortcomings in the development of AI technology applications and services. Improving the cluster innovation capability of AI undoubtedly requires the support of local governments and enterprises. In the process of supporting the development of AI, the government cannot blindly emphasize the importance of AI, blindly invest and introduce policies, prevent enterprises and universities from becoming dependent, and pay attention to preventing risks [10]. On the other hand, it is necessary to encourage and guide high-tech companies to actively introduce AI technology based on their own process understanding and cost advantages, in order to adapt to the development of the times.

With the rapid growth of market demand for various AI technologies, it is difficult for a single AI technology and a single AI company to fully meet the intelligent development needs of the market. Adhering to win-win cooperation and working with integrators in various fields to jointly promote the intelligent upgrading of the entire industry is an inevitable prospect. Enterprises should actively unite, adhere to the development concept of win-win cooperation, sincerely share opportunities, jointly promote industrial development, and serve the public. At this stage, AI technology is only closely integrated with social production, and most people do not know much about AI. Governments and enterprises should actively promote the popularization of AI and improve people's awareness and acceptance of AI. At the present stage, there are still some shortcomings in AI, but every technological revolution has a certain introduction period, and we should give more patience to its future development.

4. Conclusions

AI is an important driving force for the new round of technological revolution and industrial transformation. AI and industrial integration have become a new engine for promoting the transformation and upgrading of industrial intelligence and achieving high-quality economic development. AI is a strategic technology that leads a new round of technological revolution and industrial transformation, and is bound to profoundly change traditional production and lifestyle. The Industrial Revolution 4. 0 ushered in an era of intelligent production, with economic and industrial structures moving towards a more rational direction. However, regions with technology first mover advantages may develop significantly faster than other regions, and the application of AI technology will have an impact on the development gap of industrial structure between regions and within regions. The application of AI in specific industries will also have an indirect impact on the development of other industries. It is recommended that the government improve the bankruptcy protection system for enterprises, improve the market clearing mechanism, do a good job in industrial transfer and undertaking between regions, and avoid exacerbating the problem of overcapacity in some industries during the rapid transformation of the industrial structure. The government should increase investment in labor education and skill training, and actively cultivate versatile talents and professional talents related to AI. Only by seizing the significant strategic opportunities for the development of AI and building the first mover advantage of China's AI development can we truly achieve the goal of building an innovative country.

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