

Analysis on the Role of Artificial Intelligence Technology in Promoting Macroeconomic Growth

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ABSTRACT

Artificial intelligence technology, with its unique data processing capabilities and learning mechanisms, is gradually demonstrating its transformative potential in multiple industries and fields. At the macroeconomic level, the application of artificial intelligence technology has begun to reshape production methods, organizational structures of enterprises, and market operation models. Based on this, this paper will explore how artificial intelligence technology promotes macroeconomic growth through the above mechanisms, in order to reveal its mechanism of action. By analyzing the economic effects of artificial intelligence in detail, valuable references can be provided for a deeper understanding and rational utilization of artificial intelligence technology.

KEYWORDS

Artificial intelligence; Macroeconomic growth; Production efficiency; Economic innovation

1 Introduction

Against the backdrop of rapid global economic development, the marginal utility of traditional production factors such as labor and capital is gradually weakening; Technological innovation has become the core driving force behind economic growth. Artificial intelligence technology, as a cutting-edge technology, is receiving widespread attention from countries around the world for its potential in optimizing resource allocation, improving production efficiency, and driving innovation. Especially in the context of economic globalization and digital transformation, Researching the impact of artificial intelligence on economic growth, not only can provide new perspectives for economic theory, but also can provide reference for promoting sustainable economic growth and healthy development through technological innovation. Based on this, this paper starts with an overview of artificial intelligence and analyzes the impact mechanism of artificial intelligence technology on macroeconomic growth, to provide a fresh perspective to understand the intrinsic drivers of current economic growth. This research not only helps to enrich and deepen the understanding of economic growth theory, but also has important practical significance for promoting long-term stable growth of the global economy.

2 Overview of Artificial Intelligence

Artificial intelligence is a technology that encompasses multiple disciplines such as computer science, psychology, philosophy, and neuroscience, aimed at creating machines and systems capable of performing tasks that require human intelligence. ^[1] The implementation of artificial intelligence relies on machine learning and deep learning methods; Machine learning techniques

can improve performance through experience without the need for explicit program coding. Through training, artificial intelligence systems can recognize patterns and features, and use these learning outcomes to predict the results or behavior of new data; while, deep learning can mimic the neural network structure in the human brain and process large and complex datasets. The application scope of artificial intelligence is extremely wide, and it has also demonstrated its enormous potential in fields such as medical diagnosis, legal research, education, and scientific research. With the advancement of technology, artificial intelligence is gradually developing towards higher cognitive functions, which not only drives the development of technology, but also triggers social discussions on issues such as ethics, privacy protection, and future employment.

3 The Promoting Effect of Artificial Intelligence on Macroeconomic Production Efficiency

3.1 Optimizing Supply Chain Management

The complexity of supply chain decision-making mainly stems from the amount of information involved. These information include supplier information, inventory levels, logistics status, and market demand. The traditional decision-making model relies on historical data and empirical judgment, which makes it difficult to process and analyze large datasets in real-time and accurately, thereby affecting the timeliness and accuracy of decision-making. Artificial intelligence technology can comprehensively analyze historical sales data, seasonal changes, consumer behavior, and macroeconomic indicators to predict future product demand; This in turn guides production planning and inventory management, ensuring that enterprises can meet market demand at optimal costs, thereby significantly improving the efficiency and effectiveness of the supply chain. Meanwhile, artificial intelligence has significantly enhanced the flexibility of supply chain response. In the context of globalized operations, supply chains face various uncertain factors such as geopolitical changes, natural disasters, and rapid changes in market demand. These factors require the supply chain system to have high adaptability and rapid response capabilities. By utilizing artificial intelligence technology, enterprises can establish intelligent response systems to monitor the status of their supply chain in real-time and quickly adjust operational strategies in the event of emergencies, making supply chain management more flexible and resilient.

3.2 Improving the Level of Automated Production

In traditional manufacturing, the production process is easily influenced by human operations, making it difficult to ensure high standards and stability of product quality and production costs. With the help of artificial intelligence's deep learning and machine vision systems, automated equipment can achieve precise control and real-time adjustment of production parameters. This intelligent and precise control not only improves product consistency and quality, but also reduces raw material waste, thereby effectively reducing production costs. At the same time, artificial intelligence systems can continuously learn and optimize production processes, automatically identify and correct defects in production, ensure the stable operation of production lines, and further improve manufacturing efficiency.^[2] On the other hand, artificial intelligence can also improve resource allocation efficiency. Artificial intelligence technology can integrate data on device operating efficiency, energy consumption, and production line status, and intelligently optimize resource allocation based on this data. Through intelligent algorithms, artificial intelligence systems can predict equipment maintenance time and production demand fluctuations, arrange production plans reasonably, and significantly improve overall production efficiency. With the

continuous advancement and maturity of artificial intelligence technology, its role in automated production will become more extensive and profound, providing solid technical support for the sustained growth of the macro economy.

4 The Impact of Artificial Intelligence on Macroeconomic Innovation

4.1 The Drive of Artificial Intelligence for Innovation in New Products and Services

In the development process of new products, from market research to user demand analysis, to product design and testing, every link generates massive amounts of data. Artificial intelligence technology can effectively analyze this data, identify trends in consumer behavior and preferences, and guide the direction and focus of product development. In the product design phase, artificial intelligence technology can help designers test and optimize product performance in virtual environments, reducing the number and cost of testing physical prototypes; This can effectively shorten the time from concept to market for products, improve research and development efficiency, and enhance product competitiveness. At the same time, artificial intelligence technology can automatically customize personalized service plans based on customer behavior data and preferences, improving the targeting and satisfaction of services. In service industries such as finance, retail, and tourism, intelligent recommendation systems have become an important tool for enhancing user experience and business growth. For example, in intelligent customer service systems, robots can provide more accurate and timely answers and support based on customers' problem history and emotional changes. The real-time and interactive improvement of this service not only enhances customer loyalty, but also opens up new growth points for enterprises.

4.2 The Role of Artificial Intelligence in Scientific Research and Development

Scientific research often requires the processing and analysis of large, complex, and ever-changing datasets; This is often time-consuming and prone to errors under traditional methods. Artificial intelligence technology can effectively process massive amounts of data, identify patterns and correlations, and provide more accurate data interpretation for researchers. This not only greatly improves the efficiency of data processing, but also enhances the reliability of research results. Therefore, in data intensive research fields such as genomics and particle physics, the application of artificial intelligence technology has become an essential tool for promoting cutting-edge scientific development. On the other hand, the application of artificial intelligence technology has also promoted interdisciplinary research collaboration. Artificial intelligence technology, with its powerful ability to integrate information, can help researchers overcome disciplinary barriers, integrate theories and methods from different fields, and conduct innovative research.^[3]

5 The Optimization Effect of Artificial Intelligence on Employment Structure

5.1 Improving the Flexibility of the Labor Market

In the traditional mode, the efficiency and effectiveness of labor resource allocation are limited by geography and time, but the application of artificial intelligence technology has broken this limitation. Intelligent systems can analyze the demand dynamics of the labor market in real time, predict labor demand trends in different industries and regions, and provide scientific basis for human resource management. The application of virtual assistants and online collaboration tools in artificial intelligence technology enables workers to participate in a wider range of employment

opportunities across geographical limitations. The popularization of this technology not only improves labor efficiency, but also provides workers with more choices, thereby increasing the mobility and flexibility of the entire labor market. The application of artificial intelligence technology in the education and training industry, such as intelligent teaching systems and personalized learning plans, makes the updating of vocational skills more convenient and efficient, significantly reducing the threshold for career transformation.^[4]

5.2 Promoting the Growth of High Skilled Positions

With the rapid development of artificial intelligence technology, there is an urgent need for a large number of professionals with advanced skills in fields such as data science, machine learning, and neural network design. Experts in these fields not only need to possess profound technical knowledge, but also need to understand complex industry application scenarios to design and optimize algorithms to meet constantly changing technological and market demands. Therefore, enterprises and organizations are increasingly relying on artificial intelligence solutions in their operations, from strategic planning to product development, and from market analysis to customer service. High skilled artificial intelligence professionals have become the core force driving innovation and competitiveness in these industries. At the same time, the popularization of artificial intelligence technology has also promoted the technological upgrading of traditional industries. [5] In terms of manufacturing, the application of intelligent manufacturing and robotics technology requires operators to master the skills of interacting with artificial intelligence systems, monitoring and maintaining highly automated production lines, thereby ensuring production efficiency and quality.

6 Conclusion

In summary, this paper mainly explores the promoting effect of artificial intelligence technology on macroeconomic growth, especially in improving production efficiency, innovation driven economy, optimizing employment structure, and increasing the number of high skilled positions. Artificial intelligence can optimize supply chain management and automate production processes, accelerate the development of new products and services, create high skilled jobs, and improve labor market flexibility, thereby enhancing the competitiveness and innovation capabilities of the entire economy. In the future, it is necessary to consider how to balance the economic benefits and social impact of artificial intelligence technology, to promote sustainable macroeconomic development and expand the application areas of this technology.

References

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