Research on the Influence of Artificial Intelligence on New Quality Productivity

Jiatong Han*, Yichen Xue
School of Accounting, Harbin Finance University, Harbin, China
**Corresponding Author*

Abstract: It is an important strategy for a country to take the initiative in the world economic competition to set up a modern industrial system based on artificial intelligence technology and aimed at improving total factor productivity. From the perspective of industrial upgrading, this paper analyzes the realistic path of cultivating new quality productivity and constructing modern industrial system under artificial intelligence environment. At the same time, in the process of promoting the technological transition of traditional industries and the increase of total factor productivity, artificial intelligence is also faced with the contradictions of asymmetric technological change and institutional evolution, complex reconstruction and transformation and upgrading of factors, and coexistence of value creation and risk. From the point of view of industrial upgrading, this paper analyzes how to cultivate new high quality productivity in artificial intelligence environment and how to optimize industrial structure and improve productivity. We discuss how to break down the barriers of traditional industries and realize the extension and upgrading of industrial value chain. At the same time, the article also pays attention to the artificial intelligence technology itself facing a series of challenges in the process of promoting the traditional industrial technology transition. These challenges include asymmetry between technological change and institutional evolution, complexity of factor reconstruction and transformation, and coexistence of value creation and risk.

Keywords: Artificial Intelligence; New Quality Productivity; Industrial upgrading; Factors of production

1. Introduction

Scientific and technological innovation is an important supporting force for the economic and social development of our country. At present, a new round of technological revolution and industrial revolution represented by artificial intelligence is becoming a new engine to promote the economic development of our country. Under the background of the new revolution of science and technology, artificial intelligence drives the renewal of production factors and the reconstruction of production mode, promotes the continuous promotion of productivity, and has become the main driving force of the development of new generation productivity. However, with the continuous expansion of the artificial intelligence application market, there still exist the practical problems of technology being "choked" and the industry meeting with "bottleneck", that is, the thickness of basic technology is insufficient and the level of industrial upgrading is not high, which has restricted the emergence of a new generation of productivity. In this context, it is urgent to clarify the mechanism of artificial intelligence technology on emerging productivity and the mechanism of industrial upgrading in this process, so as to provide theoretical support for promoting the deep integration of artificial intelligence technology and the real economy and accelerating the construction of Chinese-style modernization [1]. The application of artificial intelligence reconstructs the industrial ecology from three aspects: in microcosmic, it deconstructs the allocation logic of traditional factors of production; in meso view, it catalyzes the multiplier effect brought by technology integration; in macroscopic view, it constructs a compound growth field based on digital technology spillover and industrial cooperation network, which promotes the transformation of industrial structure, industrial transformation and upgrading, and promotes the development of new productivity of enterprises.

2. Influence of Artificial Intelligence on New Quality Productivity

2.1 Artificial Intelligence Reduces Factor Allocation Cost

With the deep application of artificial intelligence technology, the production efficiency of enterprises has been improved unprecedentedly, but also in the direction of specialization and refinement. Through algorithm optimization and data analysis, artificial intelligence can allocate resources more accurately and reduce transaction costs caused by asymmetric information [2]. This kind of transformation breaks through the space-time dependence of traditional production factor allocation and improves the flexibility and efficiency of production activities. At the same time, we should promote the digital transformation of production factors, convert various elements in the material world into digital forms, and achieve accurate matching and optimal reconstruction. This new technological progress, will undoubtedly speed up the transformation of industrial structure, to bring new momentum for economic growth, but also to bring new development opportunities.

As a new factor of production, artificial intelligence is of great significance in promoting the rational distribution of labor and improving labor productivity. Enterprises can adjust the factors of production to adapt to changes in the market, so as to achieve product specialization and vertical integration. This strategy can not only improve the use efficiency of internal resources, but also seize and make full use of external transaction costs, thus forming a unique competitive advantage [3].

When the external transaction cost is reduced, enterprises can establish a new labor structure by deeply excavating their own potential and specializing in labor division. It extends from a single functional department or production line to the entire supply chain, service network, and even customer relationship management. In this case, enterprises can redefine their own industry boundaries, from simple production and operation to the integration of R&D, design, marketing, sales and after-sales service. This not only improves the competitiveness of enterprises, but also brings more and better goods and services to consumers.

For example, in the traditional market environment, due to asymmetric information and limited transaction conditions, enterprises have higher production costs, while the rise of big data platform makes it possible for enterprises to integrate the upstream and downstream products, prices, supply capacity and other information through the network, so that enterprises can quickly find the suppliers they want, and reduce the barriers to resource circulation caused by institutional conflicts.

Artificial intelligence eliminates geographic boundaries, reduces the cost of matching factors of production, and enables the cross-border flow of data to produce a global digital supply chain [4]. For example, Tesla's manufacturing data in Shanghai will be transmitted instantly to U.S. research and development centers for innovative collaboration across time zones. Problems such as technical problems and process improvement in the manufacturing process of Shanghai manufacturing enterprises can be fed back to the R&D institutions of the United States in real time, and then analyzed and studied by the R&D department, then provided with corresponding solutions by the R&D company, and then completed by Shanghai manufacturing enterprises, so as to achieve global resource integration and collaborative innovation.

In the age of artificial intelligence, data has become an important factor of production, which combines closely with traditional factors of production such as labor and capital, forming a new driving mechanism. Data factors break the traditional factors of production boundaries, and with labor, capital, technology and other factors of collaborative innovation, reshape the resource distribution model, build a more flexible ecological system of factors of production. For example, in the field of human resources, the platform realizes the accurate matching of talents and positions through in-depth analysis of the skills information, work experience, career planning and other data of job seekers as well as detailed information of job demands of enterprises, greatly improves the efficiency and quality of talent recruitment and reduces the risk of mismatch of human resources.

2.2 The Multiplier Effect of Artificial Intelligence on Technology Convergence

Applying artificial intelligence to the supply chain is not just a process of technological integration. It combines multiple advanced technological methods to generate a strong multiplier effect, greatly improving the

efficiency of the entire supply chain and achieving an unprecedented leap in productivity for enterprises. Among them, the accumulation of data and optimization of algorithms are its core, and the synergy between the two promotes the improvement of supply chain operation efficiency, making the system more efficient and flexible [5]. At the same time, with the growth of data scale and the decrease of computing cost, the applicable fields of artificial intelligence will be further expanded, thereby promoting the transformation and upgrading of China's economic structure. It has not only brought about significant changes in the way businesses operate, but also had a profound impact on the overall direction of society and the economy. Therefore, applying artificial intelligence technology to supply chain management is an important driving force for promoting industrial upgrading and enhancing competitiveness, and is the core of implementing sustainable development strategies.

Firstly, the application of artificial intelligence enables continuous iterative optimization driven by closed-loop data, forming a positive feedback mechanism of "data accumulation → algorithm improvement → efficiency enhancement"[6]. External integration of the supply chain is of great significance for enterprise resource allocation, promotion of new products and services, and generation of new quality productivity. Artificial intelligence integrates sales channels, predicts market demand, monitors data in real-time, and utilizes machine learning and optimization algorithms to achieve visibility, stability, and agility in the supply chain. For example, Netflix conducts A/B experiments to make real-time adjustments to recommendation algorithms, thereby achieving dynamic optimization based on user behavior, making the entire industry chain system have adaptive and evolutionary characteristics similar to living organisms, thereby promoting industrial upgrading and driving the development of new productivity.

Secondly, compared with the traditional economies of scale theory that focuses on reducing average costs by manufacturing units, artificial intelligence has brought tremendous changes to enterprises. In such an environment, data reuse is no longer just a simple way for enterprises to compete, but also a core capability that can rapidly expand their business scale [7]. By utilizing the data sources provided by artificial intelligence, companies can easily expand their scale without the need for additional investments. By doing so, the marginal cost will be reduced to almost zero, which is a perfect feedback: as the size of the data increases, the cost also decreases, thereby promoting further expansion of its application scope. This positive feedback mechanism not only improves resource utilization efficiency, but also generates multiplier effects in terms of cost and scale. With the continuous development and application of big data technology, major enterprises are shifting from traditional industries to emerging industries, hoping to seize the opportunity in the new economic landscape. This transformation is not only reflected in products and services, but also in how to use big data to reconstruct business models, industrial chains, and even create new forms of productivity [8]. In this context, technological innovation based on artificial intelligence and big data has become an important driving force, driving the continuous improvement of human intelligence and efficiency. For example, the storage costs of Microsoft Azure have decreased by 99% within a decade. Due to the decrease in costs, more and more companies can enjoy its services, and its application scope is also expanding, from enterprise level applications to micro and medium-sized markets.

2.3 Artificial Intelligence Drives Industrial Structural Transformation

By combining technology spillover, industrial collaboration networks, and technology and policy guidance, the division of labor model of the industrial chain can be reconstructed, opening up the compound growth areas of strategic emerging industries and future industries, promoting the green transformation of traditional industries, accelerating the intelligent upgrading of traditional industries, and incubating emerging industries [9].

With the increase in the number and scale of related enterprises applying artificial intelligence, new technologies will spread throughout the entire industry chain, forming technology spillovers, causing a qualitative change in the system, and improving the new quality productivity of the industry chain. Artificial intelligence can provide low code data analysis capabilities for small and medium-sized enterprises, such as Alibaba's QuickBI, which allows enterprises to visualize and analyze data

without the need for a dedicated team. Small and medium-sized enterprises can use the above tools to analyze their business data, explore its potential value, formulate more scientific decision-making plans, improve their competitiveness, and promote the digital upgrading of the entire industry chain.

Artificial intelligence can promote cooperation between industries. Firstly, the development of artificial intelligence technology has established deeper collaborative relationships among universities, research institutes, and enterprises. The new generation of digital technology is rebuilding the innovation model of industry university research cooperation, providing a complete pathway for knowledge production in universities, technology transfer in research institutes, and enterprise applications. On this basis, a collaborative platform for industry university research based on a data platform and intelligent algorithms was established, and a cross institutional innovation element sharing network was established. This project intends to adopt a knowledge conversion mechanism based on intelligent matching algorithms to achieve precise integration between cutting-edge research in research institutes and market demand in enterprises, greatly reducing the cycle of transformation from basic research to industrial applications. On this basis, a virtuous cycle was constructed from technological research, achievement transformation, market feedback, and iterative innovation. Secondly, artificial intelligence technology can generate synergies between multiple industries. For example, in the pilot of data hosting, the ownership and usage rights of data are handed over to third-party institutions for management. This can effectively promote the reasonable flow and use of data in sensitive areas such as healthcare and finance while ensuring its security and privacy. Artificial intelligence can help enterprises achieve flat management, promote collaborative innovation and cross disciplinary cooperation in the industrial chain, thereby driving the fission of industries, creating a cross industry industrial ecosystem, helping industries break out of low-level track locking and path dependence, and thus giving birth to more new productivity.

3. Innovation is the Main Driving Force for Promoting the Development of New Quality Productivity

With the application of artificial intelligence technology, core elements such as capital, talent, and technology have shown a clear trend of "shifting from reality to intelligence", promoting the transformation of China's industry from traditional to green industries. Taking the energy industry as an example, under the dual role of strengthening environmental regulation and deepening artificial intelligence, China's coal industry is facing the pressure of systematic transformation. Its high carbon emission characteristics force the transfer of existing resources to clean energy such as photovoltaic and energy storage [10]. The new energy industry cluster, relying on innovative application scenarios such as smart power grid and energy Internet, has not only attracted more than a trillion industrial fund layout, but also built an innovative ecosystem covering top scientific research teams, smart equipment manufacturing, carbon trading finance and other elements. This reconfiguration of factors based on market efficiency and policy orientation provides a breakthrough path for traditional industries to transform, as well as a resource ladder for emerging industries to achieve leapfrog development. Essentially, it constitutes the core driving force for the evolution of modern industrial systems towards high-end and intelligent development.

Innovation is the main driving force for promoting the development of new quality productivity, and artificial intelligence is an important strategic means of innovative development. It has achieved leapfrog development for our country's science and technology and become an important driving force for industrial optimization and upgrading. But the biggest challenge currently facing China is the asymmetry between technological change and institutional evolution, the complexity of factor reconstruction and industrial transformation and upgrading, the paradox of value creation and risk symbiosis, and the fragmentation and lack of synergy in the policy system, which are prominent issues in China's transformation process.

Due to the lag and fragmentation of the policy system, as well as structural conflicts in the policy implementation process, there has been an asymmetry between technological change and institutional evolution. Firstly, due to the lag in top-level design progress compared to technological iteration, the pace of policy

updates is difficult to adapt to the dynamic technological evolution. Some emerging industries have not yet introduced complete policy regulations, resulting in compliance issues in business operations. Moreover, the degree of policy support received by enterprises in different regions of development also varies greatly. Secondly, the endogenous driving force of market entities has not been fully activated, and existing policies focus more on quantitative evaluation, lacking attention to cultivating the willingness of enterprises to transform themselves. The coverage of inclusive policies is limited, and the specialized support tools for small and medium-sized entities have obvious deficiencies. The coverage of related financial support and service guarantees is not high, and the policy benefits of digital skills training are also relatively small.

4. Conclusion and Prospect

In the process of industrial transformation and upgrading, there are imbalances in regional transformation, barriers in enterprise scale, and significant regional gradients. Compared with manufacturing, finance and Internet industries, traditional commerce, catering, agriculture and other industries still rely on traditional methods for marketing channel expansion, customer relationship management, supply chain coordination and other fields, and it is difficult to effectively use digital and intelligent technologies to reduce costs and conduct business innovation. Compared with large enterprises with huge financial resources, they can invest more resources in digital infrastructure construction, technology research and development, and talent reserves, establish close cooperative relationships with universities and research institutions, obtain the latest technological achievements, and also merge related technology companies through mergers and acquisitions to accelerate their digitalization process. Compared with the eastern region, the central and western regions are limited by their economic development level in terms of technology research and development investment, talent aggregation, and information infrastructure construction. The upgrading speed of the artificial intelligence industry is slower, and the gap in industrial digitization between them and the eastern region is increasing. This is not conducive to the balanced optimization and upgrading of China's industrial structure, nor is it conducive to the implementation of China's regional coordinated development strategy.

Acknowledgement

This work was supported by the 2024 Heilongjiang University Student Innovation and Entrepreneurship Training Program Project (University-level project) "Trad resource sharing to realize a dream"(Project No. X202410245015).

References

[1] Shi Jianxun, Xu Ling. Research on the Significant Strategic Significance and Implementation Path of Accelerating the Formation of New Quality Productivity. Research on Financial Issues, 2024 (1): 3-12

[2] Zhou Wen, Xu Lingyun. On New Quality Productivity: Connotation Characteristics and Important Focus. Reform, 2023 (10): 1-13

[3] Chen Menggen, Zhang Ke. New Quality Productivity and Construction of Modern Industrial System Reform, 2024 (6): 58-69.

[4] Song Jia, Zhang Jinchang, Pan Yi. Research on the Impact of ESG Development on Enterprise New Quality Productivity: Empirical Evidence from Chinese A-share Listed Companies. Contemporary Economic Management, 2024 (46): 1-13

[5] Acemoglu D, Restr Epo P . The race between man and machine: Implications of technology for growth, factor shares, and employment . American Economic Review,2018, 108(6) : 1488－1542.

[6] Du Chuanzhong, Shu Shuang. Artificial Intelligence and High Quality Economic Development: Mechanisms, Effectiveness, and Policy Orientation. Social Science Frontline, 2023 (12): 78-87.

[7] Zhou Jieqi, Chen Da, Xia Nanxin. Artificial Intelligence, Industrial Structure Optimization, and Green Development Efficiency: Theoretical Analysis and Empirical Evidence. Modern Finance and Economics (Journal of Tianjin University of Finance and Economics), 2023, 43 (4): 96-113.

[8] Lin Xiaoyue, Wu Chong Research on the Path and Mechanism of Artificial

Intelligence Promoting the Emergence of New Quality Productivity. Technology and Economics, 2024 (10): 1-13.

[9] Liu Wei Scientific Understanding and Practical Development of New Quality Productivity. Economic Research, 2024 (3): 4-11

[10]Ren Baoping, Wang Xin The Framework and Path for the Deep Integration of Artificial Intelligence and the Real Economy to Form New Quality Productivity. Social Sciences, 2024 (7): 120-127.

