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The Positive and Negative Impacts on Employment in the Context of Artificial Intelligence

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Abstract. Based on the realistic background of the current employment situation, this paper combs the dual impact of artificial intelligence on the labor market. Combined with the research findings of scholars, AI has a two-way effect of employment substitution and creation. At the same time, AI has changed the employment structure, generated a wealth of new types of high skilled industries, promoted the transfer of labor to the tertiary industry and optimized the allocation of industrial employment, and also exacerbated the structural contradictions of job contraction, skill polarization and unequal income distribution. Finally, this paper summarizes the existing research, points out the lack of industry group heterogeneity and policy adaptation, and looks forward to the future, which should be combined with the development of new quality productivity, in-depth research on the medium and long-term transmission mechanism of the scene, so as to provide theoretical support for resolving structural employment contradictions and achieving high-quality employment.

Keywords: artificial intelligence, substitution effect, creation effect, total employment, employment structure

1. Introduction

Under the background of artificial intelligence, the rapid economic growth has brought great convenience to the society, and artificial intelligence is expected to change the way the world operates. However, with the continuous development of the field of science and technology, artificial intelligence has an increasing impact on employment, and even has an impact on all walks of life of economic and social development. Therefore, scholars have launched a series of discussions. The scientific and technological revolution has brought not only breakthroughs in technology, but also the reshaping of industrial structure [1]. The deep integration of AI technology with manufacturing, service, agriculture and other fields has spawned a number of new industrial forms and business models [1]. The two-way effect of artificial intelligence has brought about dynamic adjustment on both sides of labor market supply and demand, inevitably exacerbated the risk of skills gap and employment imbalance, and may become a potential threat to the sustainable development of economy [2]. The wide application of artificial intelligence has increased the demand for high skilled and new technical talents in the labor market, and many traditional jobs are facing the possibility of disappearing, while the emerging jobs put forward higher requirements for

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the technical ability of the existing labor force [3]. In addition, the development of artificial intelligence technology shows a trend of high concentration of technical resources and talents [3].

Therefore, this paper takes AI and employment as the research theme, combing and summarizing the research between AI and employment by scholars, and summarizing the impact of AI on the total employment, what growth AI brings to employment, and what fields AI replaces labor in.

2. Analysis of the impact of artificial intelligence on total employment

2.1. Substitution effect

In essence, AI substitution effect is the process of technology development replacing traditional jobs. The introduction of AI technology leads to the economic phenomenon of technical unemployment and rising unemployment scale, which is defined as an effect [4]. This effect path contains two layers of logic [4]. One is that AI has the talent of high efficiency, high accuracy and adapting to high-risk operations, which can directly squeeze out some traditional workers while optimizing labor safety protection [4]. The other is that technology updates continue to impact conventional traditional jobs such as customer service and drivers, and the demise of jobs further worsens the employment situation, especially raising the unemployment risk of low skilled labor [4]. However, AI has the natural technological advantages of high efficiency, all-weather service and adaptability to various scenarios, which meets the business needs of enterprises to reduce costs and increase efficiency. Therefore, with the cost-effectiveness and consistency advantages of AI, AI replaces the standard and repetitive work. With the improvement of the level of artificial intelligence and the reduction of equipment application costs, the scope of substitution has gradually extended from medium skilled groups to low skilled groups [5]. Drone delivery, robot services and other business forms are all confirmed by reality [5]. Compared with the high-quality labor force that can dynamically update skills, medium skilled workers who work in repetitive and procedural work such as bank tellers and assembly line operations suffer the strongest impact of substitution [5]. The substitution effect is most significant for manufacturing and service industries, while unconventional creative research and development and high-level emotional interaction industries are difficult to be deeply replaced. At the skill level, the impact of medium skills is the strongest, low skill substitution is gradually spreading, and high skills are mainly human-computer complementary. This phenomenon will eventually lead to the short-term concentrated unemployment of low and medium skilled groups, the reduction of the number of industrial jobs, the intensification of structural contradictions in the labor market, and the promotion of the restructuring of the overall employment structure. Artificial intelligence and machines improve labor productivity by automating routine tasks, while expanding employees' skills and enhancing the value of work [6]. Therefore, in the machine for machine employment mode, low skilled jobs will disappear, and new jobs that have not yet appeared will emerge [6].

2.2. Creative effect

In essence, the creation effect of artificial intelligence is a labor force development mechanism that technology development produces emerging business forms, optimizes industrial ecology and increases employment. The creation effect is the mechanism for the development of artificial intelligence to boost the overall employment level and form positive employment increment [4]. On the one hand, as an emerging strategic industry, artificial intelligence can directly create new jobs, accept the employment of highly skilled labor, and rely on talent concentration to promote the

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further development of industrial technology, so as to build a virtuous cycle of industrial development and high-end employment expansion; On the other hand, AI promotes the upgrading of production efficiency, expands the employment demand of the original industry, and realizes the consolidation and expansion of existing jobs [4]. The creation effect can make the improvement of technical efficiency drive the continuous expansion of traditional industries, thereby increasing the demand for labor. Highly standardized industries such as high-tech research and development, high-end management, and professional consulting have prominent creation effects, while conventional repetitive industries such as basic assembly lines and simple services have relatively limited job creation space. By further focusing on the characteristics of skill stratification, the employment of highly skilled labor force is dominated by the creation effect [5]. This group is mainly engaged in unconventional cognitive work such as managers and professional research and development personnel, and has the exclusive attributes of innovative research and development and complex decision-making. Artificial intelligence has high replacement cost and low adaptability for it, and has become the core beneficiary group of the creation effect [5]. The creation effect can ultimately expand the total scale of social employment,increase the proportion of high-tech jobs, promote the development of labor skill structure to a higher level, and reconstruct the new employment development pattern of man-machine coordination. Artificial intelligence technology forces the transformation and upgrading of traditional industries to adapt to market demand and technological change [7]. In the process of industrial upgrading, new jobs will be created and the total employment of the whole society will be effectively increased [7].

3. The influence of artificial intelligence on employment structure

3.1. The positive impact of AI on employment structure

3.1.1. Create new job opportunities

The continuous change and development of artificial intelligence technology has changed the structure of the labor market, created a large number of new jobs, promoted the expansion of the scale of social demand for high-tech talents, increased the number of jobs, and improved the space for career development. In the core technology research and development and education application industry, AI algorithm engineer, image algorithm engineer, artificial intelligence teacher and other new occupations have emerged. AI algorithm engineers are mainly responsible for the design, development, update and optimization of intelligent algorithms and models, and require practitioners to have complete programming skills; Image Algorithm Engineers integrate the underlying technology of artificial intelligence and the professional ability of image processing, focusing on the customized design and engineering implementation of image algorithms, so as to improve the quality and efficiency of image processing; AI teachers rely on solid professional technology reserves and teaching guidance ability to carry out AI course teaching for schools and social training institutions, help learners systematically build intelligent technology knowledge framework, and learn and master skills at the same time. Such jobs not only increase the total social employment, but also allow individuals to continuously study professional knowledge and update comprehensive skills.

Driven by low-level technology, the introduction of core AI technologies such as deep learning, natural language processing, and computer vision has directly spawned careers such as Algorithm Engineers, data taggers, and AI product managers, and gradually has the extension effect of the industrial chain [8]. On this basis, the AI industrial ecology has further incubated new business types

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such as AI trainers, algorithm ethics consultants, human-computer collaboration designers, and data annotation experts, and accelerated the transformation and upgrading of the overall employment structure to high skilled and knowledge intensive; These new forms of employment not only improve the quality of social employment, but also promote the deepening reform of the education system and promote lifelong learning and vocational dynamic skills update [9]. At the same time, artificial intelligence gradually replaces repetitive work, releases human labor factors and turns to creative research and development, strategic planning, emotional interaction services and other high value-added work fields, so as to maximize the overall value efficiency under the human-computer cooperation mode [9]. In addition, AI has the characteristics of reducing costs and improving efficiency. AI can optimize people's livelihood life experience, help enterprises improve quality and increase revenue, and realize the two-way coordinated development of social economy and people's livelihood.

3.1.2. Promote the optimization and upgrading of employment structure

The rapid development of artificial intelligence technology has become the core driving force for the transformation and upgrading of industrial structure, profoundly driving the transformation of social and economic business forms and labor allocation pattern, and promoting the gradual flow of employed population from the secondary industry to the tertiary industry. Relying on technological innovation, new productivity continues to optimize the overall industrial structure, and steadily establishes the core leading position of the tertiary industry in national economic growth [10]. The tertiary industry has its own job characteristics of cutting-edge technology, new fields and high-quality resources, which can absorb the surplus labor force in the primary industry to transfer to high-quality, high value-added secondary and tertiary industries, and finally complete the systematic remodeling of the employment structure of the whole society [10]. According to the relevant data of China's National Bureau of statistics in 2023, more than half of China's large-scale industrial enterprises have popularized cloud computing, Internet of things, artificial intelligence, industrial Internet and other digital technology applications. Among them, the digital performance of Enterprises above the scale of the tertiary industry is outstanding, and 41.5% of enterprises realize the layout of digital technology. In the subdivision dimension, cloud computing applications account for 34.5% and Internet of things applications account for 22.2%. It is not difficult to see that the realization of industrial transformation and upgrading and the improvement of production efficiency by industrial digitalization is increasingly becoming a new bright spot in the development of China's digital economy. In the overall development of the digital economy, artificial intelligence, as the core factor, relies on cutting-edge technology breakthroughs and multiple application scenarios to expand and reconstruct the underlying logic of the job market [8]. The introduction of AI underlying technology systems such as deep learning, natural language processing, and computer vision at the industrial end has created a rigid labor demand for new posts such as Algorithm Engineers, data taggers, and AI product managers, and formed a whole chain extension radiation effect relying on industrial linkage [8]. At the same time, AI will further accelerate the process of cross industry integration and innovation, "AI+medical" will build a smart diagnosis and treatment service system, and "AI+transportation" will foster a new ecology of intelligent travel; With the core capabilities of data intelligent decision-making,resource intelligent scheduling, and supply chain collaborative optimization, AI reshapes the traditional industrial organization mode, promotes the evolution of industrial clusters towards networking, collaboration, and ecology, and lays a solid foundation for the construction of a modern industrial system [9]. AI affects the employment structure in different fields and promotes industrial transformation [11]. In the process of urban-rural integration, AI has

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promoted the transformation from traditional manufacturing to digital manufacturing, vigorously promoted industrial upgrading and increased industrial added value. In e-commerce and digital platforms, AI provides a broader market for small and micro enterprises, making it easier for farmers to access information, education and resources, and helping small-scale manufacturing enterprises in rural areas to better participate in the global supply chain [11]. In the field of agriculture, artificial intelligence technology is widely used to develop agricultural mechanization, improve agricultural production efficiency and increase farmers' income [11].

3.2. The negative impact of AI on employment structure

3.2.1. Reduction and replacement of jobs

Some studies have pointed out that the continuous advancement of artificial intelligence technology will have a substitution impact on low skilled labor positions, and standardized work with high repeatability and regularity is prone to the risk of automatic elimination, with industries such as text writing, general translation, and traditional manual customer service bearing the brunt. In the field of text writing, intelligent editing and generative AI have been able to undertake basic work such as basic copywriting and conventional script writing, and the inner volume of the industry has squeezed the living space of traditional text practitioners; At the translation industry level, relying on the huge language database and algorithm model, intelligent translation can achieve efficient output, greatly reduce the labor demand for basic translation and interpretation, and make the grass-roots translators face employment pressure; In the customer service industry, the intelligent customer service system can realize all-weather continuous response, and the service response efficiency is higher than that of manual, which directly promotes the reduction of the demand for traditional manual customer service positions. Compared with the single substitution logic of past technological changes that only focused on manual labor, contemporary AI presents a new feature of two-way substitution of manual labor and conventional mental labor, which not only aggravates the unemployment risk of traditional blue collar groups in manufacturing industry, but also impacts the employment stability of a large number of conventional white-collar jobs [12]. At the same time, the construction of digital infrastructure such as digital network infrastructure, big data computing base, and artificial intelligence research and development system, as the core engine of enabling Chinese style modernization, while relying on the innovation of computing power to promote the increase of employment, it also synchronously eliminated some traditional occupations, and finally reshaped the overall employment structure from the two-way dimension of increase and decrease [13]. On the whole, AI is likely to lead to the decline of structural employment rate by squeezing traditional jobs and replacing employees in multi industry scenarios.

3.2.2. Skill polarization and employment inequality

The introduction of AI technology further exacerbates the employment polarization and structural inequality in the labor market. The rapid expansion of the artificial intelligence industry has spawned a new talent demand standard, which is in contradiction with the current traditional talent training system in Colleges and universities, causing deep-seated structural problems such as the mismatch of skills supply and demand in the job market and the imbalance of human capital matching, and continuously promoting the deepening of employment inequality [8]. At the same time, although the technological progress of artificial intelligence has brought about a huge increase in productivity, the negative impact of artificial intelligence is also a matter of concern. The negative

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impact of AI on the labor market, employment and income may lead to Matthew effect, that is, the strong are stronger and the weak are weaker. This polarization may lead to social unrest and even riots [14]. Industrial upgrading continues to raise the demand for high-end technical talents. Such jobs generally require practitioners to have both AI expertise and rich experience. Although the career development prospects are broad, the threshold is higher; In contrast, the low skilled labor force group is often difficult to adapt to the upgrading requirements of the intelligent industry due to insufficient technical reserves, resulting in distinct stratification: high skilled workers can rely on industry development to access cutting-edge technical capabilities, while ordinary workers at the bottom are difficult to access new intelligent skills, and even face the risk of unemployment, resulting in the widening employment gap and income distribution gap between groups. From the perspective of market distribution logic, AI has given birth to the effect of dual alienation and exploitation: on the one hand, the core cutting-edge technology is monopolized by a few industry elites, and the hierarchical repression expands and further widens the income gap between the rich and the poor, which is a common problem of previous technological changes; On the other hand, the anthropomorphic substitution of intelligent technology directly peels off part of the low adapted labor force from the labor demand system of the market, forming a new type of employment exclusion dilemma unique to the era of artificial intelligence [15].

4. Conclusion

Based on the existing literature on AI and employment, it is found that the academic community has formed rich research results around AI's employment substitution effect, creation effect and positive and negative impact on employment structure. Scholars generally believe that AI has a dual role in employment, which will not only impact on low - and medium skilled jobs, but also generate new jobs and promote the optimization and upgrading of employment results. However, there are still some deficiencies in the current research, which need to be further expanded.

The existing research mostly focuses on the macro level, and the discussion on the heterogeneous impact of different industries and groups is not enough. It focuses on the short-term attack and ignores the long-term change, and the research on the adaptability of the system and the practice of policy is insufficient.

Looking forward to the future, there is still room for further expansion of the research on artificial intelligence and employment. The subsequent research can combine the development of digital economy and the demand for new productivity construction, strengthen the heterogeneity perspective and medium and long-term dynamic analysis, further explore the employment transmission mechanism of AI in different scenarios, and strengthen the research on policy paths such as education reform and social security. At the same time, researchers should pay more attention to the employment equity and income distribution in the development of artificial intelligence, and provide more targeted theoretical reference and practical support for resolving the structural employment contradiction and the coordinated development of high-quality employment.

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