Study on the Harmonization of the Digital Economy and the Quality of Employment

Huiyan Zhang*, Xiaoyu Guo, Xiaoli Zhang
Harbin Finance University, Harbin, Heilongjiang, China
*Corresponding Author

Abstract: The impact of the digital economy on employment quality is twofold, and the rapid development of the digital economy brings opportunities as well as some challenges. In order to study the interactive coupling relationship between the digital economy and the quality of employment, the positive effects of the development of the digital economy in promoting the growth of total employment, the optimization of the technical structure of employment, and the improvement of the quality, as well as its differentiated effects and negative impacts on the employment of different groups, industries, and regions, are respectively elaborated from the theoretical point of view. It is found that the development of the digital economy may widen the income gap between different groups, may reduce economic efficiency, and may increase the imbalance of regional development, based on which, the digital economy should be vigorously developed, the optimization and upgrading of the employment structure should be continuously promoted, and workers should be guided to transfer to the digital economy in an orderly manner, and the cultivation of digital talents should be innovated, the digital skills of workers should be improved, and the construction of digital infrastructure should be accelerated, so as to narrow the regional, industry differences in employment in the digital economy.

Keywords: Digital Economy; Quality of Employment; Structure of Employment; Digital Infrastructure Development

1. Introduction

In the current stage, the digital economy has been developed rapidly, and the application of digital technology has penetrated into various industries, which to a large extent shows the innovation of system, industrial model and information technology, and at the same time, its impact on the quality of employment is also a matter of concern for many people.

The digital economy has had a far-reaching impact on the reform of the employment market, leading to a great change in the employment carrier, the employment pattern and the employment skill requirements, and it not only has a great employment creation effect, but also faces a great employment substitution effect, and there is a deep internal mechanism behind this phenomenon, which has had a great impact on different periods, different regions and different groups.

The development of the digital economy will promote the quality of employment for the rural migrant population; the digital economy has an obvious positive impact on the wage income, social security, unit benefits and the signing of labor contracts of rural migrant workers, but it has a negative impact on the number of years of working experience of rural migrant workers in the local area and the expected stability of their careers; the digital economy "promotes employment" effect is more significant for women, high-skilled talents and laborers across counties and cities. The digital economy's "employment promotion" effect is more significant for women, highly skilled people and cross-county and city laborers [1].

Since the internet economy has grown, more and more job opportunities are being utilized to meet the needs of college students. The proportion, satisfaction and expectation of university graduates employed in industries and fields related to the digital economy are rising every year, which constitutes a benign and mutually reinforcing situation with the development of the digital economy. [2]

The development of digital economy can promote the improvement of the quality of

employment of workers, thus improving the stability of employment, the level of employment income and the level of protection of rights and interests of workers; secondly, it realizes a double effect on the development of digital economy by increasing the employment rate of the society and reducing the cost of searching for information, thus improving the level of employment [3].

Regarding the total employment scale, the growth of the digital economy has led to a notable increase in the workforce's participation rate. This suggests that the digital economy has a more substantial impact on the creation of jobs than on the demise of jobs, and that it may also have some promotion effect on the overall employment participation rate; the impact of the digital economy on employment has a territorial nature, and it has a significant impact on the total employment participation of the workforce in the eastern region, on the optimization of the employment structure, and on the improvement of the quality of employment. However, it has a weaker impact on the central and western regions where the digital economy infrastructure is weak and talent is relatively scarce, and low-income groups benefit less from the development of the digital economy than high-income groups.

The digital economy has led to a significant improvement in the quality of employment. In the meanwhile, industrial upgrading plays an important moderating role in the development of digital economy and the improvement of employment quality, that is to say, digital economy can improve the quality of employment by way of industrial upgrading [4].

In terms of industry employment structure, the digital economy accelerates the transformation of China's labor force from agriculture and industry to service industry; in terms of occupational skill structure, the digital economy will cause unidirectionality or bipolarity of occupational skills; in terms of employment quality, the digital economy will have an impact on the wage income, the income gap, and to a certain extent positively affects the degree of matching between the labor force and the jobs [5].

In order to realize fuller and higher-quality employment under the conditions of digital economy and solve the current employment conflicts quickly and effectively, this paper, through literature research method, qualitative analysis method and descriptive analysis method, discusses in depth the law of coordinated development of digital economy and employment quality, and finds that it should be achieved by strengthening the cultivation of digital talents, improving the digital skills of the workers, building digital infrastructure at a faster pace, and promoting the digital economy services to achieve stable employment and employment quality improvement. This will provide new ideas for the solid promotion of common wealth; it will also offer fresh concepts for the cultivation of the new power of China's economic development, which is of great theoretical and practical significance for the promotion of China's economic and social development of high quality.

2. Positive Effects of the Development of the Digital Economy on Employment

2.1 Creating New Types of Occupations and New Jobs and Promoting Total Employment Growth

In social and economic reality, employment in sectors related to digital industries is growing: new forms of employment are emerging as a result of the new digital economy, and a variety of flexible forms of employment are becoming more common. Digital technologies are continuously transforming traditional industries, and the use of digital technologies is becoming more widespread. This has led to two consequences: first, the number of people working in industries related to the digital economy has been increasing and their share of total employment has been growing. Secondly, employment patterns have become more diversified. As the digital economy grows, new occupations and jobs are constantly emerging, diversifying the employment and occupational patterns of society.

Referring to the Statistical Classification of the Digital Economy and its Core Industries (2021), the 56 new occupations added to HR in 2019-2021 are categorized and matched, and more than 30 new occupations directly related to the digital economy are found. Most of the newly added occupations are related to digital industrialization, such as artificial

intelligence engineers, industrial internet engineers, and information security testers. Emerging industries in digitalization include management, maintenance and operation related to the application of digital technology products, such as drone pilots, digital managers, etc.; there are also new occupations created under the conditions of combining the virtual and the real, such as online learning service providers and online marketers. The new occupations created by the development of the digital economy will absorb a large number of social employment groups, ranging from highly qualified and educated high-end laborers to middle- and low-end laborers transferred from rural areas, thus promoting the improvement of the employment status quo of the whole society. [6].

2.2 Raise the Need for Highly Qualified Workers and Optimize the Technical Structure of Employment

In theory, technological progress can significantly affect the structure of an industry, and changes in the structure of an industry are closely related to changes in the structure of employment. The labor conditions required by an industry must be in line with the characteristics of that industry. As the most emerging and cutting-edge industrial form, the digital economy is the application of digital technology, and it generally has higher requirements for employees. The development of the digital economy and its related industries specifically encompasses both the development of the digital industry itself and the digital transformation of traditional industries, both of which place higher demands on the quality and skills of those employed in the national economy, thus prompting workers to pay more attention to their own level of education and the cultivation of their labor skills, thus bringing hope for the improvement of the overall employment structure in terms of advancement.

The industrialization of digital technologies has a strong innovative and advanced basis of its own. The labour force required by digital industries based on the industrialization of digital technologies, such as software development, high-precision hardware manufacturing, big data, artificial intelligence, cloud computing, self-driving cars, etc., must be well-educated high-end practitioners who have mastered professional skills related to digital technologies. During the rapid development of the digital industry from scratch and from small to large, a large number of the working population has gradually turned into specialists who are very familiar with and proficient in digital technology, and because of their scarcity, they are getting higher and higher salaries in the market. According to national statistics, the average salary of workers in the IT industry and other industries related to digital technology is always the first in the national economy. This makes more and more high-level talents pouring into the related industries, and also makes the middle and high-level education as well as vocational education related to digital science and technology develop rapidly, and the major universities in China have opened the disciplines of Digital Economy, Information Technology, Artificial Intelligence, and Big Data one after another.

2.3 Diversification and Flexibility in Employment and Intergenerational Employment Mobility

The role of the digital economy in promoting the diversification and flexibility of employment patterns is mainly reflected in its impact on entrepreneurship, innovative behaviors, and self-employment and flexible employment. Knowledge, data and information are the most important constituent elements of the digital economy, and they can enhance the relevance of economic activities between regions, weaken the spatial and temporal constraints of economic activities, and produce obvious spatial spillover effects in promoting the dissemination of technology, improving the mismatch of resources, and promoting the digitalization of industries. This will enable the future employed population to better cross geographical and industrial boundaries and better participate in entrepreneurial innovation activities, thus improving the innovation efficiency of enterprises. The digital economy has greatly optimized the pre-entrepreneurial business environment from the perspectives of market information transparency, start-up capital raising, matching efficiency between supply and demand, and total factor productivity

enhancement. At the same time, due to the unique social interaction characteristics of the digital economy, it can produce a strong demonstration effect, while its platform characteristics can effectively promote successful cases and stimulate entrepreneurial enthusiasm in related fields.

In the context of the digital economy, diversified and flexible employment models can help to promote intergenerational occupational mobility and improve the quality of employment and well-being of employees. Occupational mobility between different groups is affected by a variety of personal characteristics such as gender, education, family, environment, location, capital, status, ethnicity, endowment, etc., but education is the main factor affecting intergenerational occupational mobility. The digital economy facilitates intergenerational occupational mobility by promoting education [7]. The development of the digital economy has brought obvious advantages to the education industry, with platformization and digitization promoting the popularity of online education, and the development of information and communication technology (ICT) leading to a significant reduction in the production cost of online education and diversification of educational forms. In areas where development has started late, children and youth can use the Internet to access cutting-edge educational resources, thereby accumulating workforce skills or updating their personal perceptions, and laying a good foundation for future education and employment.

3. Differential Effects of Employment in the Digital Economy and Its Negative Impact

3.1 Differential Effects on the Employment of Different Groups May Widen the Income Gap

The development of the digital industry and the scaled-up application of digital technologies are having an impact on a number of occupations and jobs, while at the same time generating new occupations and job opportunities. As a result, there are bound to be different impacts on different groups of employed people, thus causing changes in employment demand. Digital technology has a complementary effect on highly skilled workers, but a strong substitution effect on low-skilled workers. Some jobs that are simple, repetitive and have a relatively clear pattern can be replaced by machines, and many services that are applicable to the web and networks can be replaced by a "winner-takes-all" approach.

Studies have concluded that the new generation of artificial intelligence technology may lead to structural unemployment among middle- and low-end skilled laborers. Therefore, in the process of the development of digital economy, the proportion of high-tech and high-skill employment will increase, while the demand for low-skill labor will decrease due to capital substitution and digital applications. This leads to two tendencies: first, the share of capital profitability rises while the share of labor income falls. While AI can increase labor productivity and promote economic development, its substitution effects will cause labor's share of economic value added to decline. Second, higher-skilled workers earn more and lower-skilled workers earn less. The digital economy has boosted the demand for high-skilled workers and raised the skill premium, further widening the income gap between high-skilled and low-skilled workers. Both tendencies are detrimental to our goal of achieving common prosperity [8].

3.2 Differential Effects on Employment in Different Industries May Reduce Economic Efficiency

In the development of China's digital economy, the four aspects of digital industrialization, industrial digitization, digital governance and data valorization, industrial digitization and its employment-expanding effect take the absolute lead. The Research Report on Employment Development in China's Digital Economy: New Forms, New Modes, New Trends (2021) released by the China Academy of Information and Communication Research shows that in 2020, the scale of industrial digitization in China has reached 31.7 trillion, accounting for 80.9% of the digital economy. In terms of industrial digitization, it is mainly reflected in the fact that employment in the service sector has grown considerably, while the employment demand in agriculture and manufacturing has shown a downward trend, which is consistent

with the trend of the evolution of industrial structure. The manufacturing sector is the first to bear the brunt of this digitalization wave, and under the combined effect of robotics and artificial intelligence, the automotive manufacturing industry, the chemical industry, the metallurgical industry, the electronics industry, and the food and beverage industry, all of which are absorbing jobs, have experienced a significant contraction.

In China, the development of the digital economy is particularly prominent in the tertiary industry, leading to a rapid increase in employment in the tertiary industry, while the growth rate of employment in the primary and secondary industries continues to decline. In particular, the decline in employment in the secondary industry has a great deal to do with the unbalanced development of China's digital economy. In the secondary industry, on the one hand, the development of the digital economy, such as artificial intelligence and industrial robots, has replaced a large number of traditional jobs; on the other hand, there is a serious shortage of high-end talents and practical experience required for the digital transformation of the manufacturing industry, which restricts its transformation and upgrading. Between the secondary and tertiary industries, the imbalance in the development of the digital economy and related employment has not only hindered the digitalization of the overall economy, but also brought about a series of problems for employment.

3.3 Differential Effects on Employment in Different Regions May Increase Regional Development Imbalances

Because of the different resource endowments as well as the different stages of development in various regions, both the level of development of the digital economy and the quality of economic development have shown significant differential characteristics in regional distribution, and therefore, its impact on employment has also shown significant regional differences. The eastern part of China has a major edge over the central and western parts, regardless of the level of economic development or the digital economy. According to the White Paper on the Development of China's Digital Economy (2021) released by the China Academy of Information and Communications Research, by 2020, the digital economy is expected to reach over 1 trillion yuan in 13 provinces and cities, like as Jiangsu, Shandong, and Guangdong. The share of digital revenue in the GDP of Beijing and Shanghai has surpassed 50%. In terms of employment, Guangdong's digital economy jobs accounted for 25.7 % of the country's total; followed by Beijing with 17.8 % of the total investment; and Shanghai ranked third with 12.3 %. From this, we can see that there are significant regional differences in the demand for jobs in China with reference to the digital economy. Among the practitioners related to the digital economy, the demand for highly skilled personnel in digital technology also shows regional differences, in which the proportion of highly skilled personnel in technology among the practitioners in the digital economy in the three regions of Guangdong, Hong Kong and Macao, the Yangtze River Delta, and Beijing-Tianjin-Hebei is 46.2%, 45.0% and 48.0%, respectively, which is much higher than that in other regions.

At the same time, the employment imbalance that emerges in different regions in the context of the digital economy will further widen the development gap between regions. In China's unbalanced market-oriented transition process, the differences in resource endowment between regions have led to more resources being tilted toward the southeast coastal region with location advantages, which has both exacerbated the imbalance in economic development between regions and caused a certain impact on the agglomeration of mobile populations between regions.

4. Strategies and Paths to Promote the Higher-Quality Development of Employment in the Digital Economy

4.1 Promote the Development and Growth of Digital Industries and Expand New Space for Total Employment Growth

In the age of the internet economy, the advantages of the cutting-edge digital technologies of big data and artificial intelligence have continued to converge and develop with various fields, facilitating the expansion of the market scale and the enhancement of entrepreneurial activity, which in turn has played a positive role in

broadening employment channels and promoting the growth of the number of jobs. Therefore, it is necessary to seize this development opportunity to accelerate the development of the manufacturing of digital products such as electronic equipment manufacturing, industrial machine manufacturing, and artificial intelligence equipment manufacturing, such as computers, industrial robotic arms and brain-computer interaction hardware. Efforts should be stepped up to develop the digital product service industry, such as sales, leasing, maintenance and consulting of digital products, and to strengthen the role of remote after-sales service and online financial services and other jobs in absorbing employment in China. Accelerate the development of digital technology application industries such as multi-disciplinary software development and information technology services, and give full play to the positive impact of digital products such as cloud computing, big data platforms and virtual reality on the marginal growth of employment. Accelerate the development of industries driven by digital elements, such as industrial Internet platforms and Internet finance, so that the digital economy can play a greater role in general.

4.2 Promote the Digital Transformation of Traditional Industries, Leading to the Development of the Employment Structure towards Advanced Level

Today, industrial digitization has become a major driving force in expanding employment, as well as an important entry point for improving the employment structure. Industrial digitization emphasizes the combination of the digital economy and the real economy, taking data as a key production factor and digital technology as the basis for transformation, providing new kinetic energy for the development of China's new ecosystems, new business forms and new jobs. It is necessary to pay attention to the fundamentals of the digital development of industries, accelerate the construction of information and communications and other related infrastructure, promote the circulation of information, data and technology and other factors, and accelerate the effective transmission of information between the government and enterprises, between enterprises and enterprises, and between enterprises and individuals. On the one hand, the construction of information infrastructure can directly drive the growth of labor demand, and after the construction is completed, the inevitable demand for its long-term monitoring, testing, maintenance and management can also create new jobs. On the other hand, in the process of constructing facilities with relatively more significant support and stronger relevance to industrial digitization, it can provide a good learning platform for participants, cultivate talents needed for industrial development and enterprise transformation, and continue to improve the employment structure of related industries and the level of human capital in a subtle way.

At the same time, it should also combine the digital economy with the real economy, push forward in breadth and depth, and continue to explore new combinations to promote the transfer and employment of employees through the development of the entire industrial chain. For example, the Internet of Things is a representative product of digitization and networking, and it has made outstanding contributions to the employment of China's rural labor force in the new era. It provides assistance to the entrepreneurial employment of rural laborers in many aspects, such as logistics management, scientific production, direct marketing of products, and cultural promotion, thus triggering a boom in returning to their hometowns for employment.

4.3 Innovative Digital Talent Cultivation to Enhance Digital Skills of Low-Skilled Labor Force

In the context of the digital economy, the imbalance between the supply and demand of human resources is an important issue currently facing the development of talent in China's digital economy. Coastal cities are developing much faster than the interior, and this significant population polarization will inevitably lead to an imbalance in the talent structure of the digital economy. At the same time, the development of the digital economy also puts forward higher requirements for the education level of workers. At present, there is a big gap between the training of talents for the digital economy in China, and the labor

force required by the digital economy. At the same time, the public services for employment in the digital economy are yet to be further improved, and there are problems such as ambiguity in the labor relations under the new employment pattern. In colleges and universities, it is necessary to increase the research and development of the digital economy so that it can meet the development needs of China. In terms of employment training, private funds should be encouraged to actively participate in employment training, such as artificial intelligence, big data, blockchain and so on. It is necessary to ensure a balanced combination of general and vocational education, which should be oriented to the needs of the market and economic development, and aimed at the cultivation of talents.

4.4 Accelerate the Construction of Digital Infrastructure and Reduce the Employment Differences in the Digital Economy between Regions and Industries

The employment gap in digital economy regions is caused by uneven digital infrastructure and talent aggregation. To close the gap with the eastern area, it is therefore imperative to increase investment in digital economy infrastructure in the central and western regions. At the same time, in the central and western regions, we should actively formulate a digital talent strategy, promote the implementation of the "Internet + Digital Skills Training Program", and regularly assess and dynamically monitor the quality of employment, so as to identify the root causes of the problem in the provinces where the quality of employment is relatively low and make timely adjustments, thus further narrowing the gap in employment quality between different regions and employment quality gaps between different regions.

The imbalance in the development of industries has resulted in the employment gap between different industries. Therefore, we should be fully aware of the existence of certain spatial correlation and spillover effects in the development of the digital economy. We should make a reasonable distribution of digital factors, not only supporting those industries with a more mature level of development, but also paying attention to giving full play to the radiating effect of these industries on the related industries, and extending and enlarging the products and services of the digital industry, so as to promote synergistic development among various industries. Focused attention should be paid to industries with a relatively weak foundation for transformation and development potential, and tilted in terms of infrastructure and supporting policies and other factor resources, to help them establish an industry development model that is compatible with their own characteristics. At the same time, it is important to note the role of the labor force as a "reservoir", and to focus on industries with comparative advantages among the weaker industries, with a view to attracting talent.

4.5 Strengthening Digital Employment Services and Leading Digital Conceptualization

Numerous new job opportunities, including self-employment and flexible work schedules, have emerged in the digital economy to meet the labor and talent demands of the growing industry. Therefore, it is necessary to create a stable institutional foundation for these forms of employment in terms of laws and regulations, institutional construction, and market systems, so that the legitimate rights and interests of the relevant workers can be protected by the system, such as the minimum wage system, the labor contract system, labor legislation and law enforcement, industrial trade unions and industry associations, etc. [9]. Different occupations, different ages, different genders, different stages of development, different occupations, different ages, different genders, different stages of development, have different employment demands and different employment dilemmas. For example, because of the rapid development of the Internet economy, some people are turning to new forms of employment such as self-media, live broadcasting or independent R&D promotion. However, this type of employment is characterized by a great deal of instability and scarcity of resources, and as a result, most of the employed people have relatively weak bargaining power in the market. Therefore, when formulating relevant support policies, they should combine universality with specificity, giving reasonable guidance to new forms of employment and protecting the

legitimate rights and interests of workers, while also guiding the updating of social attitudes and responding to new types of demands.

5. Conclusions

China's labor market has seen a variety of effects from the growth of the digital economy. These include positive effects on the country's overall employment volume, structural optimization, and quality improvement, as well as negative and uneven effects on the employment of various industries, groups, and geographical areas. For this reason, we must take positive measures to solve the problem and promote the higher-quality development of employment in the digital economy: on the one hand, to further expand the positive effects of the digital economy in promoting the growth of total employment, structural optimization and quality improvement by promoting the development and expansion of digital industries, promoting the digital transformation of traditional industries, and stimulating the vitality of innovation and entrepreneurship in the digital economy. On the other hand, it is necessary to further reduce group, industry and geographical differences in the digital economy and the negative impact they bring by cultivating digital talents, accelerating the construction of digital infrastructure and strengthening digital employment services.

References
[1] Peng, L.N., Xu, J.P., Jiang, Z.D., & Yan, Z.Y. (2023). Impact of digital economy on employment quality of rural migrants. Population and Development (04), 31-46.
[2] Liu, H.B. & Chang Q. (2023). Current Situation, Trends and Challenges of Full and High Quality Employment of College Graduates Empowered by Digital Economy: A Survey Based on 40,000 College Students. China College Student Employment (06), 10-17.
[3] Tian, Y.P. & Xiang, X.F. (2023). Digital economy development and labor employment quality improvement. Northwest Population (03), 65-79.
[4] Song, X.X. (2023). Digital economy, industrial upgrading and employment quality. Science and Industry (07), 111-116.
[5] Wang, C.C. & Nie, Y.F. (2023). Progress of research on the impact of digital economy on employment. Economics Dynamics (04), 134-149.
[6] Hu, Y.P. & Zhang, X.H. (2023). Analysis of the current situation of new employment patterns in China under the background of digital economy and suggestions for their development. Science and Industry (09), 30-35.
[7] Sun, F. & Gao, H. (2023). Institutional choices of flexible employment development driven by technological progress. Administrative Reform (06), 13-21.
[8] Wang, Y.S. & Zhang, Y.F. (2022). The double employment effect of digital economy and the development of higher quality employment. New Horizons (03), 43-50.
[9] Liu, Y.J. (2023). Exploring the impact of digital economy on the development of urban social security. Industrial Innovation Research (12), 70-72.